World Cancer Research Fund

American Institute for Cancer Research

Policy and Action for Cancer Prevention

Food, Nutrition, and Physical Activity: a Global Perspective

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Policy and Action for Cancer Prevention

Food, Nutrition, and Physical Activity: a Global Perspective

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Preface

The food system is remarkable; it strains credibility. Most of the nearly seven billion people in the world eat on most days. Given that most of the world's population now live in cities and do not grow their own food, imagine how much food has to move around every day. In megacities such as London or Mexico City, without a minister of food, supply and demand match up more or less. Quite phenomenal!

Within the context of this phenomenon of approaching seven billion people having access to food on a near-daily basis, there are pressing needs for change. Food not only meets basic needs, it can also influence health in dramatic ways, and the supply and demand mechanism has not got it right. The rising prices of food may cause inconvenience to people in rich countries, but death to people in poor countries. While some of the world's population, particularly in low-income countries, have too little food, often of poor nutritional quality, increasingly people in middle- and high-income countries have too much and, often, of nutritional quality that increases the risk of a range of non-communicable diseases including cancer. This is compounded by the increasingly sedentary nature of many people's lives around the world.

The evidence for the last two statements — the influence of diet and activity levels on cancer — was brought together in the 2007 publication *Food, Nutrition, Physical Activity, and the Prevention of Cancer*. This was the work of an international panel of scientists working with a set of commissioned systematic literature reviews to produce conclusions of what the science showed on the relation of food, nutrition, and physical activity to cancer. These conclusions were translated into quantitative recommendations for individuals and populations.

The recommendations themselves were rather straightforward: stay lean throughout adult life, limit foods and drinks that promote weight gain, be physically active, limit red meat consumption, avoid processed meat, eat non-starchy vegetables and fruit, limit alcohol consumption, limit salt intake, and breastfeed children.

Straightforward they may have been but, if acted on, these recommendations could make a dramatic difference to cancer globally. In 2007 there were about 11 million cases of cancer in the world, and nearly eight million deaths. This could be reduced by about a quarter to a third by dietary change including reduction in overweight and obesity together with regular physical activity. Dealing with the tobacco epidemic would be the single biggest contribution to reducing the global burden of cancer but implementing recommendations on diet and physical activity can play a vital role. What is more, both of these changes — diet and smoking — will also have positive impacts on non-communicable diseases other than cancer.

Ample experience suggests that simply conveying information on risks and benefits has limited impact on food and activity choices. People's knowledge of diet and health is but one of many influences on matching seven billion people's demands to the supply of food. The market is key but so are subsidies and other economic instruments, monopoly suppliers influencing demand, prices, international agreements, local supplies, catering arrangements, and the weather, quite apart from traditions, culture, and individual preferences. These combine to determine what is available for consumption and what people eat.

The World Health Organization Commission on Social Determinants of Health, which I chaired, borrowed the simple phrase of the epidemiologist Geoffrey Rose "the causes of the causes". Diet and physical activity may be causes of health and disease but we must address "the causes of the causes" — the topic of this report. (See box 1.3)

The Panel that was convened to address the causes of the causes consisted largely of the Panel that produced the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report enriched with the expertise of a few other distinguished scientists. We tried to bring the same rigour to the policy task that we brought

to the task of assessing the exposure–disease associations that underpinned the 2007 WCRF/AICR Diet and Cancer Report. But the nature of the evidence was different. It was quite possible when assessing the relationship between meat or physical activity and colon cancer, for example, to specify in advance the nature of the criteria that would lead to a judgement on the strength of association. With the evidence on the drivers of dietary change, particularly when those drivers act in the social and economic sphere, similar precise criteria were not applicable. We commissioned systematic literature reviews to underpin policy recommendations but the judgement and experience of the Panel were perhaps even more important parts of the process than with the 2007 WCRF/AICR Diet and Cancer Report.

Publication of the 2007 WCRF/AICR Diet and Cancer Report attracted some misplaced criticism about the perceived overprotective and controlling nature of government, in the UK referred to as the 'nanny state'. I say that the criticism was misplaced because the 2007 WCRF/AICR Diet and Cancer Report said nothing about what policies should flow from our recommendations. It simply drew scientific conclusions, made recommendations as to how diet and physical activity should change to reduce the burden of cancer, but said nothing about how such changes may be brought about. I would have thought that conveying information so that people could make up their own minds is the opposite of 'controlling' or 'nannying'.

Nor should the present report be seen as nannying. To see this, consider an analogy. We know that water contaminated with microorganisms causes disease. We do not think that public health is best served by simply conveying that information and leaving it to people to demand, and the market to supply, clean water. If the right to the highest attainable standard of health has meaning, people can expect their government to provide a water supply that is uncontaminated or, at the very least, ensure that it is supplied. If people choose, and can afford, to drink bottled water rather than use the safe municipal supply, that individual choice is theirs. But it does not absolve the state from the obligation to ensure the provision of a safe supply of water. Experience from around the world tells us what happens when the supply of water is left to an unregulated market: gross inequities in the supply of water and a high toll of water-borne diseases.

Food and activity may be thought to be more in the realm of individual choices of ways of life than clean water, which is clearly in the public health tradition — particularly since the 19th century. But such sharp distinction is not appropriate. People's choices of how they live are influenced by the circumstances in which they find themselves. It is precisely one aspect of those circumstances — the determinants of food consumption, physical activity, and body fatness — that forms the substance of this Report. Taking action on those circumstances is no more 'nannying' than is finding that you live in a neighbourhood where 'fast food' is abundantly available cheaply, but not fresh fruit, or opportunities to be physically active.

There is clear responsibility of various actors to make it possible for people, exercising free choice, to have healthy patterns of diet and activity. This report lays out who those actors are and what the evidence shows they could do to bring about the possibility of healthy choices about diet and physical activity.

I am very grateful, as with the Panel for the 2007 WCRF/AICR Diet and Cancer Report, to the distinguished scientists who made up this Panel and to the Secretariat who made this project a reality. The excellence of the Panel and Secretariat, the capacity for hard work of all concerned, the commitment to the cause of improving global health, and the sheer pleasure of working together made this a special experience.

Michael Marmot

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Introduction

Cancer is a largely preventable disease. The question then arises of how best to achieve this. The current Report, which builds on the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) report *'Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective'*, provides answers to that question.

The recommendations in the 2007 Report were based on systematic reviews of the literature relating food consumption, nutrition including body fatness, and physical activity to cancer risk (see box 1), and are therefore based on the best evidence available. In more affluent societies, or groups within societies, people can choose to follow the personal recommendations. However, in less affluent societies or populations, people's ability to choose healthy ways of life is constrained, for instance by food supply or economic factors. Even for affluent groups, simply knowing what are healthy ways of life may not lead to these being adopted. The way people live their lives, and in particular their patterns of diet and physical activity, are powerfully influenced by external factors. The improvement and protection of public health does not happen by accident — it requires policies and actions, and that all relevant sectors of society, from legislators to citizens, play their part.

Box 1 **General recommendations of the 2007 WCRF/AICR Diet and Cancer Report**

BODY FATNESS
Be as lean as possible within the normal range of body weight

PHYSICAL ACTIVITY
Be physically active as part of everyday life

FOODS AND DRINKS THAT PROMOTE WEIGHT GAIN
Limit consumption of energy-dense foods
Avoid sugary drinks

PLANT FOODS
Eat mostly foods of plant origin

ANIMAL FOODS
Limit intake of red meat and avoid processed meat

ALCOHOLIC DRINKS
Limit alcoholic drinks

PRESERVATION, PROCESSING, PREPARATION
Limit consumption of salt
Avoid mouldy cereals (grains) or pulses (legumes)

DIETARY SUPPLEMENTS
Aim to meet nutritional needs through diet alone

BREASTFEEDING
Mothers to breastfeed; children to be breastfed

CANCER SURVIVORS
Follow the recommendations for cancer prevention

This box shows the general recommendations of the 2007 WCRF/AICR Diet and Cancer Report. These introduce a series of specific population goals as shown in chapter 2.7 of this Report and personal recommendations.

The preventability of cancer

After smoking, unhealthy diets, physical inactivity, excess body weight, and associated factors are the next most important preventable causes of cancer. For people who do not smoke, they are the most important. Together these are estimated to account for over half of all cancers around the world. In addition, as shown in the 2007 WCRF/AICR Diet and Cancer Report, ways of life that reduce cancer risk also reduce the risk of cardiovascular disease, obesity, diabetes and other chronic diseases.

New estimates commissioned for this Report, summarised in chapter 2 and appendix A, confirm that both in high-income countries such as the USA and the UK and in lower-income counties such as Brazil and China, healthy patterns of diet and physical activity as set out in the 2007 WCRF/AICR Report could prevent a substantial proportion of all cases of cancer.

The nature of the evidence

The 2007 WCRF/AICR Diet and Cancer Report provides authoritative evidence that food, nutrition, and physical activity directly affect cancer risk. This Report addresses the underlying and basic causes that determine these dietary and activity patterns, in four broad dimensions: the physical environment, and economic, social, and personal factors. As in the 2007 WCRF/AICR Diet and Cancer Report, its recommendations are based on the best evidence available.

Two systematic reviews of published literature were undertaken and peer reviewed. In order to ensure that the information was as up to date as possible, and recognising

that some salient evidence would escape this process, the reviews were reinforced by other literature known to members of the Panel and reviewers. This Report also recognises that globally significant factors such as economic globalisation and climate change will likely have an enormous impact on food systems, yet there is little direct evidence on its precise nature. These and other potentially important factors that have been relatively poorly explored in relation to food, nutrition, and physical activity have also been considered.

The public health approach

Although well-informed choices can be valuable in influencing personal risks of cancer and other diseases, such an approach has limitations as a means of reducing the population burden of disease. Many factors such as levels of air pollution, the availability of different foods, and the accessibility of environments for active ways of life are outside people's direct personal control. The environmental, economic, and social pressures summarised in this Report that, for example, make food supplies more processed and often higher in sugars, refined starches, and fat, and that make people more sedentary and thus increase overweight and obesity, need to be addressed in the public interest. This implies policies and actions at global, national, and local levels, on the scale of those that improved public health beginning in Europe in the mid-19th century.

Public health is a public good. Its protection needs to be seen as a prime responsibility not just of people themselves and of government, but also of other relevant actors — policy-makers and decision-takers — in civil society, industry, the health and other professions, and elsewhere. Such actors need to recognise that their decisions influence public health and to act with that as one key consideration. Established public health successes are guides to how to prevent cancer. The common feature of initiatives that have improved air and water quality and traffic safety, reduced smoking and alcohol consumption, and increased breastfeeding, is concerted action.

The need for regulation

Market economies are not designed to protect public health, and cannot be relied on to do so. Existing regulations may have unintended adverse effects on health, and regulation needs to be used in the interests of public health.

For example, physical activity needs to be built into everyday life.This requires that regulation leads both to the redesign of cities and transportation systems to make walking and cycling safe and pleasant, and to the revival and encouragement of physical education and active recreation and sport in schools.

Furthermore, voluntary agreements are often unreliable. Advertising and marketing processed foods high in sugar, refined starches, fat or salt, and sugary drinks to children and young people tends to increase consumption of such products. Voluntary approaches to limit this have been ineffective. Where voluntary agreements fail, regulation is needed, especially to protect the health of vulnerable groups.

Structure of this Report

This Report is divided into three parts:

Part 1 is the background to the Report. Chapter 1 outlines the physical environmental, economic, and social determinants of health and disease, including cancer. These basic and underlying causes operate at global, national, and local levels, and affect the accessibility, affordability, and acceptability of foods, drinks, and physical activity. These in turn affect what foods they purchase and consume, and their decisions regarding physical activity, and so also their risk of cancer and other diseases.

Chapter 2, 'The case for action', shows that as the size and average age of populations increase, the numbers of cases of cancer also increase and are projected to increase further. Patterns of cancer are also changing, sometimes remarkably rapidly, in response to external changes such as industrialisation, urbanisation, and consequent shifts in ways of life. While conventional medical approaches to cancer will remain essential, their cost and availability, as well as the limits to their efficacy, make them an unsustainable means of controlling the burden of cancer. Prevention needs to be a major platform of public policy.

Part 2 of the Report, 'Evidence and evaluation', consists of four chapters that summarise the evidence on the physical environmental (chapter 3), economic (chapter 4), social (chapter 5), and personal (chapter 6) determinants of patterns of diet, physical activity, body composition, and associated factors. Based on evaluations of this evidence, these chapters then identify the most promising policy and action options.

Part 3 comprises the final two chapters of the Report. Chapter 7 sets out the principles that guide the Report's recommendations, and chapter 8, based on the groundwork set out in chapters 3 to 6, then specifies the Panel's recommendations for policies and actions most likely to help prevent cancer.

Policy and action priorities

Chapter 8 contains 48 recommendations, all of which are important, addressed to nine groups of actors. Some are more ambitious than others, some can bring quick benefits, while others are likely to be effective in the longer term. Special attention needs to be given to those recommendations that are especially relevant to vulnerable groups, in particular children and young people. Public health concerns everybody, but it is a fundamental responsibility for those concerned with public health to protect the health of future generations.

The purpose of this Report

The overall purpose of this Report is to help prevent cancer by recommending rational policies and effective actions at all levels, involving all actors, to achieve the public health goals in the 2007 WCRF/AICR Diet and Cancer Report.

Cancer is largely preventable. Much still needs to be learned, but enough is known about how this can be done. This Report is a call and spur to action.







Part 1

1

Background and need for action

Introduction to Part 1

Both new cases of and deaths from cancer are projected to increase if only because the world population is growing and ageing. At the time of publication, roughly 11 million people worldwide are diagnosed with cancer and nearly eight million people die from cancer each year.

However, cancer is mostly preventable. If nobody smoked or was exposed to tobacco, about one third of all cases of cancer would not occur. New analyses undertaken for this Report show that following healthy patterns of diet and physical activity as set out in the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report has the potential to prevent a similar amount.

This Report shows how cancer can most effectively be prevented. The 2007 WCRF/AICR Diet and Cancer Report includes public health goals as well as recommendations for personal choices. This Report is concerned with the environmental, economic, and social as well as personal forces that drive patterns of diet, physical activity, and body composition, and thus affect the risk of cancer. These, therefore, are targets for action to achieve the public health goals.

The wide and diverse evidence underpinning this Report is the best available, and in many cases is sufficient to act as a basis for policies and actions. Public health is everybody's concern. Policy-makers and decision-takers in government, civil society, industry and the media, and employers and other actors, share responsibility for taking action, as do people as consumers and citizens. Cancer will most effectively be prevented by all these and other actors working together.

Chapter 2 shows that the prevention of cancer is now one of the most important, achievable, and potentially rewarding global public health challenges. Cancer and its prevention is not only a personal issue. The costs of treating cancer place an intolerable burden on the economies and human and other resources of even high-income countries. Furthermore, the actions that will prevent cancer will also prevent other chronic diseases.

The comprehensive public health goals for the prevention of cancer by appropriate and healthy food, nutrition, and physical activity specified in the 2007 WCRF/AICR Diet and Cancer Report need to be turned into policies and actions at all levels, from global and national to municipal and local. The first step is acceptance that, in common with many diseases, rates of cancer can be seen to be affected as much by environmental, economic, and social factors as by biological — including nutritional — factors.

Since the early 20th century, the main approaches to cancer have included research into its biological causes; prevention by public information and education programmes; control by surveillance, screening and early detection; medical and surgical treatment; and palliative care. Treatment of some cancers is now remarkably successful, and 5-year survival rates after diagnosis of some common cancers have greatly improved in countries and regions with adequate resources.

These approaches are necessary, but not sufficient. Worldwide, the burden of cancer is projected to increase, as are obesity and basically sedentary ways of life, and, in many countries, smoking. These trends are shaped by external forces that have become even more powerful since the 1980s.

This means that the need for action is increasingly urgent as well as important. Strategic policies on food, nutrition, and physical activity need to be agreed by the actors identified in this Report: teams in multinational bodies, government, civil society organisations, industry, the media, schools, workplaces and institutions, and the health and other professions, all working together and supported by a well-informed public. Policies, programmes, and actions to prevent cancer then need to be monitored and evaluated.

The prevention of cancer in this 21st century begins with awareness of the key factors that protect against cancer and those that are causes of cancer. Enough is known to take action. The next step is to act.

CHAPTER 1

The basis for policy

This Report builds on the associated 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report. Its purpose is to identify policies and actions that are most likely to prevent cancer, at all levels from global to local, involving all policy-makers and decision-takers — actors — from multinational bodies, civil society, government, industry, the media, schools, workplaces and institutions, and the health and other professions.

Prevention of cancer also involves everybody, as individuals, as members of families and communities, and as customers, consumers, and citizens. People's choices and actions affect their and others' risk of cancer, and also the risk of other diseases. The best-known and most clear-cut example is tobacco. It is generally agreed that on a population basis, about one third of all cancers are caused by smoking and other exposure to tobacco (for example, passive smoking), which massively increase the risk of cancers of the lung and upper aerodigestive tract.

The enormous variation in patterns of cancer around the world, and the often rapid changes in cancer rates after migration from one part of the world to another, show that ways of life profoundly affect cancer risk. The 2007 WCRF/AICR Diet and Cancer Report shows that wise choices of foods and drinks, and sustained physical activity and healthy body weight, protect against cancers of many sites. The purpose of this Report is to show how this can be done.

Like the 2007 WCRF/AICR Diet and Cancer Report, this Report is concerned with biological, behavioural, and other personal factors that affect the risk of cancer. But it goes further, examining the impact of deeper economic, social, and environmental determinants. This ambitious and challenging classic public health approach is essential to reduce the number of new cases of and deaths from cancer. This approach will also help to prevent obesity and other chronic diseases such as cardiovascular disease. One task has been to use the most rigorous possible methods in applying public health principles to the circumstances of this century.

1.1 The need for policy and action

Health is everybody's business. The preservation of good health throughout life, which implies avoidance of serious diseases such as cancer, is a personal and public priority throughout the world. Protection of health is now commonly recognised as a basic human right.[1]

In 2007, over 11 million people in the world were diagnosed with cancer (excluding non-melanoma skin cancer), and nearly eight million people died from cancer. Cancer is now the second leading cause of death in most high-income countries such as those in Europe and North America, and also in many lower-income countries.[2]

The global population continues to increase, and is ageing. For these reasons alone, large increases in the incidence of and deaths from cancer are projected. Further increases are projected as a consequence of improved surveillance, screening, and detection. The prevalence of lung cancer is projected to rise in those countries where smoking continues to increase. There is also a general tendency for the rates of various common cancers to increase as populations become physically inactive and overweight, as food supplies become increasingly processed and energy-dense, and as consumption

Box 1.1 'Fast foods', sugary drinks, and energy density

The 2007 WCRF/AICR Diet and Cancer Report[3] recommends avoiding sugary drinks, consuming 'fast foods' sparingly if at all, and limiting consumption of processed energy-dense foods. This is because they promote weight gain, and thus are expected indirectly to increase the risk of cancers of which overweight and obesity are a cause.

'Sugary drinks' refers principally to drinks with added sugars. 'Fast foods' are 'convenience' foods that tend to be processed, energy dense, and to be consumed frequently and in large portions.

The term 'energy density' refers to the amount of dietary energy in foods in relation to their weight. Energy-dense foods are typically processed, high in refined sugars, starches, or fats, and relatively low in nutrients. Examples are pies, cakes, biscuits (cookies), confectionery (candy), and many snacks. Relatively unprocessed energy-dense foods, such as nuts and seeds, have not been shown to contribute to weight gain when consumed as part of typical diets, and these and many vegetable oils are valuable sources of nutrients. (Also see boxes 8.1 and 8.2 in the 2007 WCRF/AICR Diet and Cancer Report)

Box 1.2 The meaning of 'prevention'

The term 'prevention' as applied to chronic diseases such as cancer can be misunderstood. To say that cancer is preventable does not mean that it can be eliminated, as infectious diseases like smallpox may be. To say that cancer is preventable means that its incidence can be reduced, at any specific age. In turn this means that the cancer process can be checked or slowed, that the age at which cancer is detected can be delayed, and that the number and proportion of people who die without any detectable cancer can be increased.

'Prevention' in the public health sense

In this Report, 'prevention' is used in its public health sense, meaning maintenance and promotion of external factors that protect against cancer, and reduction and ideally elimination of external factors that are causes of cancer. This approach is sometimes termed 'primordial prevention'. Examples of cancer prevention in this sense are pricing policies designed to reduce the prevalence of smoking and of consumption of alcoholic drinks, and regulations and codes of practice designed to encourage breastfeeding. In some countries, national immunisation programmes against human papilloma virus infection, a cause of cervical cancer, are carried out.[4–6]

The control of cancer by means of surveillance, screening, examination, and elimination of early cancers or precancerous lesions is vital. While such methods are conventionally termed 'primary prevention', they are not what is meant here by 'prevention'. Here, 'prevention' means stopping cancer before it appears by addressing environmental, economic, and social factors, as well as behavioural and biological (including nutritional) factors, that determine whether susceptibility to cancer manifests as clinical disease.

What counts as success

A successful prevention programme will result in a reduced number of cancer cases in the group of people that is subject to the intervention, compared with a similar group without any intervention. Public health programmes designed to prevent cancer may be successful if overall numbers of cancer do not fall, or even if they increase. This is partly because effective prevention policies and actions may reduce the proportion of people at any age developing cancer, although, as populations age, the numbers at risk may increase. Current and projected trends in disease therefore need to be taken into account when planning and evaluating a programme of prevention.

Furthermore, because cancer may take many years, even decades, to develop from its beginnings to an identifiable tumour, prevention programmes need to be strategic, with results projected for decades in the future, and not necessarily expected to give quick results. For example, in countries where rates of smoking have decreased, rates of lung cancer have also decreased, but not until about 20 years later (see figure 2.8).[7 8] Nevertheless, some interventions may have effects on prevention of cancer within a few years, though the social changes needed to engender such effects may take longer to achieve. Therefore, it is sensible to expect the same sort of time lag when well-based policies and programmes to prevent cancer by appropriate nutrition, regular physical activity, and healthy body weight are put in place.

of alcoholic drinks increases. (For an explanation of energy density, see box 1.1.)

In many countries, the efficacy of medical and surgical treatment of cancer has greatly improved in recent decades. But treatment alone is not and never will be the solution to cancer at a population level. For some cancers, especially those most common in childhood and early life, treatment in well-resourced countries can be remarkably successful. But other cancers remain relatively unresponsive to treatment, which in any case is costly and often unpleasant or even disfiguring. Also, at a population level lower-income countries do not have and are unlikely ever to have sufficient medical, surgical, or financial capacity for universal or even widespread cancer treatment, which in such countries is a relatively effective option only for more prosperous people.

The most rational way to 'win the war' against cancer is therefore prevention. This requires general acceptance that the prevention of cancer is a great public health challenge, on a scale similar to that which led to safe water supplies in the cities of Europe in the later 19th century. All actors, including policy-makers and decision-takers in governments, civil society, industry, and the media, as well as in the health and other professions, need to agree that cancer can be prevented, and also to commit to being partners in the task, as set out in this Report.

1.2 Cancer prevention

The 2007 WCRF/AICR Diet and Cancer report states: "If all factors are taken into account, cancer is mostly an environmentally determined and preventable disease" (see box 1.2).

Several authorities, whose findings are endorsed by the Panel, have estimated that about one third of cases of the commonest cancers in higher-income countries can be prevented by consumption of appropriate diets, regular sustained physical activity, and maintenance of healthy body weight, as specified in the recommendations of the 2007 WCRF/AICR Diet and Cancer Report. There is also a general consensus that around one third of all cases of cancer can be prevented by not smoking and by avoidance of exposure to tobacco smoke. Cancer is further preventable by environments and ways of life that minimise the dangers of carcinogenic infective agents and industrial and occupational pollution.

The extent to which specific cancers are preventable by appropriate diet, sustained physical activity, and healthy body weight varies greatly. For example, childhood cancers, or those of the brain and nervous system and of the musculoskeletal system, seem not to be affected much, if at all, by these factors. Other cancers, particularly of the digestive system, including those of the mouth, throat, oesophagus, stomach, colon, and rectum, and those related to hormones, such as cancer of the breast, are affected to a great, but evidently varying, extent by these factors.

The degree of preventability of cancer on a population basis also varies in different regions and countries, as do the most appropriate ways to prevent cancer. This is not because humans or cancers are different depending on geography, but because patterns of cancer vary. This is generally true not only between but also within countries. For example, patterns of cancer in big cities in China, India, and Brazil are often different from those in small towns and rural areas, and all the more so in remote rural areas.

For these and other reasons, the Panel decided that rather than make new overall global estimates of the preventability of cancer it would be more meaningful and helpful to make new estimates of the preventability of specific cancers in specific countries. To this end a special review was commissioned, summarised in the next chapter and in appendix A.

As two examples, it is now evident that following the recommendations of the 2007 WCRF/AICR Diet and Cancer Report should prevent about 45 and 43 per cent of all cases of colorectal cancer and about 38 and 42 per cent of all cases of breast cancer in the USA and the UK respectively, and by inference other industrialised high-income countries. The estimated proportions for Brazil, a middle-income country, are about 37 per cent for colorectal cancer and about 28 per cent for breast cancer, and for China, a low-income country, about 17 per cent and 20 per cent respectively.

These estimates indicate that effective policies and actions designed to prevent cancer have the potential over time to substantially reduce the incidence of common cancers.

1.3 How to prevent cancer

The 2007 WCRF/AICR Diet and Cancer Report's recommendations, expressed both as public health goals and personal recommendations, relate to the nutritional, behavioural, and other biological factors that modify the risk of cancer. For example, on foods and drinks that promote weight gain, overweight, and obesity, which increase the risk of a number of cancers, the public health goal is for population average consumption of sugary drinks to be halved every 10 years. Targets like these are benchmarks against which the success or otherwise of population-based policies can be judged. The

Box 1.3 The causes of cancer

What causes cancer? This is a deceptively simple question. At one level, it appears quite straightforward that, for instance, exposure to the carcinogens in cigarette smoke is a cause of lung cancer. In the same way, as detailed in the 2007 WCRF/AICR Diet and Cancer Report, various dietary, nutritional, and physical activity factors including obesity are direct or indirect causes of, or protect against, several types of cancer.

But this account does not explain why patterns of cancer (and of other diseases) change over time, and also vary between populations and between groups within populations. In fact, changes in patterns of behaviour often underlie the changes in exposure to the direct cause. Thus, changes in smoking prevalence predict changes in smoking-related cancers, differences in obesity rates relate to alterations in the cancers of which obesity is a cause, and differences in physical activity and dietary patterns in turn influence obesity rates.

Such patterns of behaviour are sometimes known as 'lifestyle choices'. But choices are never made in a void. They are, for example, influenced by affordability, accessibility, and acceptability, which in turn are influenced by social, economic, and environmental factors, as outlined in figure 1.1. For most people, freedom of choice is constrained. Further questions remain, such as: Why do some people smoke and others not? What drives changes in patterns of physical activity over time? At population levels, answers to such questions point to ways to prevent cancer (and other diseases).

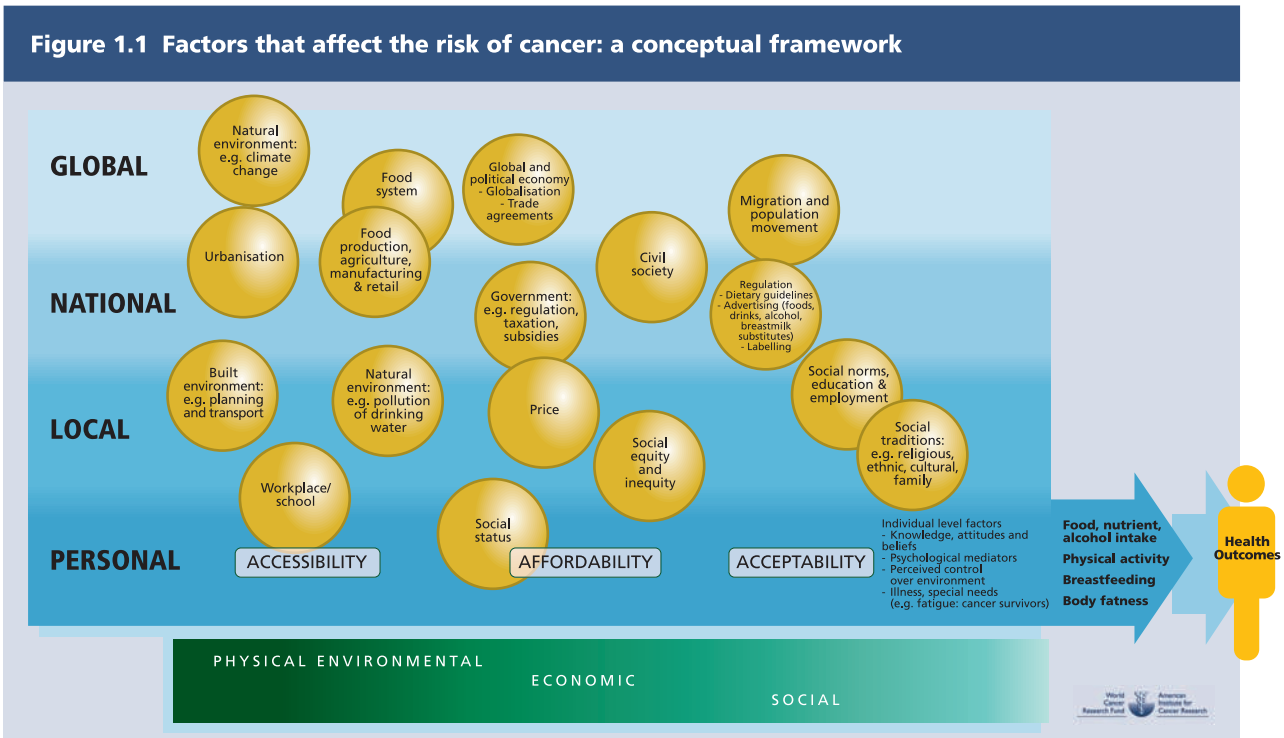
The "causes of the causes"

The 2007 WCRF/AICR Diet and Cancer Report addressed immediate and direct causes of cancer as these relate to food, nutrition, and physical activity. This Report investigates those types of cause that underlie the immediate pathological and behavioural causes, which can be seen as "the causes of the causes".

Thus in the case of smoking, it is known that taxation of cigarettes (an economic factor) and restrictions on places where cigarettes can be purchased and smoked (a social factor) reduce rates of smoking. As cigarette smoking causes lung cancer, these interventions can be seen to protect against lung cancer. Similarly, a cause of consumption of large amounts of red and processed meat may be cultural (a social factor), a cause of consumption of alcoholic drinks may be peer pressure (also a social factor), and a cause of physical inactivity may be cities built for vehicles and not for pedestrians (an environmental factor). Modification of these factors can change behaviour at a personal and also population level.

The 2007 WCRF/AICR Diet and Cancer Report was concerned with the immediate causes of cancer. This Report is concerned with the underlying and basic causes and with how best to ensure that public policy and action is designed to prevent cancer before it appears.

Figure 1.1 Factors that affect the risk of cancer: a conceptual framework



Personal and population risk of cancer is mostly determined by external factors. Once people are made aware of what affects their risk, what they do might seem to be a simple matter of personal choice. However, this figure illustrates that many factors influence patterns of food and drink consumption, physical activity, and breastfeeding. These factors can be broadly categorised as being in the dimensions of the physical environment or of economic or social drivers. However, there is substantial overlap between the categories (depicted by the graduation in colour in the horizontal green bars). These factors can operate on a global, national, or local level. Again, there can be overlap between these levels (indicated by gradual change in shade from top to bottom). As experienced at a personal level, these factors impact the accessibility, affordability, and acceptability of foods and drinks, breastfeeding, and physical activity.

personal recommendation is to avoid sugary drinks. This enables people, as community and family members and as individuals, to know what to do.

However, this valuable guidance is only the beginning. The risk of cancer, as of other diseases, is also affected by environmental, social, and economic factors, sometimes known as "the causes of the causes". (See box 1.3). The goals of the 2007 WCRF/AICR Diet and Cancer Report cannot be achieved simply as a result of informing people and leaving them to make personal choices. The evidence summarised in Part 2 of this Report shows that facts and the communication of facts through education programmes, while essential and also potentially effective at a personal level, by themselves do not change unhealthy or maintain healthy ways of life at community, national, or global levels.[9] For example, environments in which sugary drinks are artificially cheap, as in the USA where subsidies are given to the growers of corn whose syrup is used to sweeten drinks,[10–12] and where manufacturers of sugary drinks spend large sums of money promoting their products[13–15] and placing them in vending machines within schools,[16] are environments in which sugary drinks are more likely to be consumed excessively. Also, choice is constrained and even eliminated when people cannot afford or do not have access to adequate amounts of healthy foods and drink, or where built and other physical environments impede choice.

Public health goals are most likely to be achieved and sustained when all sectors of society whose policies and actions affect public health, including multinational bodies, governments, civil society, industry, employers, the media, and the health and other relevant professions, work together at local, national, and international levels. This is discussed in chapter 8 of this Report. Personal recommendations designed to reduce the risk of cancer — or any other disease — are more likely to be achieved within an enabling environment in which the choices likely to improve health and protect against disease are the easier choices.

Another consideration is time of life. There is good evidence, set out in the 2007 WCRF/AICR Diet and Cancer Report, that early life course events modify the risk of some cancers. For instance, being breastfed probably decreases the risk of excess weight gain in childhood, and thus later in life of overweight and obesity, and therefore of cancers of which body fatness is a cause.

1.4 Determinants of cancer

The interplay between economic, social, and environmental factors that determine patterns of production and consumption of food and drink, and of patterns of physical activity, and so body composition, at local, national, and global levels is illustrated by the conceptual framework in figure 1.1.

Prosperous individuals living in materially rich countries have great freedom of choice. Even so, their choices are constrained to a greater or lesser extent by culture, availability, habit, peer pressure, or disability. For most people in the world, such a degree of individual choice is not attainable.

Some influences are more direct or personal than others. Nevertheless, changes at the global level or in the environment may have a more profound impact than more direct and specific influences such as providing information or education. There is a large degree of interaction and interdependency between these factors. (See box 1.3)

Figure 1.1 indicates the approach taken by the Panel. In effect, what is proposed is a return to the classic public health approach to relevant public policies. An example of such an approach is the construction of sewage systems in order to make water supplies safe, still needed in many countries in the world, and indeed relevant to the prevention of some cancers. Reliable advice on water safety is necessary but not sufficient. Clean water depends on appropriate sewage disposal. In this case action by governments at national and municipal level, often involving major expenditure, is essential.

Other examples of concerted public health action are laws and regulations enacted by governments, often in association with industry and encouraged by public health professionals and civil society organisations, that address food security, the use of seat-belts, the price of cigarettes (and of alcoholic drinks, a subject of this Report), the availability of guns, and the degree of air pollution.

Boxes 1.4, 1.5, and 1.6 illustrate how individual behaviour is shaped and limited by the nature of the environment, and the role of various actors in achieving the personal recommendations as well as the public health goals of the 2007 WCRF/AICR Diet and Cancer Report.

In summary, the 'classic' public health approach, involving all sectors of society that influence public health, whether purposefully through policy and action or through unintended effects of other activities, applies just as much to food, drink, and physical activity and the prevention of cancer — and other diseases — as it does to other major public policy and public health issues.

Box 1.4 Physical activity

Urban populations tend to be sedentary. Sustained physical activity protects against cancer of the colon and (probably) postmenopausal breast and endometrial cancers, and also against weight increase, overweight, and obesity. Body fatness is a cause of cancers of the oesophagus (adenocarcinoma), pancreas, colorectum, breast (postmenopausal), endometrium, and kidney, and probably the gallbladder. Sustained physical activity and healthy body weight also protect against cardiovascular and musculoskeletal diseases.

People can be encouraged to become more physically active. But even when people are fully aware of the benefits of exercise and other forms of activity, there is a limit to the effectiveness of information and education programmes. Physical activity needs to become more available and accessible, and more usual. A public health approach involves collaboration between civil society organisations, national and local government, industry and employers, and other actors. Results can include strategic approaches to the built, workplace, and home environments that facilitate physical activity (see chapter 3).

Box 1.5 Salt

Salt is contained in a vast number of processed foods. Salt, and salted and salty foods, are a probable cause of stomach cancer, and are also a cause of high blood pressure and stroke.

Population salt intakes usually greatly exceed recommended levels. If most or all salt was added at table, it might be easy to avoid. But almost all salt contained in diets is added as an ingredient in processed and other pre-prepared foods. Some of these taste salty, others — bread and breakfast cereals as examples — are not obviously salty. The taste for salt is acquired, and it takes some time for people who are accustomed to salty diets to get used to lower-salt foods. Some traditional diets, such as those of Japan, Portugal, and Brazil, are exceptionally salty.

Use of salt as a preservative tends to decrease as the use of industrial as well as domestic freezing and refrigeration increases. However, salt is still being used extensively in food processing. People can be encouraged to reduce salt intake by consciousness-raising campaigns, but by itself this is only of limited value. The most effective method is to reduce salt in food supplies at population levels (see Part 2) by programmes in which government agencies, civil society, and public health organisations are partners with the food manufacturing and catering industries. Manufactured and prepared foods can be reformulated to contain less salt, supported by public education on the value of lower-salt foods.

1.5 The basis for policy and action

Changes and developments in public policies and programmes have costs and possible harms as well as benefits. Furthermore, policy-makers have many pressing priorities. Proposals for new policies and actions need to be based on sustained evidence of need and on the best evidence of critical problems and effective solutions. This is especially so when proposals involve substantial expenditure or substantial changes in existing policies and practices. Lists of unexamined policy options are not a sound basis for effective programmes. Evidence of effectiveness needs to be produced and scrutinised before a strong and confident case can be made. Even when a policy is generally agreed to be essential, there may be alternative approaches that are easier to achieve, more cost-effective, or preferable in other ways.

Chapter 8 of this report sets out the actions that will need to be taken to achieve this change. Turning these recommendations into action will require political will and commitment of resources, together with pressure from civil society and other groups.

In order to generate political commitment, a clear and impressive case needs to be made for the sustained public benefit of proposed policies and programmes. This is particularly so when proposals are made for public health interventions that include legal, fiscal, and other formal

Box 1.6 Aflatoxins

Aflatoxins are produced by moulds that may contaminate cereals (grains), nuts, and pulses (legumes). They are a cause of liver cancer.

Contamination occurs during storage under damp conditions that allows toxin-producing moulds to grow. The mould is usually visible, so contaminated grains or nuts can be removed by hand. But when contamination is widespread this is impractical, and processing makes the mould invisible. The most effective way to reduce contamination, and thus reduce the incidence of liver cancer, is to change agricultural practices and to ensure that cereals and pulses are stored in dry conditions. Governments and other actors have a responsibility to ensure that such storage conditions are possible for the communities that need them and thus make the foods safe to eat.

measures, or that may not be in the immediate interest of some partners.

The evidence base summarised and assessed in Part 2 of this Report, which leads to the conclusions and recommendations in Part 3, is as firm as any of its kind can be (see box 1.7). The Panel commissioned and has made use of two systematic reviews of the literature, both subjected to peer review. These examined both the economic, social, and environmental determinants of patterns of diet, physical activity, and body composition, and thus on cancers for which the risk is affected by these factors, and the effectiveness of existing relevant public health interventions and actions. These reviews can be accessed electronically on www.diet andcancerreport.org.

Gathering and organising the evidence in these systematic reviews has necessarily involved a substantial amount of interpretation and judgement. The literature is much more diverse than in the field of nutritional and associated modifiers of cancer risk, the subject of a series of systematic literature reviews whose findings were the main basis for the 2007 WCRF/AICR Diet and Cancer Report. The Panel has therefore made further literature searches; has used its collective knowledge and experience, as well as relevant information gained during the 5 years of preparation of the 2007 WCRF/AICR Diet and Cancer Report; and has subjected this Report to peer review, partly to ensure that the most reliable literature has been identified.

Box 1.7 Evidence for policy and action to prevent cancer

Approaches to gathering evidence

As stated in the text of this chapter, two separate approaches were taken to assemble evidence for this Report. These two complementary sources of evidence are generally identified as such in Part 2.

Systematic reviews of primarily epidemiological and public health literature on relevant determinants and interventions were commissioned from independent research centres. These reviews used a standardised methodology including predetermined inclusion and exclusion criteria designed to increase transparency and reduce investigator bias. These reviews necessarily had limitations. Systematic reviews of this type have special power as a basis for judgment when the relevant studies are homogeneous, standards of quality and rigour are already established, and the evidence is in the form of quantitative studies using readily comparable protocols, as is the case with modern medical and some other biological science, particularly that concerned with the safety and efficacy of drugs.

Typical systematic review methods are less applicable to qualitative and quantitative studies from a great range of disciplines within the environmental, ecological, economic, political, social, cultural, behavioural, and other sciences, disciplines that hold valuable information to guide actions for cancer prevention.[17 18] Some types of evidence, particularly that which is historical, anthropological, or recorded in books or journals not identified in the searches made, have not been systematically accessed. Furthermore, some types of determinants involve whole systems that are inherently complex and some potential interventions that involve policy change are only now beginning to be systematically researched. Evolution of research in these areas will undoubtedly produce evidence that might justify more options and other recommendations.

The second method used to gather evidence for this report was identification of additional studies found by Panel members, the Secretariat, observers, external reviewers, and other consultants to fill perceived gaps; this evidence was then checked by the Panel. This is the method on which expert reports have usually relied. Complementary to the systematic reviews, this evidence was also a crucial basis for identifying some policy and action options and recommendations.

Important contextual issues

Some of the most powerful forces that determine patterns of diet, physical activity, and body composition at population levels are recognised as contexts for the study of food, nutrition, and physical activity behaviours. However, they are often taken for granted and not studied in their own right, such as ethnicity or culture. Other examples include aspects of communities or the society at large that shape and reflect human behaviours, including technological developments, the nature of city and transportation system design, agricultural price support systems, the industrialised production of animals, the marketing of convenience processed foods and drinks by transnational manufacturers and caterers, and climate change. In this Report, these and other important contextual issues are acknowledged, usually in boxed text.

This is the first time that evidence for the physical environmental, economic, social, and personal determinants of patterns of diet, physical activity, body composition, and associated factors has been assembled, categorised, summarised, and evaluated in order to justify recommendations most likely to result in coherent policies and effective actions to help prevent cancer worldwide. The evidence review does not encompass all relevant information from the environmental and social sciences, and that from books and other documents does not fall into the domains accessed by systematic or ad hoc reviews. Comprehensive evaluation of these sources was beyond the scope of this Report. Even so, this is the most comprehensive such review ever undertaken, and the evidence base for the recommendations made in Part 3 is sufficient. In all areas of public policy, judgements and decisions are made on the best evidence available; evidence, by its nature, is never complete.

Direct evidence of the impact of relevant interventions and actions can only be as strong as the information resulting from published studies. Here, three considerations have to be taken into account. First, there are and probably always will be only a comparatively small number of studies of the impact of interventions specifically on cancer risk. Most substantial interventions quite properly have broader aims. Second, many actions may affect the risk of cancer inadvertently, not having been undertaken with public health generally, or cancer specifically, in mind. Two examples are cities designed to favour automobiles and the vast increase in production of 'fast' and other convenience foods and drinks. Third, broad forces liable to affect patterns and incidence of cancer and other diseases, such as the population shift from rural to urban settings, changes in food systems involving increasing consumption of processed products, and adoption of sedentary ways of life, cannot be studied using simple models. Necessarily, their overall impact on disease risk has to be inferred.

For these and other reasons, much of the most compelling evidence on the impact of economic, social, and environmental forces on the risk of cancer, and on the effectiveness of interventions and actions designed to prevent cancer, is and will remain indirect. This is always the case with big public health issues, and indeed other big public policy issues, which for this and other reasons will necessarily require careful assessment and judgement.

Ideally, the evidence preceding action is compelling. But when public policy issues are important or urgent, and when causes have been reliably identified, it is often neither possible nor right to wait for conclusive evidence before taking action. Indeed, such evidence may be derived only as a result of action being taken. For this reason it is crucial that major public health interventions and actions are rigorously monitored and evaluated.

The method agreed by the Panel to be most likely to generate rational policies leading to sustained and effective action is as follows. The first stage is to identify whether, and if so where, intervention is needed. Although evidence of potential need for action may begin with anecdotal reports, a systematic approach is desirable. This needs to be based on agreed food, nutrition, and physical activity standards such as those set out in the 2007 WCRF/AICR Diet and Cancer Report, and also reliable information from food, nutrition, and physical activity surveys. The second stage is to agree programmes and actions that are most likely, from existing evidence, to be efficient and effective. The third stage is to estimate the potential benefit to public health. For example, programmes that even modestly reduce rates of breast, colorectal, or prostate cancer will have a major impact in most countries, whereas action that has an equivalent effect on a rare cancer will not. The fourth stage is to agree which determinants are likely to be most powerful and what interventions are likely to be most effective. The fifth stage is to analyse costs and benefits of proposed programmes and actions, in terms of projected human, financial, and other material costs and projected impact, as well as potential adverse effects. There should be appropriate stakeholder and actor involvement at all levels.

Once all this is done, the sixth stage is to draft the policies, subject them to review and consultation, and to agree and enact them in the form of programmes and interventions. Sometimes the best approach is to preserve existing healthy practices. The final stage is evaluation of the policy in action. This policy-driven research will produce continually more sharply focused interventions and needs to be designed to produce more direct evidence on their effectiveness and that of other actions. Public health programmes designed to have an impact on the prevalence of cancer are likely to have an impact on other diseases and on general health and well-being. Indeed, the most effective programmes are likely to be directed at prevention of a number of major diseases that have common causes. Competent evaluation will then form an increasingly strong basis for future development of policy and action.

When major public policy and public health issues are clearly important or urgent, and when careful assessment and analysis suggests that new policies and actions will work, and will have more benefits than harms, the proper approach is to act. Cancer, and its prevention, is one such case.

CHAPTER 2

The case for action

This 21st century is seeing new great global public health challenges. Suffering and death from nutritional deficiencies and infectious diseases have been the dominant public health issues in lower-income countries, as they were some generations previously in the first countries to become industrialised. Poverty and food insecurity remain important causes of death and disability in many countries. But chronic diseases, of which heart disease and cancer are the most common, are now dominant not only in Europe, North America, and other materially rich countries, but also throughout Latin America, in most Asian countries including India and China, and in many African countries.

This is essential knowledge for those responsible for policy formulation and programme action at all levels. Undernutrition and infection especially among children will rightly remain a top priority particularly within impoverished countries and populations, but the most prevalent public health challenges represented by diseases now and in the future are chronic diseases, including cancer.

Overweight and obesity, diabetes, heart disease, and various common cancers are not, as was once thought, 'diseases of affluence'. They increasingly afflict relatively impoverished communities in all countries.

The case for action to prevent cancer worldwide is now stronger than it has ever been. New estimates prepared for this Report show that some of the commonest cancers are mostly preventable. Rates of cancer are projected to increase, most of all in middle- and low-income countries. At a population level, the costs of screening, medical and surgical treatment, and palliative care are beyond the reach of most if not practically all countries. Globally and nationally, the one feasible and rational course of action is prevention — meaning, stopping cancer before it appears.

2.1 The revolution in patterns of disease

At a global level, and within many countries, patterns of disease are in a state of transformation, as they have been since the 1980s. Historically, the main public health concerns have been to do with nutritional deficiency and infectious diseases, which remain crises in lower-income countries. Now, however, chronic diseases including cancer are dominant in most countries. These changes have followed two other related dramatic shifts.

2.1.1 The accelerated shift to cities

All over the world the proportion and sometimes the number of people living in rural areas has dropped, and continues to do so, while correspondingly the proportion and number of people living in cities has risen and is still rising, often precipitately. This is in the context of continually growing populations.

Thus in 1800 the total global population is estimated to have been around 1000 million (1 billion), of which perhaps 25 million (2.5 per cent) lived in cities, rising in 1850 to 1200 million, without any great increase outside Europe of the proportion of city dwellers.[1,2] A century later in 1950 the total global population had more than doubled to 2500 million, and the urban population had increased more than sixfold to almost 750 million (30 per cent).[3] In 2000 almost 2800 million (47 per cent of a total global population close to 6 billion) lived in cities.[3] The figures projected for 2020 are a total global population of over 7500 million of which around 4000 million (55 per cent) will be living in cities.[3] Thus within one human lifetime, the 70 years between 1950 and 2020, the global urban population is likely to have increased over fivefold.

The rise in total and in urban populations is worldwide. Thus in 1950 the population of the USA was 157 million, of which roughly 100 million (64 per cent) lived in cities.[3] By 2008 the total US population had almost doubled to around 300 million, of which roughly 240 million (81 per cent) lived in cities.[3] Increases in the number and proportion of urban people have been most dramatic in middle- and low-income countries. For example, in 1950 the total population of Brazil was 54 million, of which about 20 million (36 per cent) lived in cities.[3] By 2006 the total population had more than trebled to 187 million, of which over 150 million (84 per cent) lived in cities.[3] In 1950 the total population of China was 555 million, of which about 70 million (13 per cent)

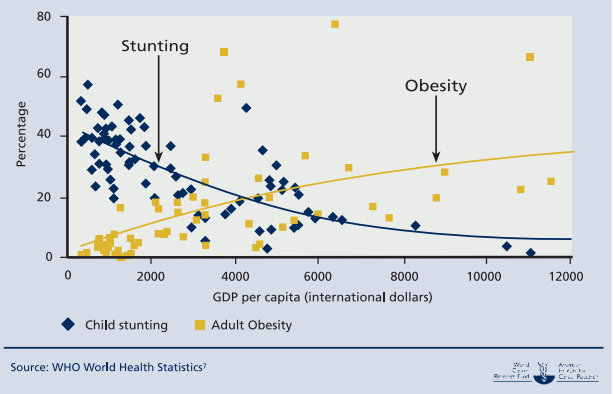
lived in cities.[3] The total population is currently around 1300 million, of which about 500 million (40 per cent) live in cities.[3] Thus both in Brazil and China, between 1950 and 2008 the number of urban people has increased more than sevenfold. Such increases are found in other lower-income countries.

2.1.2 The global industrialisation of food systems

The second great and related shift is in the nature of food systems. Until well into the second half of the 20th century, most foods supplied in markets and shops were primary products, or dried, bottled, canned, or salted 'store food', made into meals at home. Now much food and drink in many countries is pre-packaged, increasingly processed, and more often purchased in the form of ready-to-eat and other convenience meals and snacks.

Urbanisation and the industrialisation of food systems have many benefits, one of which is that food supplies generally become secure and apparently more varied, and microbiologically and chemically safer, particularly when refrigeration is used. With the exception of the more impoverished communities among the currently estimated 1 billion people[4] who live in urban slums, shanty towns, or *favelas,* urban families that include adults who are in employment are likely to have enough to eat and drink.

Figure 2.1 The global shift from childhood stunting to adult obesity as national income rises



The figure shows that as average national incomes rise, stunting becomes less common and adult obesity more common.[7] However, in the middle range of incomes between about $US 2000 and $US 6000 a year, both stunting and adult obesity may be prevalent.

Stunting (shortness) is a marker of prior nutritional deficiency, and increases vulnerability to communicable diseases, especially in childhood. Obesity (body mass index of 30 or more), now itself usually regarded as a disease, has causes in common with and is associated with a number of serious chronic diseases, including heart disease and cancer. In the figure, the diamonds and squares represent specific national data, while the lines show the trends.

2.1.3 Chronic diseases become dominant

As a result of urbanisation and the industrialisation of food systems, of the reduction in food insecurity with generally sufficient and even abundant food, and of the replacement of active with sedentary ways of life, patterns of disease and disability have changed. Until well into the second half of the 20th century the most serious public health issues in the lower-income countries in Asia, Latin America, and Africa were malnutrition in the classic sense of undernutrition and associated infectious diseases especially of infancy and childhood. These remain serious public health issues in low-income countries and among impoverished populations in higher-income countries. However, in 2008 at least 1.6 billion people were overweight, and this number is projected to rise rapidly throughout the world.[5]

Figure 2.1 shows that stunting in childhood leading to reduction in adult stature, which is an indicator of food insecurity, remains common in countries where population income is low. As income rises and food generally becomes secure at household and community levels, the nature of food supplies changes and people become less active. What then emerges is overweight and obesity, in adult life and also among children. Obesity is usually now seen as a disease in itself,[6] and is a cause of a number of diseases that are common causes of premature disability and death, including heart disease and — as shown in the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report — several common cancers.

Deficiencies and infections remain common in low-income countries in South Asia and many sub-Saharan countries, but chronic diseases, including cancer, have become dominant in the great majority of countries, even some countries in sub-Saharan Africa.[8] This trend is projected to become more pronounced. In many impoverished countries, nutritional deficiencies and infections, especially in early life, will remain endemic, but already exist side by side with chronic diseases within the same populations, and even

within the same communities and families.

A critical concern is that increasingly the poor in both high- and lower-income countries are becoming obese faster than the rich; in much of the world, there are already more poor than rich overweight and obese people. Over the past half century it has been increasingly clear that in Europe, the USA, and most high-income countries, more obesity, heart disease, and cancer is found among the poor than the rich. This great burden of obesity, poor diets, and reduced activity is now found among the poor in more and more transitional and low-income countries each year.[9 10]

These dramatic changes in associated patterns of population and food systems and diseases are a modern phenomenon in Asia, Africa and Latin America. They follow similar shifts to those that took place in Europe and North America as a result of the first phase of industrialisation and urbanisation in the 19th and early 20th centuries. The difference is that this time the shifts are global, are projected to accelerate, and are occurring at a time of rapid increases in world population and well-founded concern about degradation and deterioration of soil quality and water and energy reserves.[11]

Secure food supplies are a foundation for the development of human potential, as well as a protection against disease, and likewise, increased income and life in cities are of course not in themselves undesirable. More money usually means more choice. Well-designed cities with safe water supplies, clean air, green spaces, and well-stocked markets and shops enable people with adequate incomes to lead productive, enjoyable, and healthy lives.

But industrialised food supplies tend to become more processed and more energy-dense (see box 1.1) and urban populations more sedentary. Together with economic inequity, these major causes of serious chronic diseases, including cancer, can be halted and reversed. Their underlying as well as their immediate causes need to be recognised. In addition, all actors, including those responsible for the shape and nature of food systems and the structure and design of cities and living and working environments, need to work together to make healthy ways of life more affordable, accessible, and acceptable.

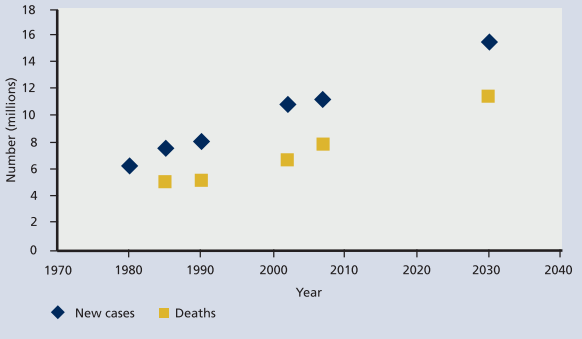
2.2 The increased global burden of cancer

Globally, the numbers of cases of cancer are rising and the rise is predicted to continue. The same is true of other chronic diseases. The two main reasons for these increases are the rise in global population and the fact that most populations worldwide are ageing. Changing ways of life also account for increasing rates of some cancers and the screening programmes used in some countries to detect cancer in its early stages identify more cases than in the past.

2.2.1 General increases

In 1980 the annual number of new cases of cancer was estimated at around 6.3 million, rising to an estimated 8.1 million cases and 5.2 million deaths in 1990, and 10.9 million cases and 6.7 million deaths in 2002.[12] Recent estimates are

Figure 2.2 Estimated global number of new cases of and deaths from cancer (excluding non-melanoma) (actual and projected)



Data from WHO[12], Parkin et al[13, 14, 15], Pisani et al[16, 17, 18], and IARC[19]

The figure shows general increases in cases of and deaths from cancer (excluding non-melanoma skin cancer) since 1980. [12–19] **The main reasons for these increases are the rise in global population, and the fact that populations are ageing.**
Note: Different methods have been used in different years. Figures for 2007 and 2030 are projected.

11.3 million cases and 7.9 million deaths in 2007, with 15.5 million cases and 11.5 million deaths projected for 2030.[12] These estimates are shown in figure 2.2.

2.2.2 Increasing and ageing populations

The main single reason why global numbers of cancer are rising is that the global population is increasing. This rose from 2.5 billion in 1950 to above 4 billion in 1975 and 6 billion in 2000, and is projected to rise to 8.3 billion in 2030.[6] The projections of increases in cancer incidence and death take this into account.

Most cancers become more common with greater age, and the world's population in almost all countries is ageing as well as inreasing. Between 2000 and 2050 the global number of people aged over 70 is projected to increase from 267 million to over 1000 million,[20] an almost fourfold increase. Most of this increase is projected to be in lower-income countries. The population aged over 70 in high-income countries is projected to increase from 93 million to 217 million.[20] In lower-income countries the projected increase is from 174 million to 813 million.[20]

2.2.3 Screening identifies more cases

Another reason why numbers of new cases of cancer are rising is that in well-provided countries, the use of programmes designed to screen for cancer and to detect it in early stages is increasing. Two examples are screening and detection programmes for cancers of the breast and cervix. Also, the great rise in the incidence of prostate cancer, now recorded as the first or second most common male cancer in a number of high-income countries, is largely because of increased provision of screening designed to detect this cancer in its early stages.

2.2.4 The context for prevention

Given the increasing and ageing populations and increased use of screening programmes, it follows that successful actions to

prevent cancer may not necessarily result in lower overall rates of cancer, although its incidence at younger ages would be expected to decline. Also, as detailed in box 1.2, one effect of prevention of cancer is to delay or slow the process, so that if cancer does appear, it is at a later age.

There are other reasons to expect rises in the overall numbers of several common cancers. As already mentioned, the populations of most countries are tending to become fatter and increasingly sedentary, and production and consumption of processed energy-dense and other convenience foods and drinks that promote increase in weight is also increasing. Furthermore, consumption of red and processed meat is increasing in many countries, as is consumption of alcoholic drinks.

2.3 Cancer is preventable

Cancer is often thought to be a mainly inherited disease. This is not so. Some people, and related family members, have inborn high vulnerability to specific cancers. However, to a lesser or greater extent every person has innate or acquired susceptibility to many different diseases. In the great majority of cases, such susceptibility only leads to actual disease, such as cancer, when driven by external factors.

2.3.1 The incidence of cancers varies

Inherited genetic factors that influence susceptibility help to determine which people in a population are more likely to develop disease, but they do not explain varying patterns of cancer between populations. As shown in chapter 1 of the 2007 WCRF/AICR Diet and Cancer Report, these can vary greatly over time, and also between and even within countries.

Great ranges of variability are found with most cancers. For example, oesophageal cancer is four times more common in China than in the USA.[19] In the 35 years between 1960 and 1995, colorectal cancer incidence in Japan has risen sixfold, whereas the incidence of stomach cancer has more than halved in many countries.[20] The rates of breast cancer vary up to 25 times in different parts of the world.[19] Age standardised rates of malignant melanoma in Australian males almost tripled between 1955 and 2003.[21]

The most impressive 'natural' evidence that risk of cancer is affected by external causes comes from studies of populations of the same ethnic group who migrate from one part of the world to another. Such migrant studies are specified in some detail in chapter 1 of the 2007 WCRF/AICR Diet and Cancer Report. Thus, when Japanese populations migrated from Japan, first to Hawai'i and then to the USA, in one or two generations their patterns of cancer changed from those historically most common in Japan to approximate those of the USA.[22] At a population level, this phenomenon is invariable when people migrate to other parts of the world where patterns of cancer are different. Migrant studies indicate that the main factors affecting patterns of cancer are environmental. Genetic and other external factors that determine susceptibility may influence who in a population exposed to external causes will actually develop cancer, but the varying patterns of cancer seen between different populations are driven by these external causes.

2.3.2 Adventitious prevention

On a population basis, the incidence of cancer usually has not varied as a result of deliberate policies and actions designed to prevent cancer in the sense defined in box 1.2. Change has mainly been adventitious as a result of changes in external factors whose impact can be inferred, and whose possible causal effect can be investigated. Recent global and national action deliberately designed to reduce smoking and thus to control and prevent lung cancer is an important — and significant — exception.

An example of adventitious prevention of cancer has been and is legislation designed to reduce atmospheric pollution, such as the Clean Air Acts made into law in Britain in the 1950s. These were designed to make life in cities more pleasant, to reduce chronic air pollution, to eliminate 'smogs', and to reduce the incidence of bronchitis, a disease then known to be caused by the environmental factor of air pollution. Such laws are likely also to have reduced the incidence of cancers of the airways and lung. Retrospective investigation would probably provide evidence that first, clean air does protect against some cancers, and second, relevant legislation and regulation can be effective in improving public health and reducing cancer rates.

Another example of likely adventitious prevention directly relevant to the subject matter of this Report is the increased use of industrial and domestic methods of cooling and freezing, the consequent reduction in the use of salting to preserve such foods, the year-round availability of fresh vegetables, fruits, and other perishable foods, and the reduction in the prevalence of stomach cancer. These changes are likely to be causally related. They did not occur, at least initially, as a result of any policy to reduce stomach cancer, but they do provide evidence that can lead to deliberate interventions designed with public health in mind.

2.4 Estimates of preventability

Policy-makers responsible for allocating human, financial, and other resources to public health initiatives need to know to what extent specific courses of action are likely to modify the risk of cancer.

A rational approach to allocation of funds will take account of the costs and benefits of different approaches to addressing specific problems. A rational decision on whether or not to act will be influenced by how common or important the problem identified is, how much a factor might contribute to that problem, whether the factor can be modified — and if so how much it would cost — and how big an effect might be achieved. Most benefit will result from actions that have a big impact on common conditions. However, even a small impact on common conditions and, to a lesser extent, a large impact on less common conditions will have value.

Because policies and actions to control and prevent cancer, in common with other diseases, need to be well founded, researchers and other authorities in the field have since the early 1980s tried to quantify the relative contribution of various factors that affect cancer risk. The two most important

causes of cancer worldwide are agreed to be smoking and other use of tobacco; and food, nutrition, and physical activity (including body fatness) and associated factors. The next most important cause is generally agreed to be infection and infestation, followed by environmental and industrial pollution, industrial chemicals, medication, and radioactivity.[23 24] In some populations with low body weight and undernutrition, infections remain a key preventable cause. Some of these factors interrelate. For example, when smokers also consume alcoholic drinks, the risk of cancers of the oral cavity and oesophagus multiplies.

Action to control and prevent smoking and other exposure to tobacco has been spurred by the knowledge that it is the overwhelming cause of lung cancer and a significant cause of several other cancers, as well as other diseases, and that about one third of all cancers can be prevented by avoidance of exposure to tobacco smoke. As a result, governments have taken a lead in warning the public of the harmful effects of smoking. More recently, government actions have gone further than information and education. Taxes on cigarettes and other tobacco products have been progressively raised, often at rates higher than those of inflation; warnings on packets, counter displays, and elsewhere have become more explicit; advertising has been restricted; and smoking is prohibited in an increasing number of public places. These and other initiatives have been generally welcomed or accepted, including by many smokers.

In summary there is overwhelming evidence from many types of evidence that external environmental factors determine the great majority of cancers of most sites. Individual genetic susceptibility is also an important factor. The profound and rapid changes in cancer incidence that occur in populations over time, and when they migrate, indicate that external environmental factors are paramount. Among these, as demonstrated by the 2007 WCRF/AICR Diet and Cancer Report, food, nutrition, physical activity, body composition, and associated factors all modify the risk of many cancers, including the majority of the most common cancers.

2.4.1 Previous estimates

The extent to which cancer can be prevented by appropriate food and nutrition, physical activity, body composition, and associated factors has been addressed by a number of authorities since the early 1980s, usually referring to patterns of cancer typical of affluent countries. As stated, these have usually concluded that around one third of all cancers could, over time, be prevented by appropriate diets and associated factors and by avoiding obesity, roughly as important as the one third that is estimated to be preventable by avoidance of smoking, other use of tobacco, and exposure to tobacco smoke.

The first such estimates were made in 1981 by the epidemiologists Richard Doll and Richard Peto. They were invited to quantify the effect of all significant external factors on the risk in the USA of cancer in general and of specific cancers, in order to guide priorities for research funding and for policies and actions. They estimated that the extent to which diet modifies the risk of cancers all taken together was 35 per cent.[25] This figure did not include alcoholic drinks, to which they attributed an additional 3 per cent for all cancers, or food contaminants and additives, whose effect on cancer they estimated as trivial. They also did not include physical activity, body composition, or infant nutrition. They specified a very wide range of possible influence of diet as they defined it on the risk of cancer — between 10 and 70 per cent — of which the 35 per cent figure was regarded as a 'best guess'. Later Richard Doll somewhat narrowed this range, to 20–60 per cent.

Another US report was published by the National Academy of Sciences (NAS) in 1983. This endorsed the estimate that around one third of all cancers are modifiable by diet and nutrition, as have a number of more recent reports. A further NAS report published in 1989 concurred.[26] The Panel responsible for the 1997 WCRF/AICR Diet and Cancer Report also came to a similar conclusion, that over time, 30–40 per cent of all cancers were preventable by appropriate diets, together with healthy body weight and sustained physical activity.[27–29] At that time, this amounted to 3–4 million cases of cancer every year agreed to be preventable over time, if the recommendations of that Report were followed everywhere.

For this Report, WCRF/AICR commissioned a systematic literature review (SLR) of peer-reviewed authoritative estimates of preventability published since 1980. The full review is available electronically.[30] Twenty-nine studies met the inclusion criteria, which covered exposures agreed in the 2007 WCRF/AICR Diet and Cancer Report to be convincing or probable modifiers of cancer risk. Most of these studies were concerned with preventability either of colorectal (or colon) cancer or breast cancer. Others were concerned with oral or oesophageal cancers and stomach, kidney, and endometrial cancers. The studies made estimates of the extent to which risk of these cancers is modifiable by specific exposures, such as foods containing dietary fibre, vegetables, alcoholic drinks, physical activity, or overweight and obesity.

With some cancers, such as those of the oral cavity and oesophagus, colorectum, and breast, specific dietary and associated factors were estimated to be substantial modifiers of risk. However, none of the studies in the review reported estimates for the preventability of any specific cancer, or for all cancer, by all these exposures combined.

2.4.2 New estimates

The Panel responsible for this Report agreed to make new estimates of the extent to which cancer, and also specific cancers, can be prevented, based on the conclusions of the 2007 WCRF/AICR Diet and Cancer Report.

In considering how best to calculate such estimates, the Panel bore in mind that the extent to which cancer and specific cancers are preventable varies in different parts of the world. (See box 2.1)

Therefore estimates were made for two high-income countries (the USA and the UK), a middle-income country (Brazil), and a low-income country (China), where adequate data exist. Estimates were made for all exposures judged to be convincing or probable modifiers of cancer risk in the 2007 WCRF/AICR Diet and Cancer Report, with a few exceptions (see appendix A). Thus 12 cancer sites were

Box 2.1 Estimating preventability

In estimating the degree to which specific cancers are preventable by food, nutrition, physical activity, and associated factors, the nature of the relationship between the relevant exposures and the related cancers needs to be taken into account.

One consideration is the degree of impact of the exposure, characterised as its 'relative risk estimate'. Thus the greater the impact on the risk of cancer, the greater the potential to prevent cancer by modifying the level of the exposure.

Another consideration is the prevalence of any exposure within any given population. If, to give an imaginary example, nobody in country X was obese, the extent to which obesity was a cause of cancer would for that country be zero, even though obesity is a cause of some cancers; whereas if everybody in country Y was obese, the number of cancers that could be prevented by avoiding obesity for that country would be high. This is important, because patterns of diet, physical activity, and body composition vary in different parts of the world.

In order to calculate the preventability of several or all cancers combined it is additionally necessary to know the incidence of the various cancers, which will also vary from country to country.

included: those of the mouth, larynx, and pharynx; oesophagus; lung; stomach; pancreas; gallbladder; liver; colorectum; breast (postmenopause); endometrium; prostate; and kidney. Details of the method used are given in appendix A.

In the absence of reliable evidence to the contrary, it is reasonable to suppose that the estimates of preventability for the USA and UK can be applied to other high-income countries, and that the estimates for China and for Brazil can be applied to other low- income and middle-income countries, respectively.

The estimates made in the review are cautious and are likely to be underestimates of the true level of preventability. This is for a number of reasons. No estimate was made for cancers other than those that were the subject of SLRs for the 2007 WCRF/AICR Diet and Cancer Report. No estimate was made for exposures where the evidence was judged to be too limited, although suggestive. Estimates derived from comparisons of actual high and low levels of exposure may not take into account recommended levels of exposure, whose benefits could be greater. For example, few people in high-income countries consume the amount of cereals (grains) or vegetables and fruits recommended in the 2007 WCRF/AICR Diet and Cancer Report, so reliable evidence of possible additional benefit gained at such levels is sparse. As detailed in appendix A, some exposures judged 'convincing' or 'probable' could not be included in the analyses because of lack of information at national level. Further, dietary and physical activity assessment methods are relatively imprecise and may either over- or underestimate the effect. Many studies may also fail to capture information on diet, physical activity, or body fatness over a sufficient length of time or at the most appropriate period in relation to the link between the particular nutritional factor and cancer. Overall, taking account of these reasons, the true level of preventability is likely to be higher. However it is not possible to calculate with any confidence the degree to which this is the case.

2.4.3 Results

The analysis shows that overall about 34 per cent of the combined incidence of the 12 cancers selected are preventable in the USA and about 39 per cent in the UK. In Brazil, about 30 per cent of these cancers are estimated to be preventable, and in China around 27 per cent. This reflects similar patterns both of diet, physical activity, and body composition and of cancer in the USA and the UK, which are different from those in lower-income countries.

For all four countries, as shown in table 2.1, the cancers with the highest preventability estimates are those of the oesophagus, endometrium, and mouth, pharynx, and larynx, followed by colorectal and breast cancers. The cancers least preventable by dietary and associated means are those of the liver, gallbladder, and kidney.

Within the USA, estimates of preventability for common cancers include about 38 per cent for breast cancer, 45 per cent for colorectal cancer, 70 per cent for endometrial cancer, and 63 and 69 per cent for cancers of the mouth, pharynx, and larynx, and of the oesophagus repectively. Figures for the UK are broadly similar, at about 42 per cent for breast cancer, 43 per cent for colorectal cancer, 56 per cent

Table 2.1
Estimates[1] of cancer preventability by appropriate food, nutrition, physical activity, and body fatness in four countries[2]

	USA	UK	BRAZIL	CHINA
Mouth, pharynx, larynx	63	67	63	44
Oesophagus	69	75	60	44
Lung	36	33	36	38
Stomach	47	45	41	33
Pancreas	39	41	34	14
Gallbladder	21	16	10	6
Liver	15	17	6	6
Colorectum	45	43	37	17
Breast	38	42	28	20
Endometrium	70	56	52	34
Prostate	11	20	N/A[3]	N/A[3]
Kidney	24	19	13	8
Total for these cancers combined	34	39	30	27
Total for all cancers	24	26	19	20

1. These values are percentages rounded to the nearest whole number and are based on several assumptions. There is a range of likely plausible figures around these point estimates, but they represent the most likely estimates (see appendix A).
2. Based on the conclusions of the 2007 WCRF/AICR Diet and Cancer Report.
3. Exposure data not available

for endometrial cancer, and 67 and 75 per cent for cancers of the mouth, pharynx and larynx, and oesophagus respectively. The preventability estimates are generally lower for Brazil and China. In Brazil, estimates include around 28 per cent for breast cancer, 37 per cent for colorectal cancer, and 63 and 60 per cent for cancers of the mouth, pharynx and larynx, and oesophagus respectively. Corresponding figures for China are about 20, 17, 44 and 44 per cent respectively.

The 12 cancers analysed amount to around two thirds to three quarters of the incidence of all cancers. If preventability of these other cancers by dietary and associated means is assumed to be zero, then the total estimate for the preventability of all cancers on average is about 24 per cent for the USA, 26 per cent for the UK, 19 per cent for Brazil, and 20 per cent for China. In fact other cancers may well be preventable by food, nutrition, and physical activity, in which case these figures would be higher.

A more detailed analysis was made of those cancers the risk of which is convincingly or probably modified by degree of body fatness. These are cancers of the oesophagus (adenocarcinoma), pancreas, gallbladder, colorectum, breast (postmenopause), endometrium and kidney. The estimates were similar for the USA (about 20 per cent for men and 19 per cent for women) and the UK (about 18 per cent for men and 16 per cent for women). Figures were lower for Brazil (13 per cent for men and women) and lower still for China (11 per cent for men and 12 per cent for women). Currently, cancers of which obesity is a cause are less common in these and other lower-income countries, reflecting the fact that rates of overweight and obesity are lower. Trends summarised in this Report indicate that the estimates are liable to rise.

As stated, these figures are almost certainly underestimates of the actual degree of preventability, but to what extent is unknown. Given that the figures are likely underestimates, it is reasonable to say that as it turns out, the 'classic' estimate of 'about one third' for the preventability of all cancers by food, nutrition, and associated factors is broadly accurate for high-income countries, for which such estimates were originally made. Using the same reasoning, the true level of preventability in middle- and low-income countries may approach around one quarter. If patterns of diet, physical activity, and body composition in lower-income countries approach those of higher-income countries, as current trends indicate, the level of preventability through modifying these factors will increase.

2.4.4 Conclusions

These are among the most comprehensive, detailed, and up-to-date estimates of the preventability of cancer by appropriate diet, physical activity, body composition, and associated factors. The methods used have some limitations, detailed in appendix A. The figures here are likely to be lower than the true figures. Although only four countries have been studied in detail, the results can be taken to apply broadly to other high-, middle-, and low-income countries. While there might be some differences between countries, the proportion of cancers preventable by food, nutrition, physical activity, and body fatness is not likely to be so small that the case for policies and actions, as recommended in chapter 8, does not apply.

These new estimates confirm that a substantial proportion of many cancers can be prevented by improving patterns of diet, physical activity, body composition, and associated factors. For those cancers convincingly or probably modified by food, nutrition, and physical activity, estimates of preventability range from about 27 per cent (in low-income countries) through 30 per cent (in middle-income countries) to 34–39 per cent (in high-income countries). For all cancers taken together, if it is assumed that food, nutrition, physical activity, and associated factors are irrelevant for the other cancers, about 24–26 per cent are preventable in high-income countries and 19–20 per cent in lower-income countries.

However, dietary and associated factors probably do have

Table 2.2
Estimates of preventability of cancers of which body fatness is a cause by appropriate body composition[1], in four countries

CANCER SITE	USA		UK		BRAZIL		CHINA	
	Male	Female	Male	Female	Male	Female	Male	Female
Oesophagus	32	38	29	33	20	26	14	20
Pancreas	34	25	32	19	25	14	20	10
Gallbladder	11	28	8	21	3	15	2	10
Colorectum	16	3	14	2	8	1	5	1
Breast	-	17	-	16	-	14	-	12
Endometrium	-	49	-	38	-	29	-	18
Kidney	20	28	17	21	10	16	6	10
Total for these cancers combined	20	19	18	16	13	13	11	12

1. Based on the conclusions of the 2007 WCRF/AICR Diet and Cancer Report.

some relevance to the causation of these other cancers, and so a broad estimate of about a quarter to a third preventability in higher-income countries and about a fifth to a quarter preventability in lower-income countries through these factors is reasonable. A major proportion of the cancers attributable to food, nutrition, physical activity, and body fatness could be prevented by avoiding overweight and obesity alone. Once again, the vital importance of tobacco control is emphasised. Most cancer is preventable by not smoking and by avoiding other exposure to tobacco smoke, and by following the recommendations in the 2007 WCRF/AICR Diet and Cancer Report.

2.5 Why prevention is needed

Prevention of cancer is feasible and also of great potential benefit. Furthermore, the preventive actions that will improve cancer will have major benefits for heart disease and many other preventable health problems. Cancer treatment will remain essential, but the costs of effective treatments for cancers are insuperable for many countries, and for several cancers effective treatments do not exist. Any rational approach to controlling the burden of cancer must be based on prevention. Indeed, for populations in lower-income countries and increasingly also in high-income countries, prevention is the most feasible approach.

2.5.1 Treatment

Currently, the usual approach to cancer is conventional treatment. Apart from controls on exposure to environmental carcinogens and radiation, the dominant declared commitment of governments, the medical profession, and publicly and privately funded hospitals and other relevant services is to provide appropriate treatment for people with cancer.

High-income countries such as those of Western and Central Europe, North America, Australia, and Japan characteristically have health services that include provision of high-quality medical and surgical treatments of cancer, together with palliative care services. Treatment services within most of the larger cities of middle- and low-income countries are also usually of high quality.

In recent decades, treatment of some cancers has become remarkably successful. For example, there have been major improvements in the treatment of breast and colorectal cancer and of some childhood cancers in high-income countries, but in many lower-income countries these advances are only available to those with access to the major cancer treatment centres who have the necessary resources to purchase them. However, some cancers, such as lung cancer, are as yet relatively unresponsive to treatment.

All forms of cancer treatment have limitations. For example, at and after the point when most cancers have been diagnosed, symptoms are usually unpleasant and even disabling. Also, cancer treatments are themselves also typically unpleasant and may be disabling.

Another limitation, gradually becoming more severe, is that cancer treatments are expensive and are likely to be beyond the means of people without access to publicly funded health services or without financial cover from health insurance. In the USA, for instance, the costs of health care have increased by on average 2.5 per cent more than the increase in gross domestic product since 1970, and the trend is for the costs of new medical technology, such as new drugs and innovative surgical and ancillary treatments, to escalate.[31 32] A major review published in 2006 concluded that initial surgical treatment for resectable cancers could be relatively cost-effective in low-income countries, but that other therapies would not be affordable in these countries.[33]

While the costs dedicated either to prevention or treatment of chronic diseases like cancer divert limited resources from other important health, social, educational, and other services needed for countries to become more secure and prosperous, preventive actions are more likely than treatments to impact on a variety of chronic diseases.

Comprehensive availability of cancer treatment is far beyond the means of lower-income countries.[33] Only rich people within such countries can expect to receive treatment, for which they pay. These countries, mostly in Asia, Africa, and Latin America, have limited funds for medical and public health services, which are now often diminished as a result of economic structural readjustment programmes imposed as a condition of external loans.[33–35] Costs of treating cancer are already overwhelming public health services in impoverished countries, and other than the rich, patients with cancer are likely to receive rudimentary if any treatment.

Furthermore, rates of cancer are increasing faster in lower-income countries than in higher-income countries, as their populations increase and age, when smoking becomes more prevalent, as their populations become increasingly overweight and sedentary, and as patterns of diet change to include more processed energy-dense and convenience foods and to contain more fat and sugar and often more alcohol. Seventy per cent of the increase in cancer incidence up to 2020 is expected to occur in lower- and middle-income countries.[36]

Cancer treatment will remain an essential component of any cancer control strategy, including in lower-income countries where people present with a later stage of cancer. But in low-income countries, national and local health budgets are almost all allocated to the treatment of nutritional deficiencies, infections, accidents, and emergencies, and usually there is little public money available for specific treatments of any chronic disease, including cancer.

2.5.2 Integrated control and prevention

After treatment, currently the next most used approach to cancer is control by screening and early detection.

Population-based screening and early detection of precancerous lesions or early stage cancers such as those of the stomach, colorectum, breast, and cervix can help avoid their progression or spread and so improve chances of survival. Currently, though, there are no simple tests that can help identify people at higher risk of cancers, as there are for cardiovascular disease, where checks of blood pressure and blood cholesterol are valuable.

Screening programmes may influence apparent incidence rates. In the early years after a screening test is introduced,

Box 2.2 Prevention and 'the market'

Since the 1980s, most international economic policies have aimed to remove restrictions to the flow of technology, capital, and goods, including food. This 'market economy' is promoted by the World Bank, the International Monetary Fund, and other multinational bodies such as the World Trade Organization. (Also see chapter 4). This system has replaced policies designed to protect national interests or those of special-interest groups such as farmers, that deliberately use regulation and intervention in markets in order to promote stability, fairness, and equity.[40 41]

Regulations, public health, and the equity of markets

A market economy is expected to increase stable economic growth and prosperity in lower-income as well as higher-income countries. However, it does not take account of equity, welfare, and the public good in general, including public health, especially among more vulnerable lower-income and geographically isolated communities within higher-income as well as lower-income countries.[42] The global economic turmoil that began in September 2008 has also highlighted limitations with the system.

In the case of food and drink, and especially animal products and processed foods, the market is often not a free one. A major distortion is introduced by national regulations that protect the interests of farmers and other groups within the food, drink, and associated industries, most notably in high-income countries such as the USA and those represented by the European Union. Extensive subsidies are given to producers of beef and pork, and of corn (maize) and soya beans mainly used as animal feed. Subsidies for corn production also artificially reduce the price of high-fructose corn syrup used, mostly in the USA, to sweeten soft drinks and many processed foods, and therefore also maintain artificially low prices for these products, so encouraging their consumption.

In 2007 and 2008, the price of a number of staple food commodities and foods and drinks sharply increased, and many countries, including those previously thought to be economically most secure, suffered increases in unemployment together with sharp drops in the value of money, houses, and other investments.

Subsidies also affect the relative as well as absolute costs of healthy foods such as fruits, vegetables, and pulses (legumes; notably beans). The export of subsidised staples and products also undermines the food systems of lower-income countries where food production and export is not given price support. It also displaces relatively unprocessed healthy foods such as local vegetables, fruits, pulses (legumes), roots, and tubers, with artificially cheap staples, meats, processed meats, and oils, and processed energy-dense foods and sugary drinks.

In a number of areas, governments intervene in markets to protect the public interest. Thus, laws and regulations are commonly used to govern conditions of employment, school attendance, public order, the availability of guns and drugs, the speed at which vehicles can be driven, the requirement for immunisations, and the price and availability of cigarettes.

an artificial increase in incidence is seen as previously undiagnosed cancers are identified. Some early cancers detected by certain screening tests may not otherwise have been detected or led to clinical disease.

Screening cost-effectiveness varies widely, even between different high-income countries. For example, the cost-effectiveness ratios for breast cancer screening every 2 years were estimated in 1999–2000 at $US 2450 per life year saved in Spain and $US 14 790 per life year saved in Norway.[37]

Screening programmes may be more difficult for lower-income countries to implement even though initial cost might be lower than that for higher-income countries. For example, in India breast cancer screening costs US$ 2000 per life year saved, compared to $US 3000 in the Netherlands. In the Netherlands this is around one tenth of average annual income, compared with about four times the average national income in India.[37] Thus in terms of average purchasing power, screening is on average 40 times as expensive in India as it is in the Netherlands.

The value and cost-effectiveness of screening and detection programmes varies, and depends on the cancer incidence, the ability of the screening method reliably to identify the presence or absence of relevant lesions, the availability, efficacy, and effectiveness of treatments for these lesions once detected, the possible harms from the screening, and cost. Validated screening programmes that meet these criteria are valuable components of a cancer control strategy and can also provide settings for interventions and actions for prevention.

Overall, control of cancer by screening and early detection programmes, and by its treatment and where necessary palliation, is and will remain essential. Programmes for primary or primordial prevention need to be integrated with screening, treatment, and palliation programmes in an overall integrated strategy. (See box 1.2). This said, comprehensive availability of treatment for cancer will be beyond the reach of many countries. The most rational and feasible approach is prevention.

2.6 The challenge

The challenge of preventing cancer worldwide is analogous to that presented by climate change. Until recently, the evidence on climate change was not well known, and then was widely challenged, or else not seen as due to human activity. Now that the evidence is accepted by all key players, a political and general will has been built to check and reverse the causal factors, and targets have been agreed. A similar will is needed to prevent cancer. This can only be expected from governments after presentation of convincing evidence and concerted pressure from other actors, including professional and civil society organisations, backed by the media.

2.6.1 Most cancer is preventable

The combination of not smoking and avoidance of exposure to tobacco, together with appropriate diets, regular physical activity, and healthy body weight, could over time prevent most cases of cancer. The new calculations made for this Report (see section 2.4.2 and appendix A) from selected countries where data allow relatively robust estimates,

Notwithstanding this, governments of most high-income countries, especially since the 1980s, have been reluctant to introduce regulations designed to improve public health as affected in particular by food and nutrition, physical activity, and body composition. There are exceptions, such as pricing and availability of alcoholic drinks; and regulations and codes of practice to prohibit or discourage misleading promotion of breast milk substitutes and weaning foods, and to encourage breastfeeding. Also, in many countries, staple foods may or must be fortified with specified nutrients.

The case against intervention

Governments have relied on three arguments to justify decisions not to intervene in markets in order to promote public health. First, it is said that evidence on the determinants of disease is unclear. However the evidence on cancer set out in the 2007 WCRF/AICR Diet and Cancer Report is robust, and generally consistent with evidence on the determinants and prevention of other major diseases such as obesity, diabetes, and heart disease.

Second, it is said that evidence that intervention in 'the market' would improve public health is unclear. However, the nature of the evidence supporting the benefits of change designed to protect public health is similar to that which supports orthodox and established economic or social policy in other areas. Though it is of a different sort from that linking food, nutrition, and physical activity to cancer, it is still the best evidence available.

A third argument against formal intervention to prevent cancer is that it is not the business of government to interfere with individual decisions on how to behave. Freedom of choice can be seen as a human right. But as this Report shows, most people's choices are constrained. People have a right to expect government to intervene on their behalf to support choices that facilitate and promote their health and welfare, and to make healthy choices easier.

The case for intervention

State-sponsored anti-smoking programmes have shown that taxation and other regulation can reduce smoking. By analogy, the explosive increase in overweight and obesity, especially in children, and of early life diabetes, gives more weight to the argument for regulation to promote healthy diet and activity patterns. As a result, some governments and local authorities have restricted the availability of soft drinks, notably sugary drinks, from vending machines in schools and other institutions, and some have also restricted the advertising and marketing of processed foods and drinks to children. (There is more detail on this in chapter 4.)

'Market economies', which in the case of food and drink are in any case distorted, do not give sufficient priority to the public good and can have adverse effects on public health. The protection of public health, including the prevention of cancer by appropriate diets, sustained physical activity, and healthy body weight, requires large-scale concerted actions including appropriate legal and fiscal measures. Public health requires public commitment and the use of public resources for the public good.

indicate that common cancers such as those of the oesophagus, colorectum, and breast are to a considerable extent preventable by following the recommendations of the 2007 WCRF/AICR Diet and Cancer Report.[23] Following these recommendations is also likely to improve cardiovascular health and protect against other disabilities and diseases.

2.6.2 Personal choice and its limitations

The challenge is first met by dissemination of the good news that much cancer is preventable, and how to protect against cancer. The WCRF global network, including its US affiliate AICR, is committed to this task. One prime reason why the 2007 Diet and Cancer Report and this Report were commissioned by WCRF/AICR has been to ensure that their programmes remain based on the most reliable science, most authoritatively assembled and interpreted.

However, the literature reviews prepared for this Report provide compelling evidence that prevention of disease throughout the world, and even through different parts of society, cannot be achieved only through information and education designed to encourage healthy choices.

Privileged people in higher-income countries with exceptional freedom of choice, who are familiar with the findings and recommendations of the 2007 WCRF/AICR Diet and Cancer Report, who are generally well informed, and who choose to follow the recommendations can effectively protect themselves and their families.

However, most people do not yet realise how important food and nutrition, physical activity, body composition, and associated factors are in modifying the risk of cancer. As just one example, few people even in the relevant health professions have been aware that being breastfed probably protects children against overweight and obesity, and therefore against cancers the risk of which is increased by excess body fat, and also that breastfeeding protects the mother against breast cancer.

Also, few people make choices solely as a result of personal reasoning. In common with animals, humans have innate desires, for instance, for sweetness, as a sign that fruits are ripe and safe, and when exposed to it, for salt. Most people are or have been members of families within which choices of meals, foods, and drinks, as well as attitudes to them and beliefs surrounding them, have been shaped. Climate, terrain, customs, culture, and other social and environmental factors shape food systems and thus what is available in shops and markets. In any society, accessibility, availability, and affordability also shape choice. Food and drink choice is also shaped by the advertising and marketing of processed foods and drinks, and most of all that which is targeted directly at children.[38] These factors all combine to hinder the operation of a free market in the interests of health (see box 2.2).

Such points apply to all people, however privileged, but particularly to populations with low disposable incomes. In lower-income countries, and among relatively impoverished populations within high-income countries, people are constrained in their access to and ability to afford many types of food and drink.[39] It is obviously fanciful to suggest or imply that subsistence or cash-crop farmers in Africa and Asia, or their urban counterparts dwelling in slums, shanty towns, or

favelas, have much scope for choice of food and drink. The same applies to families living on or below the poverty line in high-income countries.

2.6.3 Adverse trends

In general, populations are moving away from, not towards, fulfilling most of the goals proposed by the Panel. In some cases, including body weight and physical activity, the gap between the reality and the goal is wide and evidently widening. Being and remaining lean protects against a number of common cancers, but the tendency in almost all countries is towards increased overweight and obesity across all age groups. Sustained physical activity protects against cancer, but most people in the world are now much less active than was the case even a generation ago. Foods and drinks that cause weight gain, such as sugary drinks, many 'fast foods', and other processed energy-dense foods, are now produced and consumed more than previously in middle- and low-income countries as well as high-income countries, as also are red and processed meat.

By contrast, the use of salt to preserve food is generally declining, and with this the prevalence of stomach cancer. Also, rates of breastfeeding and of exclusive breastfeeding, having declined in most countries in the second half of the 20th century, are now increasing, albeit generally slowly, and mostly among more highly educated and informed families.

2.6.4 The time for change

Policy-makers in governments, and other actors, need to know that prevention of any chronic disease, including cancer, may take time. Box 2.3 shows that reduction in smoking is followed by drops in the rates of lung cancer after roughly 20 years. (Also see figure 2.8). Common adult cancers are thought to take many years to develop to the stage when they can be diagnosed. However, death rates from ischaemic heart disease begin to drop within 1 to 2 years after cessation of smoking, and recent preliminary studies of massive weight reduction following obesity surgery indicate that overall cancer rates may be halved within 7 years.[43] While morbidly obese people are obviously not characteristic, this could suggest that the benefits of prevention programmes may take effect earlier than commonly supposed. Monitoring will enable more precise judgements. However, achieving the social changes that will eventually lead to cancer reduction may indeed take decades. Policy-makers ought not to expect short-term drops in cancer incidence following the institution of cancer prevention programmes.

2.6.5 Priorities in lower-income countries

Policy-makers in many lower-income countries may still believe that cancer prevention is a minor issue compared with the need to reduce nutritional deficiency and infectious diseases. Disorders and diseases caused by food insecurity — and by the causes of food insecurity, such as poverty, inequity, oppression, and war — do indeed remain crises within many countries, especially in Africa and Asia. However, in recent decades chronic diseases, including cancers, have become the leading causes of premature disability and death in most lower-income countries, including many in Africa.

2.6.6 Additional benefits

Programmes and actions that will prevent cancer will also control and prevent most other chronic diseases, including diabetes, hypertension, stroke, and heart disease. The vision of this necessary global campaign is gradually to increase the proportion of populations who eventually die in old age and after only a short — if any — period of illness.

2.7 Public health goals for cancer prevention

This section states the Panel's public health goals for prevention of cancer, as published in the 2007 WCRF/AICR Diet and Cancer Report.[23] It also summarises the Panel's findings on the extent to which cancer is preventable by increasing exposures to protective factors and by avoiding or limiting exposure to causal ones.

Figure 2.3 summarises the Panel's conclusions from the 2007 WCRF/AICR Diet and Cancer Report that certain dietary factors, degrees of body fatness, physical activity, or associated factors convincingly or probably protect against, or are causes of, various cancers. The Panel's recommendations, expressed as public health goals as well as personal recommendations, are based on these judgements. These judgements are in turn based on evidence, mostly collected in the form of specially commissioned SLRs.

2.7.1 Body fatness and foods and drinks that promote weight gain

PUBLIC HEALTH GOALS

Median adult body mass index (BMI) to be between 21 and 23, depending on the normal range for different populations

The proportion of the population that is overweight or obese to be no more than the current level, or preferably lower, in 10 years

Average energy density of diets to be lowered towards 125 kcal per 100 g

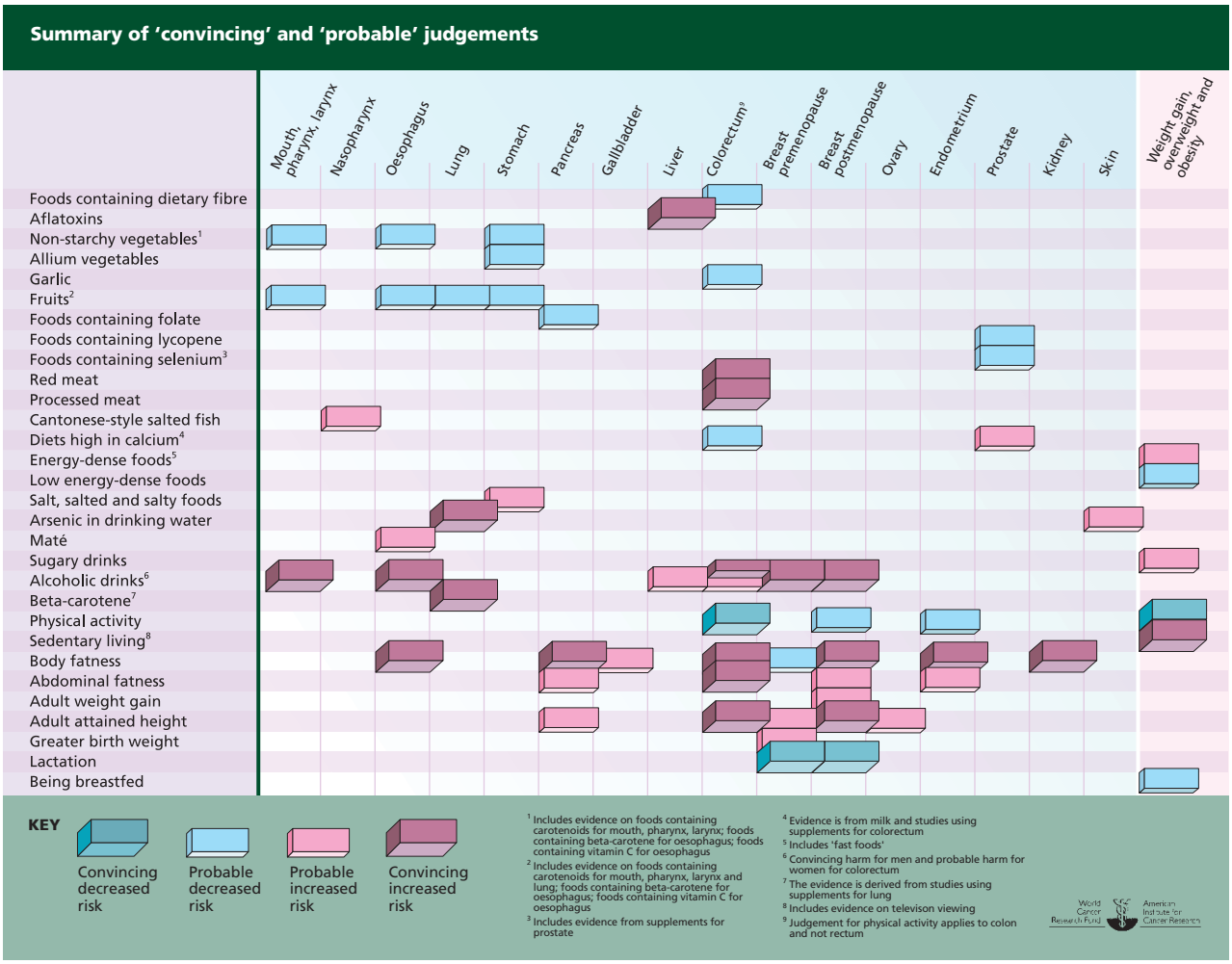
Population average consumption of sugary drinks to be halved every 10 years

BMI is a measure of weight relative to height, taken to be a reasonable indicator of degree of body fatness. BMIs of 25 or over are identified as 'overweight' and of 30 or over, 'obese'

The quantitative goal for energy density is based on relatively few data and its use needs to be evaluated further. It should be used with caution

The special review undertaken for this Report estimates that keeping body weight within a healthy range will prevent about 19–20 per cent of those cancers whose risks are increased by excess body fatness, in the USA, about 16–18 per cent in the UK; about 13 percent in Brazil; and about 11–12 per cent in China. These estimates, which can be taken to apply to other high-, middle- and low- income countries, are likely to be underestimates. (See chapter 2.4.2 and appendix A).

Figure 2.3 Food, nutrition, physical activity, and the prevention of cancer: overview of the Panel's key judgements



This matrix, from page 370 of the 2007 WCRF/AICR Diet and Cancer Report, displays the Panel's most confident judgements on the strength of the evidence causally relating food, nutrition, and physical activity with the risk of cancer. It is a synthesis of all the matrices introducing the text of Chapters 4, 5, 6, 7, and 8 of the 2007 WCRF/AICR Diet and Cancer Report, but shows only judgements of 'convincing' and 'probable', on which its recommendations are based. It does not show a detailed breakdown of the individual foods, drinks, and their constituents.

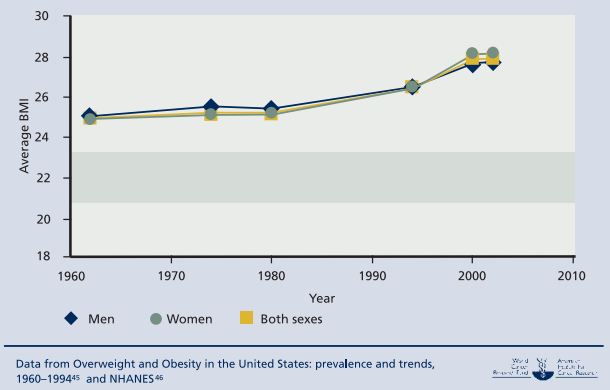
In this matrix, the columns correspond to the cancer sites that are the subject of Chapter 7 of the 2007 WCRF/AICR Diet and Cancer Report and body fatness that is the subject of Chapter 8. The rows correspond to factors that the Panel judges to be 'convincing' or 'probable', either as protective against or causative of cancer of the sites specified. Such judgements usually justify public health goals and personal recommendations. The strength of the evidence is shown by the height of the blocks in this matrix — see the key.

In the second half of the 20th century, and particularly since the 1980s, average body fatness has increased in most populations (see figures 2.4 and 2.5). At a global level the number of overweight people aged 15 and over (with a body mass index (BMI) of over 25) is projected to rise from 1.6 billion in 2005 to 2.3 billion in 2015.[44] In 2005, at least 400 million adults were obese (with a BMI of over 30) and it is projected that this will rise to 700 million in 2015.[44]

In some low-income countries, especially in Africa and Asia, food insecurity resulting in stunting and underweight remains a public health crisis. But as already stated, in most lower-income countries, deaths from nutritional deficiency and infectious diseases have dropped in recent decades, and rates of chronic diseases, including heart disease as well as obesity and various cancers, have increased.

In the USA, sugary soft drinks availability has risen from 127.2 litres (33.6 US gallons) per person in 1980 to 191.5 litres (50.6 US gallons) per person in 2006.[50] Figure 2.6 shows that between 1965 and 2002, the amount of dietary energy from soft drinks in the USA increased more than fourfold. Figure 2.7 shows that in a much shorter period of time, between 1999 and 2006, younger Mexican children more or less doubled their consumption of soft drinks.

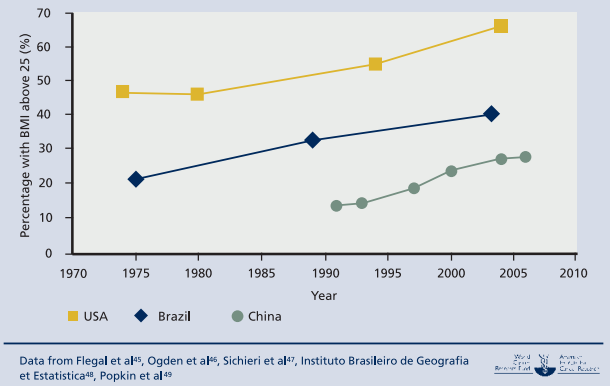
Figure 2.4 Body fatness. National trends for the USA



Data from Overweight and Obesity in the United States: prevalence and trends, 1960–1994[45] and NHANES[46]

The shaded area represents the body fatness public health goal from the 2007 WCRF/AICR Diet and Cancer Report. Figures are national average body mass indices (BMIs) for adults aged 20+ (1962–1980) or 20–74 (1994–2002); 1964–1980 data are from Overweight and obesity in the United States: prevalence and trends, 1960–1994[45]; 1994–2002 data are from NHANES.[46]

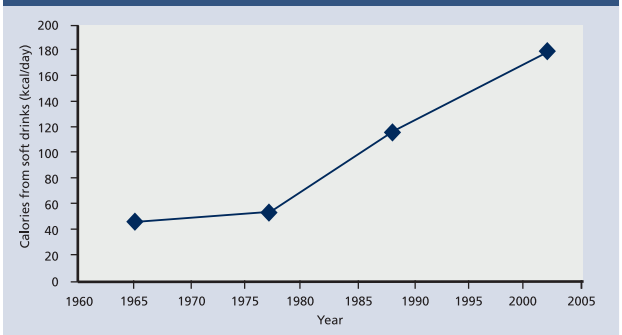
Figure 2.5 Overweight and obesity. National trends for Brazil, China and the USA



Data from Flegal et al[95], Ogden et al[96], Sichieri et al[47], Instituto Brasileiro de Geografia et Estatistica[48], Popkin et al[49]

Brazilian data for 1975 and 1989 are for adults aged 25+[47]; 2003 data are for adults aged 20+[48]. China Health and Nutrition Survey 1991–2006 data are for adults aged 20+ [49]. USA data for 1974–1994 are for 20–74 year olds[45]; data for 2004 are for adults aged 20+.[46]

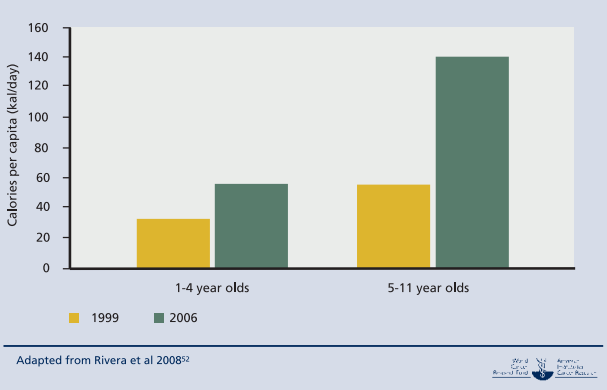
Figure 2.6 Daily energy intake from soft drinks. Trends in the USA: adults



Data from Duffey & Popkin [51]

Data are for soda and fruit drinks .[51]

Figure 2.7 Soft drinks. Trends in Mexico: younger children



Adapted from Rivera et al 2008[52]

Data are for sweetened juice drinks, which includes 100 per cent fruit juice with sugar added and agua fresca (water, juice, sugar) and for sodas, which includes carbonated and noncarbonated sugary bottled beverages.

2.7.2 Physical activity

PUBLIC HEALTH GOALS

The proportion of the population that is sedentary to be halved every 10 years

Average physical activity levels (PALs) to be above 1.6

PAL is a measure of the daily intensity of physical activity;[53] the term 'sedentary' refers to PALs of 1.4 or less

The special review undertaken for this Report estimates that regular physical activity will prevent about 17, 12, 11 and 8 per cent of postmenopausal breast cancer, and about 15, 12, 15 and 7 per cent of colorectal cancer, in the USA, UK, Brazil and China respectively. These estimates, which can be taken to apply to other high-, middle- and low- income countries, are likely to be underestimates. (See chapter 2.4.2 and appendix A)

Just as the general global trend is towards overweight and obesity, it is towards physical inactivity, itself a cause of excess body fat. With industrialisation and urbanisation, average levels of physical activity decline. Sedentary ways of life are now dominant in most countries, including cities and urban areas of lower-income countries. What are now generally regarded as high levels of physical activity (physical activity levels (PALs) of 1.70 and above) were common even two generations ago, but are now unusual in industrialised countries and in urban areas of practically all countries. The public health goal implies that people will be moderately physically active for at least 30 minutes each day, increasing to an hour a day.

Most people who live predominantly sedentary lives turn over 400–600 fewer calories (1700–2500 kilojoules) a day compared with people for whom physical activity is built into their everyday lives. The general trend is towards lower levels of physical activity. Farmers and other physically active members of rural communities are moving into cities all

over the world. Access to television is becoming universal. Within cities, ways of life at work, at home, and at leisure are all becoming increasingly inactive. As with overweight and obesity, meeting the specified public health goal involves reversing existing trends.

2.7.3 Plant foods

PUBLIC HEALTH GOALS

Population average consumption of non-starchy vegetables and of fruits to be at least 600 g (21 oz) daily

Relatively unprocessed cereals (grains) and/or pulses (legumes), and other foods that are a natural source of dietary fibre, to contribute to a population average of at least 25 g non-starch polysaccharide daily

It is not possible to estimate the extent to which plant foods or plant-based diets will prevent cancer. The 2007 WCRF/AICR Diet and Cancer Report identified several foods of plant origin as probably protective against several cancers. These include non-starchy vegetables, fruits, and foods containing dietary fibre, and some vitamins. Estimates for specific plant foods and cancers are given in appendix A. These include for foods containing dietary fibre and colorectal cancer, about 11, 12, and 11 per cent in the USA, UK, and Brazil respectively; and for non-starchy vegetables and cancers of the oral cavity, about 34, 34, 37, and 12 per cent in the USA, UK, Brazil, and China respectively. These estimates, which can be taken to apply to other high-, middle- and low-income countries, are likely to be underestimates. (See chapter 2.4.2 and appendix A).

In general, average levels of consumption of non-starchy vegetables and also of fruits are considerably below the recommended levels. For example, 76 per cent of adults in the UK and 75 per cent of adults in Brazil on average consume less than 5 portions (400 g) a day.[56]

Box 2.3 Smoking and lung cancer: a case history

Smoking and lung cancer provide a classic example of cancer being prevented by policies and actions that address its environmental, economic, and social causes.

The rise and fall of smoking and of lung cancer

Rates of cigarette smoking and of lung cancer were both low until the early 20th century. Cigarette smoking then began to become common in the USA, the UK, and other industrialised countries, and rates of lung cancer began to rise around 20 years later. By mid-century, rates of smoking and lung cancer were both high.

Figure 2.8 shows the incidence of lung cancer in men over a half century in the USA and the UK, where there are reliable long-term data. It also shows the proportion of men in each country who were cigarette smokers. In the USA, a decline in smoking started during the 1950s, and rates of lung cancer then began to decline from a peak in the early 1990s. In the UK, smoking prevalence had been declining for some time by the 1970s, and lung cancer began to decline from its peak in the 1980s. For both countries, there is a substantial time-lag between change in smoking prevalence and change in lung cancer incidence.

The trends are different for women, though the pattern is the same. Younger women are tending to smoke more, and this is reflected in a currently rising trend for lung cancer in women. Similarly, in several lower-income countries, smoking prevalence is still high and rising, and the full effects on lung cancer can be expected to become apparent in the future.[54 55]

The prolonged time-lag between changing the exposure and seeing a difference in the disease outcome provides an important context for the development, implementation, and evaluation of policies and actions.

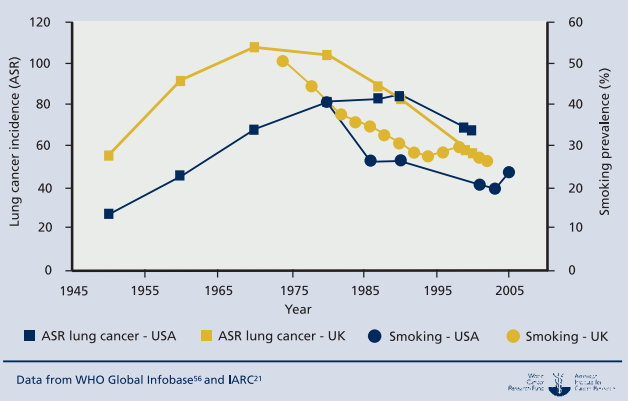
Agreement and action against smoking

Health professionals generally began to accept in the 1960s that smoking, especially of cigarettes, is the main cause of lung cancer.

Since then, smoking has been discouraged in many countries by a series of methods designed to make it easier for people not to smoke or to stop smoking. Information and education campaigns and programmes supported by governments remain one method. Others include legal, fiscal, regulatory, and other formal policies, such as laws against smoking in public places and offices, taxes levied on cigarettes and other forms of tobacco, restrictions on advertising and marketing, codes of practice on cigarette product placement and any association with glamour, increasingly explicit health warnings on cigarette packet labels and advertising and, notably in the USA, class actions against cigarette manufacturers sometimes resulting in massive payments of damages.

The figure shows the prevalence of cigarette smoking and age-standardised incidence of lung cancer in men in the UK and USA. Trends in the prevalence of cigarette smoking are followed after a substantial time-lag by a similar trend in lung cancer.

Figure 2.8 Smoking and lung cancer. Experiences in two countries



Data for smoking prevalence come from WHO Global Infobase[56] and for lung cancer incidence from the WHO database on the IARC website.[21] Both countries used surveys that included rural and urban data. USA smoking data from 1980–1990 are for age 35+, for 2001 and 2003 are for aged 20+, and for 2005 are for age 18+. UK smoking data are for ages 16+.

2.7.4 Animal foods

PUBLIC HEALTH GOAL

Population average consumption of red meat to be no more than 300 g (11 oz) a week, very little if any of which to be processed

The special review undertaken for this Report estimates that avoiding processed meat will prevent about 12 per cent of colorectal cancers in the USA, and about 10, 5, and 1 per cent in the UK, Brazil, and China respectively. These estimates, which can be taken to apply to other high-, middle- and low-income countries, are likely to be underestimates. (See chapter 2.4.2 and appendix A). Additionally reducing red meat consumption as recommended in the 2007 WCRF/AICR Diet and Cancer Report would prevent further colorectal cancers. Specific figures are given in appendix A.

Average levels of consumption of red meat and of processed meat in many countries are above the amounts recommended. For example, the average consumption of red meat in the UK is well over 600 grams a week, and is close to 550 grams a week in the USA.[57] Levels of consumption of red and processed meats in lower-income countries historically have been low, but now are often rising fast.

2.7.5 Alcoholic drinks

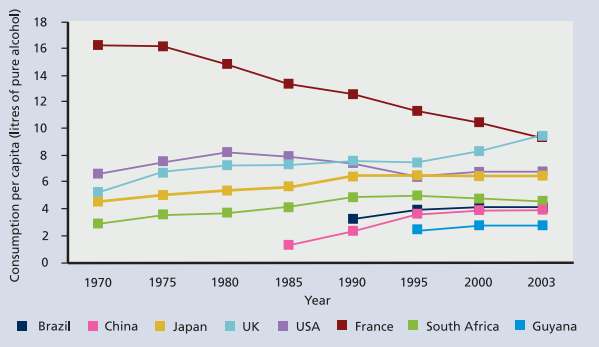
PUBLIC HEALTH GOAL

The proportion of the population drinking more than the recommended limits to be reduced by one third every 10 years

Recommended limits are 2 drinks a day for men, 1 drink a day for women

The special review undertaken for this Report estimates that not consuming alcoholic drinks will prevent a proportion of cancers of the mouth, pharynx and larynx, oesophagus, breast and liver. Estimates for specific cancers are in appendix A.

Figure 2.9 Alcoholic drinks consumption. National trends for various countries



Data from World Drink Trends 2005[58]

Figures are for consumption of spirits, beer, and wine, based on industry data.

These include for breast cancer about 11, 22, 6 and 1 per cent; and for oesophageal cancer about 34, 51, 23 and 11 per cent in the USA, UK, Brazil and China respectively. These estimates, which can be taken to apply to other high-, middle- and low- income countries, are likely to be underestimates. (See chapter 2.4.2 and appendix A)

Figure 2.9 shows that trends in different countries vary. Averages for consumption can disguise variations in drinking habits — a substantial proportion of the population may not consume alcoholic drinks at all, while most adults may drink small or moderate amounts, and a minority drink heavily. Also, estimates for consumption of alcoholic drinks based on reports from consumers underestimate actual levels of consumption; production figures are generally more reliable.

2.7.6 Preservation, processessing, preparation

PUBLIC HEALTH GOALS

Population average consumption of salt from all sources to be less than 5 g (2 g of sodium) a day

The proportion of the population consuming more than 6 g of salt (2.4 g of sodium) a day to be halved every 10 years

Minimise exposure to aflatoxins from mouldy cereals (grains) or pulses (legumes)

The special review undertaken for this Report estimates that limiting consumption of salt will prevent about 14–16 per cent of stomach cancers in the UK and the USA. Because robust data for exposure to aflatoxins were not available, no estimates of preventability through avoiding this were made.

The great majority of salt consumed is in processed food and not added during cooking or at the table. Consumption of salt is generally far above recommended levels. Very high levels of intake are found in Japan, some parts of China, Korea, Portugal, and Brazil. The average adult intake is around 9–12 grams per day in high-income countries, including Europe and North America. For example, in the UK the average daily consumption is 9.7 grams for men and 7.7 grams for women.[59] In many countries, there is a downward trend as a result of increased use of industrial and domestic freezing, chilling, and refrigeration, and correspondingly less use of salt as a preservative. For example, in Finland between 1979 and 2002 urinary sodium excretion, a measure of salt consumption, dropped by over one quarter.

2.7.7 Breastfeeding

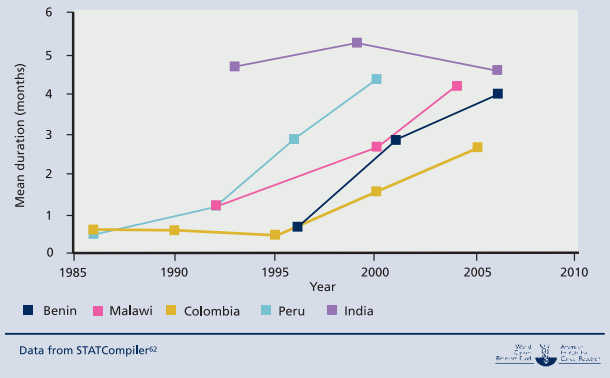
PUBLIC HEALTH GOAL

The majority of mothers to breastfeed exclusively, for 6 months

In accordance with the UN Global Strategy on Infant and Young Child Feeding

Until the middle of the 20th century, breastfeeding was practically universal. In the third quarter of the century, formula

Figure 2.10 Breastfeeding trends for various countries



Figures are expressed as average number of months of full breastfeeding which includes exclusive breastfeeding and breastfeeding + water only.[62]

feeding generally became dominant, at first in high-income countries and then in many lower-income countries. In many societies, the tradition of women relying on the experience and support of other mothers has been lost. Levels of breastfeeding are now a long way below those of the mid-20th century. For example, between 2000 and 2006 the proportion of children who were exclusively breastfed (up to 6 months of age) was 51 per cent in China, 46 per cent in India, 17 per cent in Nigeria, 21 per cent in Turkey, and 63 per cent in Chile.[60]

Since the 1980s, the unique value of breast milk and breastfeeding has become generally recognised. In several countries, there is now an upward trend towards the WCRF/AICR public health goal (see figure 2.10). In the UK, the percentage of mothers who breastfed initially has risen from 62 per cent in 1990 to 76 per cent in 2006, but the figure for extended exclusive breastfeeding is very much lower.[61]

2.7.8 Other

Other external factors affecting the risk of various cancers are public health problems only in specific areas or regions of the world. Contamination of pulses (legumes) and some other primary products with aflatoxins is a cause of liver cancer, and is a problem in many low-income countries, especially in tropical and subtropical regions. Contamination of water with arsenic is a cause of lung cancer and probably of skin cancer, and is a particular problem in parts of Asia. Drinking of *maté* prepared by traditional methods in the south of Latin America is probably a cause of oesophageal cancer. Consumption of Cantonese-style salted fish is probably a cause of nasopharyngeal cancer, but is mostly confined to populations living around the Pearl River delta. These factors are best prevented by local and regional programmes and actions, involving all actors as specified in chapters 7 and 8 of this Report.

The 2007 WCRF/AICR Diet and Cancer Report also includes recommendations on dietary supplements, and for cancer survivors. These are not subjects of this Report.

2.8 The life course approach

Prevention of cancer is best achieved by addressing all stages of life. While factors in early life contribute to susceptibility to later cancer, it is never too late to make a difference. The initial stages of a process that results in a diagnosed cancer at the age of 70 might occur decades before. In general, there is a wealth of evidence, summarised in chapter 2 of the 2007 WCRF/AICR Diet and Cancer Report, that healthy ways of life, including appropriate diets, regular physical activity, and healthy body weight, may check the cancer process at different stages of its development and at any time of life. The importance of prevention in early life is that it is then that susceptibility to cancer may be set, and in later life is also underlined by the fact that most cancers are more common at older age.

Another reason for older people to follow the personal recommendations of the 2007 WCRF/AICR Diet and Cancer Report, as summarised at the beginning of this Report, is that so doing will encourage and set an example for younger family members, friends, and colleagues. The recommendations are for everybody to follow, to prevent cancer and also other diseases, and also to enhance good health and well-being.

2.8.1 Special importance of early life

The strong evidence that high birthweight, accelerated growth in childhood, early sexual maturity, and greater adult attained height all increase the risk of breast cancer, and that greater adult attained height increases the risk of colorectal, pancreatic, and ovarian cancers, indicates that early life events are crucial modifiers of cancer risk.

Specifically, the best start in life is exclusive breastfeeding for the first 6 months, which among its other benefits protects against maternal breast cancer and probably protects against excess weight gain in the child.

2.9 Conclusions

The prevention of cancer is one of the most crucial global public policy challenges of this century. Cancer is mostly preventable. Major reductions in the rates of many cancers are achievable. But to be effective, prevention requires a new appreciation of the nature and role of external factors that protect against or are causes of cancer.

As populations grow and age, numbers of and deaths from cancer increase. However, cancer is not inevitable, even among populations who are most vulnerable. The risk of cancer is crucially affected by the ways in which people live, which in turn are shaped by their economic, social, and environmental circumstances.

As a general rule, as people become more affluent, they spend a smaller proportion of their disposable income on food and drink. In the USA and UK, average spend on food and drink is less than 10 per cent of income. In other European countries the percentage is somewhat higher. In these situations families can readily choose to spend more money on food and drink, and on physical activity. This does not imply that healthy diets are more expensive: it depends on

what is chosen, just as physical activity can take the form of free walking or expensive health clubs. However, in most parts of the world, especially in lower-income countries and also among disadvantaged populations within higher-income countries, scope for informed personal choices taken in order to prevent any disease including cancer is restricted. Even in the most privileged parts of the world, individual choice is shaped by external factors and, though less obviously, by behavioural drivers. For instance, people generally do not choose to be obese, and yet more than half of the adult populations of the USA and many European countries are overweight or obese.

The control of cancer by screening and early detection, and by medical and surgical treatments, is and will remain essential. Great advances in the understanding and treatment of cancer have been made, and epidemiological, experimental, and other types of research on biological and other factors that affect the risk of cancer need to continue. Dectection through screening of pre-cancerous lesions offers an opportunity for focused preventive activities, but many cancers are detected at a late stage, and some cancers remain relatively unresponsive to treatment. Also, most middle- and low-income countries do not have and are unlikely to gain adequate professional and material resources for treatment of cancer to be a rational or feasible approach on a population basis. This is also the case for relatively impoverished populations living within some high-income countries.

By far the greatest potential is with prevention of cancer — stopping cancer before it appears. This approach focuses not on the disease itself, but on its economic, social, and environmental as well as its behavioural and biological determinants.

This implies a shift of thinking, teaching, and practice, shared by all those responsible for public policies, programmes, and actions. The prevention of cancer, and the prevention of other chronic diseases, requires a classic public health approach.

Prevention of cancer involves everybody, professionally and personally. It lays a responsibility on all those working at all relevant levels in multinational bodies, government, civil society, industry, the media, and the health and other professions. Specifically, all actors need to accept and act on the fact that many economic, social, and environmental policies and practices impact on the risk of cancer, and on the risk of other chronic diseases, as well as on health and well-being in general.

This is not new thinking. It was the basis of the great public health works begun in the mid-19th century that gradually made water supplies safe, made cities generally healthier, and reduced rates of infectious diseases. It is now the basis of worldwide programmes agreed at multinational level, involving all actors, that are reducing smoking and other uses of tobacco and thus of lung and other cancers in many countries. This classic approach needs to be applied to the prevention of cancer by appropriate food and nutrition, regular physical activity, and healthy body weight.

Part 2

2

Evidence and evaluation

Introduction to Part 2

Much cancer can be prevented by appropriate diets, sustained physical activity, healthy body weight, and associated factors such as extended breastfeeding, as well as by not smoking and by avoiding tobacco smoke. The new estimates of preventability set out in this Report are impressive.

This raises the question of what are the most effective ways to encourage and achieve healthy diets and ways of life. The four chapters that follow first methodically identify the forces that shape what people consume and how active they are, and so their degree of body fatness, and then consider how to harness these forces in ways likely to protect against cancer.

The evidence presented relates to the recommendations in the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report and specifically to its public health goals. An extremely wide range of evidence of different types has been identified. It was gathered in the form of systematic literature reviews, supplemented by other information identified by the Panel and external reviewers. A special effort was made to locate research and other evidence from lower-income countries. The text indicates the findings that derive from the systematic review and those from other sources.

This is the most comprehensive attempt in this field to synthesise such a wide and varied literature. Any such review inevitably has limitations. The literature comes from a wide range of disciplines, and much is in the form of studies whose results are hard to compare directly. Also, the more rigorous studies are mostly carried out in temperate high-income countries — the USA and some European countries in particular — that have the resources for this type of research.

Each chapter then includes evaluation of the evidence, in the form of the likely political feasibility and acceptability of new policies and actions; their potential impact and possible benefits and harms; their general acceptability; and their cost, the time-frames needed to move from agreed policies to actions, and their transferability to different settings.

Some general themes emerge. First is the extent to which the method for gathering evidence has captured all the relevant evidence. The reviews have necessarily focused on evidence as it relates to food, nutrition, and physical activity as factors determining cancer risk. However, these findings need to be seen in a broader context that was not addressed by the reviews. Examples include anthropological and other information on ethnic, sociocultural, and ecological factors. Recognising such contextual settings as important determinants of the impact of various actions has been critical in the Panel's judgements. Furthermore, the review has addressed policies and action for cancer prevention. But the recommendations in the 2007 WCRF/AICR Diet and Cancer Report will have the effect of also reducing the risk of other chronic diseases. The policies and actions identified may therefore not be specific to cancer, or even intended to reduce cancer risk.

Another theme is the vital importance of public health initiatives designed to protect the health of children. Chronic diseases such as cancer usually become apparent in later life, but their seeds are often sown in early life.

A further theme is the need for relevant actors to work together. As one example, the evidence shows that actions to restrict access to vending machines for sugary drinks in schools are more likely to result in reduced consumption when these are part of concerted programmes actively supported by parents, government, relevant civil society organisations, and public opinion. Isolated interventions tend to produce relatively unimpressive results that are not sustained. Often this does not mean that the ideas that lead to such actions are mistaken, but simply that, by their nature, isolated interventions are unlikely to make a substantial impression.

A similar point applies to the nature of initiatives. Those that aim for an integrated series of outcomes, such as ways of life that include healthy diets and sustained physical activity, and that therefore reduce the risk of various diseases, are more likely to achieve sustained results than those that isolate exposures and outcomes. The important message is that policies and actions are best combined with those designed to prevent other diseases and to enhance well-being.

Each of the four chapters that follow includes tables showing the Panel's judgements of the nature and quality of the evidence, and of the potential impact of enacted public policies on patterns of diet, physical activity, body fatness, and associated factors, and thus on cancer risk.

This is the first report of its type whose conclusions and recommendations are substantially based on systematic literature reviews, and on the transparent and methodical process of judgement described above. From now on, more attention needs to be devoted to continuous evaluation of interventions, thereby providing information on those components that are more or less valuable and evidence of their effectiveness.

Guided by the principles set out in chapter 7, the recommendations in the final chapter, when translated into policies and then concerted actions, are those that are most likely to be effective in the control and prevention of cancer. They will also protect against other diseases, prolong active and healthy life, and enhance well-being.

CHAPTER 3

The physical environmental dimension

The physical environment includes both the living and the physical worlds. These aspects of the environment have only recently been considered as shapers of food systems and supplies, and thus of what people produce, purchase, and consume, and of their patterns of physical activity, and in turn of their body composition. Awareness of the significance of the environment has been heightened since the 1980s and 1990s by realisation that the world's living and physical resources are diminishing, and agreement that human activity is changing the global climate. Included here as factors liable to drive patterns of diet, physical activity, and body composition, and thus to affect the risk of cancer, are climate and terrain, food production, retail and other food system environment, planning and transport, and workplace and school environment.

Most of the evidence in the literature reviewed comes from high-income countries, in particular from the USA and Europe. An attempt has been made to supplement this with examples from countries elsewhere in the world.

3.1 Climate and terrain

Until recent times, the nature and quality of food and drink were shaped by immutable local climate and terrain, which to a large extent determined what could be gathered, hunted, or cultivated, and by what methods. Industrialisation and global trade means that people with higher incomes can buy and consume food from all over the world all year round. Nonetheless, food production (see chapter 3.2) remains to a large extent shaped by climate and terrain, as do the food systems in rural areas of lower-income countries.

Agriculture is mainly dependent on the weather. Local climate dictates what crops can be grown (at least in open fields) and when in the year they can be harvested, but economic and political forces determine which crops are actually grown. Global trade in food and high-technology food production, food processing, packing, and storage mean that many seasonal or exotic foods are widely available all year round.

3.1.1 Summary of evidence

3.1.1.1 Patterns of diet

Climate and climate change

Throughout history, variations in external temperature, humidity, wind, and other aspects of climate have been regarded as purely natural phenomena. It is now generally understood that human activity also affects climate, and thus food systems and supplies and patterns of diet. (See box 3.1 and chapter 3.1.2)

It is highly likely that climate change will affect food systems and supplies, most of all in parts of the world where agriculture is fragile because of poor soil, salination, erosion, and vulnerability to rising sea levels. Such effects will be generally damaging to local agricultural economies and also to food exports. Some effects may be beneficial. At the time this Report was compiled there was no direct evidence in this area. (See box 3.1)

For soil and soil degradation see chapter 3.2.

3.1.1.2 Water

Contamination with arsenic

Contamination of drinking water with arsenic is a cause of lung and (probably) skin cancers. High concentrations are found in drinking water in areas of Bangladesh, China, and West Bengal (India) and localised areas of Argentina, Australia, Chile, Mexico, Taiwan, China, the USA, and Viet Nam. Levels in affected areas may range from tens to hundreds or even thousands of micrograms per litre,[1–4] compared with less than 10 μg per litre (the World Health Organization (WHO) guideline limit[1]) in unaffected areas.

The systematic literature review (SLR) confirms that contaminated drinking water is a major source of exposure to environmental arsenic.[5] Providing uncontaminated drinking water prevents further arsenic accumulation and may reduce existing levels.[6] Particularly in parts of Asia, many new deep wells have been drilled to provide clean drinking water, but through bedrock containing arsenic. People in these regions will benefit from the provision of alternative, safe drinking water.[1]

Various agricultural practices can also contribute, such as the use of contaminated water to irrigate food crops,[7] arsenic-containing fertilisers and pesticides,[8] and contaminated feed for livestock destined for the food chain.[9] In endemic areas, arsenic can accumulate in rice grains[10] and roots[11] and some green leafy vegetables.[7 12 13] Arsenic levels are high in the soils and river sediments of the Antofagasta Region in northern Chile, and levels in the corn (maize) and potato crops grown here are also high — 2 mg/kg in corn (maize).[4] In Bangladesh, vegetable samples were found with arsenic concentrations of 306–489 μg/kg. And in India, many vegetables (especially skins) and spices are contaminated.[4] It is not clear whether irrigation practices mobilise arsenic and so contribute to food contamination.

For depletion of water see chapter 3.2.

3.1.2 Evaluation of evidence

Many aspects of climate and terrain affect food systems and supplies. These are mostly immutable and therefore not evaluated here.

Climate change as now projected is very likely to have a profound impact on food systems and supplies, especially in tropical, low-lying, and other vulnerable territories. It is likely that any impact on food systems and supplies will, over time, in turn affect rates of disease, including chronic diseases such as cancer, cardiovascular disease, and obesity. However, currently there is no pertinent evidence that can be evaluated. Research into the impact of climate change on food security and on the risk of nutrition-related diseases, including cancer, is important.

Contamination of water supplies with arsenic is partly a natural phenomenon, and is also made worse by agricultural practices. Given the toxicity of arsenic, this contamination needs to be controlled and prevented.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of two options for possible action. These are modelling and monitoring impact of climate change on food systems and on patterns of diet, and prevention of arsenic contamination.

3.1.2.1 Modelling and monitoring impact of climate change on food systems

Political feasibility and acceptability

Modelling and monitoring of the impact of climate change on food systems and food supplies, and patterns of diet, is likely to be politically acceptable, especially in a period of increased food insecurity and rising food prices. The work can be done by relevant expert actors as part of a more general modelling and monitoring programme.

Potential impact

BENEFITS: As stated above, climate change is likely to have a major impact on food systems. Modelling and monitoring its impact will increase understanding of its effects, and so allow policy to be developed based on a more comprehensive approach, and may well lead governments to reduce carbon emissions from all major sources, including industrial agriculture and long-distance food transport.

HARMS: Those sections of the food industry whose business depends on high carbon emissions and long-distance transport will need to adjust.

General acceptability

As part of a general policy to model and monitor climate change, the option here is likely to be acceptable.

Box 3.1 Climate change

'Climate' refers to external temperature, humidity, wind, rain, and other aspects of weather over prolonged periods of time. These shape the nature of food systems and supplies. 'Climate change' in its current sense usually refers to the average rise in global temperatures, also known as 'global warming'. Its relevance to this Report is its likely impact on food supplies and in particular on food security, most of all among lower-income countries and populations.

Causes and consequences

Climate change, mainly caused by increased burning of fossil fuels, is now accepted as a real phenomenon by the Intergovernmental Panel on Climate Change and by authoritative national governmental reports.[14–18] Between 1950 and 2000, a period when the global human population increased from about 2.5 billion to about 6 billion, the use of oil increased about sevenfold, from around 3800 to 27 600 million barrels a year.[19]

Climate change has been described as 'the greatest and widest ranging market failure ever seen'.[17] Destruction of forests and industrialised agriculture also contribute (see box 3.3). The level of carbon dioxide and other 'greenhouse gases' in the atmosphere is roughly 50 per cent higher than before the Industrial Revolution, and is beginning to rise exponentially. Some 'business as usual' projections show levels up to three times higher towards the end of this century.

Projections of climate change mostly show that current trends are towards the average global temperature rising by around 1.5–2°C by the middle of this century and, unless emissions of greenhouse gases are cut to well below current levels, up to 4–5°C in the second half of this century, which 'would transform the physical geography of the world'.[17] The impact will depend on the degree of heating, but is predicted to include a rise in sea levels, and therefore occasional or permanent inundation of low-lying land, and more frequent extreme weather conditions, such as hurricanes, flash floods, heatwaves, and droughts,[14] and therefore disruption including of food production.

Impact on food supplies and food security

Climate change may bring some benefits. In Canada, Russia, and other northern countries with long winters, while melting of permafrost will disrupt transportation systems and housing, the growing season will lengthen and so more food production should be possible.[18]

On the other hand, the impact on food supplies and food security in the tropics and most of all on low-lying and relatively arid and ecologically fragile tropical regions will be negative.[14 20] For example, melting of glaciers will reduce supplies of water to the northern Indian sub-continent and to western China. About one fifth of Bangladesh is highly vulnerable to flooding, inundation, and salinisation. The arid regions of sub-Saharan Africa will become hotter and drier. The eco-system of the Amazon rainforest may break down.[14 17] Heatwaves will become more severe in tropical countries and, together with other more frequent extreme weather patterns, are liable to damage or even devastate crop production.[21]

Consumers as well as producers will be affected, particularly low-income and other vulnerable populations in low-lying cities such as Shanghai, Hong Kong, Tokyo, Cairo, Kolkata, Mumbai, Karachi, Buenos Aires, Miami, New York, and London.

Geopolitical impact

The biophysical impact of climate change may be less severe than its geopolitical impact.[22] One prediction is that by 2050 up to 200 million 'climate migrants' may have moved from parts of the world most adversely affected by the effects of climate change to cities in their country or to other countries, which would amount to a tenfold increase compared with current numbers of refugees and displaced people.[17] Mass movements from Africa and western Asia to Europe, Latin America to the USA, and South-East Asia to Australia would place new pressures on food systems and increase food insecurity.

It is generally agreed that unless global warming is slowed and halted by radical actions taken by the governments of major industrialised and industrialising countries, it will increase food insecurity, undernutrition, and inequity between and within continents and countries, among many other adverse effects.[20 23]

Cost

Given a general policy, the cost specifically of modelling and monitoring the impact of climate change on food systems need not be great. In any case, the cost of no modelling and monitoring, and consequent lack of control of climate change, is likely to be even higher.

Timeframe

Indefinite.

Transferability

By its nature this is a global project.

3.1.2.2 Prevention of arsenic contamination

Political feasibility and acceptability

The WHO recommends that levels of arsenic in drinking water should not exceed 10 μg per litre.[1] In many high-income countries, water is piped to houses and must meet relevant standards. In these countries, policies to ensure low arsenic concentrations in water are feasible. In rural areas, especially in lower-income countries, many communities drink water of variable quality supplied by local wells. Reducing levels of arsenic in drinking water is likely to be politically acceptable and feasible (see box 3.2). Feasibility of setting and meeting target levels will vary depending on availability of public money and other resources.[24]

Potential impact

BENEFITS: Reduction of contamination will protect against lung and (probably) skin cancers and other diseases. Reducing disease has economic as well as health benefits. Policies that provide clean water to all are equitable.

HARMS: In low-income countries, people who cannot afford to buy safe water or home-treatment systems will be further disadvantaged. Some people may not be able to walk or travel to an alternative source of uncontaminated water. Water treatment methods may produce waste high in arsenic, which needs to be disposed of in ways that do not produce further contamination of land.

Box 3.2 Prevention of arsenic contamination: Bangladesh, Mexico, and Chile

In Bangladesh, many wells were sunk to provide water free from microbial pathogens. In the 1990s, it was discovered that the water was sometimes contaminated with arsenic. Contamination is nationwide but not all wells are affected and contamination levels vary. Policy was first to inform communities about the contamination level in their local wells and to identify local sources of safer water. Then arsenic levels were lowered quickly and affordably, for instance through bucket filtration systems that remove 80 per cent of arsenic.

In Mexico and Chile, there are regions where groundwater is heavily contaminated with arsenic. In both countries, provision of uncontaminated water is publicly funded. In Mexico, a new pipeline has been built to carry safe drinking water to affected communities. In Chile, six water treatment plants have been upgraded to reduce arsenic in drinking water to levels of 50 μg per litre.[24]

General acceptability
Programmes to reduce arsenic contamination are likely to be highly acceptable. Some solutions may involve considerable effort. In rural communities, people are likely to need to travel further to alternative water supplies. They may not do so if there is a hand pump or well nearby believed to supply apparently clean and otherwise safe drinking water.

Cost
Water with high levels of arsenic can be used safely for laundry and bathing, so costs can be reduced by limiting treatment to drinking water. Decontamination becomes more expensive the lower the acceptable target level set. In rural areas, water may be obtained from a number of sources, which increases costs if all of these need to be treated. Removing arsenic from piped water is costly. In high-income countries, household arsenic-removal systems can be installed, with the cost met by the homeowner.[25] In low-income countries, alternative, non-arsenic-contaminated supplies can be encouraged.

Timeframe
Water treatment may reduce levels of arsenic in water immediately. Longer-term projects may involve technical input, education, or the sinking of deeper wells.[1]

Transferability
The source and level of contamination varies widely around the world. A method that works in one part of the world may not be appropriate elsewhere.

Climate and terrain.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Modelling and monitoring impact of climate change on food systems			✔*		✔	
Prevention of arsenic contamination	✔			✔		

*Low confidence because as yet no direct evidence

3.2 Food production

Food production appears in this chapter because of its relationship with the land. The significance for human health of the ways in which food is produced and stored is increasingly recognised. Production is taken here to include agriculture and horticulture, ranging from its industrial to its subsistence forms; smallholdings and gardens designed to produce food; and also the storage of primary produce.

Methods of farming can affect the nutrient content of foods in ways not evident to consumers. In intensive systems, for instance, animals are fed processed foods for rapid growth and systematically medicated. Crops are treated with biocides; bred and selected for optimal growth, appearance, and shelf-life (not necessarily nutrient content or taste); grown with chemically controlled or prepared fertilisers; and often harvested before ripeness and transported long distances, or stored for quite long periods of time before sale. (Economic aspects of food production are covered in chapter 4.)

3.2.1 Summary of evidence

3.2.1.1 Patterns of diet

Soil, soil degradation, water, and water depletion

Agriculture depends on soil and water. Pre-industrial methods of farming were and are generally based on principles of sustainability. Intensive industrial production of animals and other forms of intensive industrial agriculture have greatly increased supplies of food and also tend to degrade soil and deplete sources of water. (See box 3.3)

Horticulture

The term horticulture includes smallholdings, home farming, gardening, and urban agriculture (for general context see box 3.3). Diets high in plant foods, and specifically non-starchy vegetables, fruits and other foods high in dietary fibre, vitamin C and carotenoids, probably protect against a number of cancers.

Smallholdings, home farms, and gardens provide vegetables, fruits, and other plant foods, and also meat and its products from smaller animals.[29] Family food complements field agriculture. Field crops provide the bulk of energy needed by communities, while gardens supplement diets with nutrient-rich vegetables and fruits and with roots, tubers, animal sources of protein, herbs, and condiments.[29]

In Africa and other lower-income regions, environmental degradation, disruption, wars, famine, migration, and the need to grow cash crops threaten the space, expertise, experience, and supply of materials needed to maintain family farming and gardening.

As food prices increase and food insecurity becomes an issue even within higher-income countries, home farming and gardening as a way of increasing production and consumption mainly of plant foods is likely to become of increased importance.

The evidence identified by the SLR mostly focused on home production of vegetables and fruits, the establishment of demonstration gardens, and seed distribution. Several studies used these approaches to improve the availability of foods high in carotenoids to tackle shortage or deficiency of vitamin A. One study involved a project supporting home gardening in a South African village to encourage production and consumption of crops high in beta-carotene. The intervention increased intakes of vegetables and fruits, and raised blood levels of retinol in village children.[30] A cross-sectional study found that households involved with a kitchen garden reported producing and consuming a wider variety of vitamin A-rich vegetables compared to households without gardens.[31] Home gardens have been effective around the world, for instance in Bangladesh, Nepal, South Africa, and Tanzania.[31–36]

Most studies that have included education and communication components have shown improvement in the quality of diets. Projects are most effective when originated by communities themselves so that they have a sense of ownership at all stages from planning to evaluation.[30 34 37] None of the trials was randomised, and so they may have selected those participants most willing to adopt healthy ways of life. Several studies also did not take baseline data to assess nutrient intake before the trial began, allowing no proper comparison of effect.

Crop breeding and fertilisation

The SLR found some papers relevant to crop breeding as a determinant of nutrient availability. Deliberate biofortification (the breeding of food crops to increase the content of bioavailable micronutrients) can increase carotenoid availability. Also, adding selenium to fertilisers can enhance its concentration in the soil and so in the crops grown in that soil.[38] (See box 3.3)

In addition, there is a large literature going back to the 1960s of studies examining the variability of nutrients such as beta-carotene and many other antioxidants, vitamins, and minerals in staple crops, fruit, and other produce. Traditional breeding approaches have been used to increase micronutrient content, especially in indigenous crops, for instance beta-carotene in sweet potato. More recently, genetic modification techniques have been used to address availability of vitamin A, iron, and other micronutrients, especially in major staples such as rice and corn.[39]

'Golden rice' is a genetically modified variety of rice specifically engineered to produce beta-carotene in the edible grains. The pro-vitamin A carotenoid is produced in quantities sufficient to change the colour of the rice, generating a recognisable yellow shade. Two varieties have been developed since 2000. These are proposed to be used to reduce vitamin A deficiency, which remains common in a number of lower-income countries.[40]

There is little reliable evidence of the impact of crop fertilisation practices on nutrient availability. The evidence was too weak to draw firm conclusions about the effect of production methods on the content of micronutrients and other bioactive compounds in food.[41–46]

Box 3.3 Food production systems

The ways in which food is produced have both direct and indirect effects on the risk of disease, including cancer.

Industrial food production

'Industrial food production' is used to mean capital- and resource-intensive and typically large-scale agriculture, including of animals, mixed farming, and horticulture.

This type of agriculture became dominant in higher-income countries from the second half of the 20th century, and is now also dominant in many parts of lower-income countries. It is one defining characteristic of 'development' – meaning economic development. Amplified by a great increase in international transportation, industrial food production has transformed the scale and nature of global, national, and local food supplies.

Scale of food produced

Industrial production systems make use of oil, fertilisers, biocides, and other chemical and pharmaceutical inputs and require a lot of water. Their main advantage, which until the 1980s and 1990s has generally been seen as of overriding importance, is the efficiency of scale. The output of animal and plant food made possible by industrial systems since the mid-20th century has outpaced population growth, and has provided relatively cheap supplies of fresh and 'value-added' processed foods and drinks throughout the world. The 'green revolution', an inherently intensive method of cereal production, doubled output of wheat or rice in a number of low-income countries between 1961 and 1985, and has made Mexico, India, the Philippines, and other countries large-scale grain exporters.

Animal food and feed

Industrial methods have vastly increased the production and thus the processing, distribution, and sale of meat, including poultry, and of other foods of animal origin. Economies of scale have made red meat, poultry, and meat products relatively cheap. In higher-income countries and many urban areas of lower-income countries, average consumption of red meat is higher than recommended in the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report. Consumption of processed meat, a cause of colorectal cancer as is red meat, is often also high. On the other hand, meat is a valuable source of iron, zinc, and other nutrients that can be lacking in the diets of impoverished communities.

As mentioned in the main text of this section, the ingredients of animal feed can be manipulated in order to make meat and other animal products more nourishing and theoretically protective against cancer. Soil can also be supplemented with nutrients that will enrich crops as well as the flesh of the animals that eat them.

Traditional systems

Industrial food production has largely replaced traditional methods that are labour intensive. These systems are still practised in lower-income countries by farming co-operatives and by small and family farmers, smallholders, home growers, and market gardeners, sometimes on a large scale, sometimes at village or family subsistence level.

Versions of traditional farming methods have been preserved or re-introduced in high-income countries, where they are sometimes identified as 'organic'. Claims made for significant nutritional benefits have not been established. Traditional systems are relatively labour intensive and so offer employment notably to rural families who might otherwise have no work. 'Organic' food and drink is characteristically more expensive.

Problems with industrial systems

The benefits of industrial food systems have to be balanced with their harms, which are mostly to the physical environment. One harm has specific and direct relevance to cancer: the release of arsenic from rock into water supplies caused by the sinking of wells to access water for irrigation. (See chapter 3.1.1.2)

Various inputs used in industrial systems are known or probable carcinogens in experimental conditions, but when used according to internationally agreed limits, the residual traces in food and drink fall within levels identified as safe. (Accidental or occupational exposure to biocides and other carcinogenic agents is outside the scope of this Report.)

Industrial systems can also affect climate, locally or in large regions, and destroy forests, cause soil degradation and erosion, and create arid regions and even deserts where little rain falls.[15 16] This in turn depletes food supplies, creates or worsens food insecurity, and can contribute to famines.[26]

Production of animals is the aspect of industrialised systems that has most impact on the physical environment. Livestock production occupies 30 per cent of the land area of the planet. It contributes 18 per cent of greenhouse gas emissions measured as carbon dioxide equivalents, mostly as a result of deforestation to accommodate livestock and from emissions by animals of methane and nitrous oxide.[27] Industrial production of animal feed and of livestock is a major cause of depletion of water supplies; it is estimated that by 2025, two thirds of the world's population will be living in areas liable to be short of water. Animal production is also a major driver of soil degradation, pollution, overfishing, and salinisation of coastal areas.[27] Global production of meat is projected to double from 229 million tonnes in 2000 to 465 million in 2050, and in the same period milk production is also projected to double.[27]

While the industrialisation of food systems has been one factor in helping meet the increasing food needs of the growing world population, achieving a food supply that allows food security for all, and that promotes health throughout life may place strains on the several parts of the food chain. In some cases meeting current dietary recommendation such as for oily fish consumption will be unsustainable, as the pressure on already overfished stocks would exceed demand.

Global public goods

Air, soil, and water need to be regarded as public goods, and their preservation and protection as essential to the health, welfare, and survival of the human species and the living and natural world.[28] Achieving this is at least as great a challenge as facing the facts of climate change.

Animal production

In high-income countries, meat and animal products (mainly domestic) are important sources of total fat and saturated fatty acids.[47] Red and processed meat are causes of colorectal cancer. 'Wild' meat is lean, low in saturated fatty acids, and high in n-3 fatty acids.[48] Meat from either source is a potentially valuable source of protein, iron, and other micronutrients.

Some aspects of industrial animal production were

assessed in the SLR. Intensive systems involving rapid weight gain in cattle, pigs, and poultry produce meat with higher energy from fat, increased ratios of saturated to unsaturated fatty acids, and lower stores of vitamin A and beta-carotene.[49–52]

Livestock feed can be changed in ways specifically designed to improve human health, though not specifically for cancer. Most countries regulate livestock feed, for example by setting maximum levels of additives and contaminants and prohibiting some ingredients.[53] Such controls affect the nature and quality of food derived from livestock, as well as ensuring that the animal feed is safe and fit for purpose. Nevertheless, high levels of some micronutrients, for example retinol, in animal feeds might still pose a risk to human health.[54]

Aflatoxin contamination of plant foods

Aflatoxins, produced by certain moulds or fungi, cause liver cancer. They affect crops such as cereals (grains) and pulses (legumes), as well as nuts, seeds, and foodstuffs for livestock.[55 56] Warm, damp climates promote the growth of aflatoxin-producing moulds. Aflatoxin contamination remains a problem in many tropical countries that do not have adequate resources to implement the available solutions (also see box 1.6).

The SLR shows that agricultural practices, along with climate and soil conditions, are a strong determinant of aflatoxin contamination.[57] A wide range of agricultural practices can greatly increase levels of aflatoxins, and many can be modified to reduce contamination of crops with these carcinogens. In many hot, humid countries, contamination occurs post harvest, and this is a major problem in low-income countries.

Contamination can be prevented during growth, harvest, storage, and processing. Pre-harvest factors include the timing of planting, irrigation, and resistance of seeds to drought, pests, and growth of the fungus. Interventions include inspection of crops and use of fungicides. Post harvest, drying the crops properly and removing contaminated kernels or grains also reduce contamination.[55 56] Rapid drying of harvested crops can reduce contamination, but in low-income countries where access to such technology may be poor, techniques such as sun drying, drying on mats, and storing the crops off the ground can be effective. Contamination usually affects only a few nuts or kernels in the stored crop, so hand or automated sorting to separate the contaminated product can reduce exposure. [55 56] One study in Guinea, West Africa, found that thorough drying and proper storage of groundnuts in subsistence farming villages reduced average blood levels of aflatoxin by over 50 per cent.[58]

3.2.2 Evaluation of evidence

The nature of agriculture and horticulture and associated aspects of food production has a fundamental effect on food supplies and thus on dietary patterns. Food systems based mainly on the primary production and light processing of plant foods such as cereals (grains), roots and tubers, vegetables and fruits, and pulses (legumes), in which animals and their products are ancillary, generate plant-based diets. Food systems in which the production of animals is a major international industry generate diets in which meat and animal products are central. Agricultural methods are also important: thus, the more intensive the production of animals — including poultry — the more fat and saturated fatty acids their meat contains, which increases its energy-density.[59] The animal feed can also influence the nutritional quality of food.

There is a wealth of evidence relating the nature of food systems to food supplies. However, little relates specifically to food, nutrition, and physical activity as determinants of cancer risk. Consequently, little evidence on food systems was identified in the SLR. This is largely because research tends to focus on specific aspects of food production — thus, there is a great deal of good evidence on the important issue of aflatoxin contamination, but less on the impact of agricultural systems on dietary patterns. In this area, and as a general observation, more research needs to be undertaken.

Taking the evidence as presented all together, *the Panel has chosen* to consider evaluation of four options for possible action. These are evaluating the impact of industrial and other food systems on patterns of diet; encouragement of smallholdings, home farms, and gardens; improvement in methods of animal production; and prevention of aflatoxin contamination. Evidence for a fifth option, increasing the nutrient content of vegetables and fruits, was insubstantial and is not evaluated here.

3.2.2.1 Evaluating the impact of industrial food production on patterns of diet

Political feasibility and acceptability

Industrial food production, and industrial food systems generally, have clear benefits but in other ways have harmful effects. An evaluation of these will need to apportion value to each. One particular advantage of industrial food production is the perception that it results in cheaper food; however, there might be adverse effects deemed to outweigh this. Any analysis that recommends changes likely to result in more expensive food will not be popular.

Potential impact

BENEFITS: Any well-founded analysis of food production systems and their effect on patterns of diet and thus on human health will provide a basis for more rational public policies.
HARMS: As well as some governments, the farming and associated industries will resist any analysis that emphasises the problems of industrial food production.

General acceptability

In many countries, public awareness of the problems caused by industrial food production is high, but resistance to increases in the price of food is also generally high, and all the more so at a time of rises in prices caused by other factors and general economic instability or recession.

Cost

The cost specifically of analysis need not be great. The

substantial costs and also benefits will result from enacted policies that follow such analysis.

Timeframe
Indefinite.

Transferability
By its nature this is a global project

3.2.2.2 Encouragement of smallholdings, home farms, and gardens

Political feasibility and acceptability
Smallholdings and gardens guard against food insecurity and therefore dietary deficiencies,[60] and so such moves may be welcomed politically. Feasibility will also depend on available resources and on local capacity. For example, a study in South Africa found that in many rural areas there was a lack of infrastructure for the implementation and promotion of sustainable gardening programmes.[34] The main issue is to strengthen small and home farms producing foods for local communities and not to replace them with cash crops. Governments in Africa and Asia, especially of countries with big foreign debt burdens, favour cash cropping.

Potential impact
BENEFITS: Plant-based diets probably decrease the risk of a range of cancers and, being typically low in energy density, probably protect against weight increase, overweight, and obesity. Home farm and garden projects enable communities to learn how to produce a range of fresh foods. Gardening also involves physical activity and such projects can help people develop new skills that could be used to gain employment. They may also generate an additional income source.[34]
HARMS: There is potential for harm from such projects if gardens are sited in areas affected by pollution or contamination. Wide access to home gardens is equitable, but access could be limited to those involved in the project.[37] However, gardening expertise can be shared among the community.[30] Smallholdings, home farms, and gardens require land and water, so urban communities may be less able to set up such schemes, although rooftop gardens have been used in various places such as Dhaka, Bangladesh.[63]

General acceptability
Sustainable local production protects against food insecurity and is usually welcomed by the communities involved. It can also teach skills and provide nutritious food for families (see box 3.4). However, not all people are inclined to grow their own food.

Cost
The cost of setting up new community farms and gardens may be substantial where land is degraded or unavailable and water is scarce. Additional costs include some level of organisation, an initial supply of materials (tools, seeds), and training. Start-up costs may be covered by the communities' own resources or external funding, but ongoing costs may need to be covered by the community.[30]

Timeframe
It is likely to take more than one season for home farms and gardens to become established. Time is also needed to allow for teaching gardening and food preparation skills.

Transferability
Smallholding, home farm, and garden projects have so far been designed primarily for food-insecure rural populations at high risk of undernutrition. Urban populations with little or no access to land also are likely to have better access to a variety of vegetables and fruits and therefore be less inclined to garden. Schemes in high-income populations to encourage people to grow their own vegetables and fruits[64 65] are likely to become more attractive as the prices of food in shops increase.

3.2.2.3 Improvement in methods of animal production

Political feasibility and acceptability
Intensive production of animals, and the distribution and sale of meat and animal products, is a vast and growing industry in the USA, Europe, and other high-income countries. Availability and consumption of animal foods is increasing in lower-income countries. Any serious proposal to reduce production of animal foods will be resisted by a highly capitalised and resourced industry, and perhaps also by consumers. For these and other reasons, calls for plant-based diets on a global scale are likely to be resisted also by

Box 3.4 Gardens in Viet Nam

In rural areas of Viet Nam in 2000, approximately 45 per cent of children and 40 per cent of women were malnourished. A 3-year pilot project carried out from March 1997 to June 2000 sought to validate an approach for tackling child malnutrition in the countryside.

The project integrated nutrition education with the transfer of small-scale agricultural technology to food-insecure households with malnourished children. The strategy was to give training and very small grants to selected households, which were clearly identified and closely monitored. Some 12 000 poor households, each with at least one young malnourished child, were assisted. In addition, 1800 community workers and staff at district-, province-, and national-level from the agriculture and health ministries and the women's union were trained. Limited incentives were also given to commune networks.

An evaluation in 1999 found that the project had reduced the rate of malnutrition by 12.8 per cent in 2 years. It confirmed the findings of a previous pilot study in four communes, in which the nutrition improvements were sustained. The project enabled 82 per cent of the participating households to improve food production and food availability through better home garden, animal production, and other agricultural activities; and children increased their daily consumption of vegetables and fruits. The experience provided useful lessons for the Food and Agriculture Organization of the United Nations and others working to improve household food security.[61 62]

governments, notwithstanding the compelling evidence that industrial production of animals on current and projected scales is unsustainable.[66] A more feasible and acceptable approach is therefore to focus on less intensive methods of animal production.

Potential impact

BENEFITS: Reducing the fat content of meat and other animal products will reduce its energy density. Improving the fatty-acid composition of foods may help to prevent other diet-related diseases such as heart disease.[67 68]

HARMS: See Cost.

General acceptability

Support of less intensive methods of rearing livestock now amounts to a popular worldwide movement. Those who oppose intensive animal production are likely to welcome modifications and restrictions. Those who enjoy relatively cheap meat and its products are liable to object to any policy that has the effect of reducing availability or increasing prices (also see Political acceptability and Cost).

Cost

Wholesale changes in highly capitalised agriculture systems will be expensive and will result in some farmers going out of business. Horticulture is generally more labour-intensive than 'factory' farming of animals. Any policy that has the effect of making meat and animal products too expensive for people on low incomes would be generally regarded as potentially damaging to health. This said, modification of animal production need not be especially threatening to industry, and corresponding development of horticulture in response to the recommendation for plant-based diets will involve more business and employment, which could offset losses in the animal production industry.

Box 3.5 Thailand acts against aflatoxin

Thailand has been spending around $US 50 million per year to reduce aflatoxin contamination.[70] Here, the Thai-UK Maize project achieved reduced levels of aflatoxins and acceptance by many sectors of the country's maize (corn) industry of a set of recommendations.[71] This project identified methods effective in reducing aflatoxin contamination, except during drought conditions, to very low and even trace levels: field drying, decreasing on-farm storage, speeding up the time from harvest to shelling, and mechanical drying. The implementation phase produced a set of recommendations that had been field tested. These included education and incentives for farmers and merchants to ensure crops are allowed to field dry and then shelled and mechanically dried to specific moisture levels rapidly post harvest. Community-based leaders can disseminate and expand programmes, as in Thailand.

Timeframe

It might take between 1 and 5 years to agree and implement modifications in farming systems within any country.

Transferability

Methods of farming differ around the world, depending for example on climate, terrain, and degree of capitalisation. General regulatory controls would need to work for intensive and less-intensive systems.

3.2.2.4 Prevention of aflatoxin contamination

Political feasibility and acceptability

Programmes to reduce and ideally eliminate aflatoxin contamination are politically welcome. The export and sale of food believed to be unsafe is likely to be blocked, whereas safe products can earn revenue and, in lower-income countries, foreign exchange.[69]

Food production.*
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Evaluating impact of industrial food production on patterns of diet		✔			✔	
Encouragement of smallholdings and home farms and gardens	✔				✔	
Improvement in methods of animal production		✔		✔		
Prevention of aflatoxin contamination	✔			✔		

*For agricultural economic policies, see chapter 4

Potential impact

BENEFITS: Reducing aflatoxin contamination protects against liver cancer. It also prevents economic loss from crops that cannot be sold for export, that are spoiled, or that have to be destroyed. Crops may fetch higher prices if contamination can be shown to be lower than usual.[72] Projects to prevent aflatoxin contamination are likely to be sustainable if the cost of equipment can be covered by increased crop sales and if knowledge of effective methods is passed on with support from expert advisors. Policies that help all producers to prevent contamination are likely to be equitable, benefiting those on low incomes.

HARMS: Policies that rely on technological solutions or on destroying contaminated foods are likely to disadvantage farmers on low incomes. In countries or communities with food shortages, contaminated crops may well not be destroyed, but sold at lower prices to impoverished communities, putting them at risk.[73]

General acceptability

Programmes and projects to minimise aflatoxin contamination are likely to be highly acceptable to farmers if the methods used increase yields of crops with low levels of contamination without considerable costs. Because farmers may supply their own community, the health benefits associated with reduced levels of contamination are also likely to make such schemes attractive.

Cost

The costs of a national scheme, such as that in Thailand (see box 3.5), can be considerable.[70] Costs are likely to be more than offset by revenue from sales of uncontaminated crops. Globally, around 1000 million tonnes of foodstuffs are lost each year due to aflatoxin and related contamination.[74]

Timeframe

Programmes to reduce aflatoxin contamination may require a number of years to yield measurable outcomes.

Transferability

Interventions in high-income countries may include technology and equipment not available or affordable in lower-income countries. Similarly, actions taken in lower-income countries — for instance sun drying — may not be useful or possible in other countries. Scaling up of projects from community to national level is likely to require government commitment and funding.[70]

3.3 Retail and catering environments

As well as production, food systems include food preservation, processing, distribution, retailing, and catering. Since the early 1980s, there has been a vast increase in the number of national and international retail chains, with supermarkets often sited at considerable distance from the homes and workplaces of most shoppers. There has been a parallel vast increase in food catering outlets offering 'fast' and other convenience meals and snacks. This change in the physical environment has an impact on patterns of diet and of physical activity. (All other aspects, including economic aspects of food systems and the food industry, are covered in chapter 4. For the physical environment of schools and workplaces, see chapter 5.)

3.3.1 Summary of evidence

3.3.1.1 Patterns of food availability

Retailers

It would seem logical that improving access to supermarkets, with their lower prices compared with convenience stores and wider ranges of foods, will improve diets. That said, improved access to supermarkets also means more access to heavily promoted processed products which are often high in fat and salt, and sugary and alcoholic drinks. (Also see chapter 4.2 and box 4.4)

The SLR found some evidence that in the USA, accessibility of retailers that provide affordable healthy food choices, such as supermarkets, was lower in low-income neighbourhoods and where the majority of residents are African American.[75] However, there is not enough evidence as to whether this is generalisable to other parts of high-income countries or to lower-income countries. In the UK, it appears that there are no differences in food availability and access to supermarkets between deprived and affluent areas, with healthier foods reasonably available in both types of neighbourhood.[75–78] It may be that additional factors — more pronounced segregation by race and income between neighbourhoods has been suggested — are operating to produce the differences seen in the studies from North America.[75] Some countries have instituted small-scale local initiatives often designed to assist local shopping facilities in more deprived areas.[79]

The physical location of foods, for instance placement of processed products high in energy such as sweets (candy), chocolates, and savoury snacks by tills within retail environments, influences choice, as do the ways in which products are labelled (either on-pack or shelf labelling/displays), positioned, and promoted in stores. Within the physical environment of supermarkets and other food stores, there is evidence for the impact of point-of-purchase displays and information. A review also found good evidence for the effectiveness of nutrition labelling and point-of-sale labelling in cafeterias and supermarkets, and provision of nutrition information on restaurant menus. 'Heart health' logos have been shown to be

effective in influencing some buyers towards healthier choices when used on product packaging in New Zealand,[80] and a shelf-labelling programme run in Detroit, USA, also showed the ability to influence purchasing choices.[81] (For further discussion of food labelling, see chapter 4. Also see box 4.4.)

3.3.1.2 Overweight and obesity

Retailers

In the USA, the presence of a supermarket in a neighbourhood has been associated with a lower incidence of overweight and obesity,[82] while in the UK, evidence from one study suggested that opening a supermarket in a low-income area could bring about small improvements in intakes of fruits and vegetables.[83]

Caterers

It might also seem logical that easy access to 'fast food' caterers serving processed meals and snacks high in energy will increase levels of overweight and obesity. Within the USA, there is evidence for 'fast food' restaurants clustering in lower-income neighbourhoods, and for a connection between proximity to 'fast food' restaurants and increased risk of overweight and obesity in adults, though not in children.[84–91] However, studies from Australia and England do not support connections between closeness to 'fast food' restaurants and income status or obesity.[88 90]

Evidence published since the conclusion of the SLR suggests that where access to food retail outlets is poorer, and the density of 'fast food' restaurants is greater, such as in some low-income areas and neighbourhoods inhabited predominantly by African Americans in the USA, individual or household deprivation may be amplified by area-level deprivation.[91] Evidence from the rest of the world remains inconclusive.[92]

3.3.1.3 Physical activity

Retailers

Access to retailers depends not only on the numbers and types of outlets in a neighbourhood, but also on mode of travel. One feature of modern, urban food retail provision is a move to provide supermarkets, hypermarkets, and malls on the outskirts of urban areas, which displaces smaller, local shops serving individual neighbourhoods. This means that people are more likely to need cars and public transport systems to do their shopping, cutting levels of transport physical activity.

3.3.2 Evaluation of evidence

The physical environment of food retailers and caterers may affect patterns of diet and physical activity, and also body fatness, in a number of ways. The location of supermarkets can have two effects: on the one hand they usually offer a great variety of food and drink products, but on the other, many of the most prominently placed products are processed foods and drinks high in energy, many of which are aimed at children and young people. 'Fast food' outlets typically offer processed meals and snacks high in energy, but the evidence that concentration of such caterers in any area affects incidence of overweight and obesity is unclear.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of two options for possible action. These are increasing access to supermarkets, and priority given to the display of healthy foods and drinks in retail and catering outlets. Evidence of any effect of the concentration of 'fast food' outlets is unclear and this has not been evaluated. The impact of 'fast food' intake on quality of diet and obesity has been shown repeatedly and is discussed in the 2007 WCRF/AICR Diet and Cancer Report.

3.3.2.1 Increased access to supermarkets

Political feasibility and acceptability

This is a difficult area. Politicians now are often well aware of the social and environmental problems caused by location of supermarkets outside city centres, and the fact that supermarkets drive small food traders out of business. On the other hand, supermarkets are obviously popular with shoppers, and no supermarket business is likely to relocate their outlets to higher-rent areas with poor access for suppliers unless pressed very hard to do so. In some countries, supermarkets are opening mini-markets in inner city areas branded with their name, which in most respects are convenience stores.

Potential impact

BENEFITS: Well-stocked and easily accessible supermarkets offer a range of healthy foods and drinks — as well as many unhealthy choices. Supermarkets in lower-income neighbourhoods provide a number of local jobs.[83]

HARMS: Encouragement of supermarkets is likely to accelerate the closure of small, local food stores, with loss of employment for traders and loss of access for people who depend on such stores.

General acceptability

While supermarkets are popular, many people are now troubled by competition from supermarkets that results in the closure of smaller local shops. Any question of public money being used to encourage supermarket chains to open stores in inner city and other deprived neighbourhoods is not likely to be popular, as these companies typically make large profits. The inclusion of community leaders and retail representatives as partners in negotiations to improve access may increase acceptability to all parties.

Cost

Public–private partnerships could be used to make stores providing healthy foods more accessible. These could fund provision of free shuttle-bus services or of food voucher schemes, or free delivery to families in need. Some schemes could be solely funded by retailers, with public involvement only to provide guidance or negotiate methods of increasing access.

Timeframe

Planning and building new supermarkets can take years.

Ways to make existing supermarkets more accessible could be rapid.

Transferability
Most studies on improved access to supermarkets have been carried out in the USA and in Europe, and are transferable to most large cities anywhere.

3.3.2.2 Priority given to the display of healthy foods and drinks in retail and catering outlets

Political feasibility and acceptability
Many of the more profitable foods and drinks on sale in supermarkets, including many promoted to children and young people, are processed and high in sugar, refined starches, fat or salt. Many unhealthy processed products are cheaper to make because their ingredients are cheap.[93] They are often heavily advertised and their manufacturers — often transnationals — pay retailers for prime positions in supermarkets. Shelf space in supermarkets is priced according to location in the store, level of the shelf (eye level for children and parents are linked with provision of different foods and prices), and how much space is taken. Manufacturers and retailers will both resist giving more prominence to wholesome foods and drinks, unless they believe these can be equally profitable.

Potential impact
BENEFITS: Giving prominence to healthy foods and drinks will increase their purchase, and in turn help to prevent overweight, obesity, and various diseases including cancer.
HARMS: Giving less prominence to unhealthy foods would be inequitable if low-price healthy foods were not made available.

General acceptability
Abrupt comprehensive changes to in-store promotion would be confusing and, unless carried out by retailers in concert, might well drive business away. A phased programme would probably be appreciated, especially by mothers whose small children pester them for sugary foods and drinks positioned on low shelves and near check-out counters.

Cost
Retailers regularly change their display policies, and new advertising and promotion material can be phased in. Manufacturers and caterers also change their marketing policies regularly.

Timeframe
Changes in promotion and display policies can be phased in over a period of several months to say 2 years, with more time needed for planning and consultation.

Transferability
Transnational retail and catering chains already combine global policies with advertising and promotion tailored to national and regional customs and cultures.

Retailing and catering environment.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Increased access to supermarkets*		✔			✔	
Priority given to positioning of healthy foods and drinks in retail and catering outlets	✔				✔	

*Supermarket access impacts food availability and dietary patterns but may have beneficial or adverse effects depending on the setting

3.4 Planning and transport

Built environments profoundly affect people's ways of life. This is most obviously the case with their impact on levels of physical activity and thus also of degrees of body fatness, and so also in turn on risk of chronic diseases including cancer.

Transportation systems have transformed the ways in which people live. Within cities, the design of buildings, streets, parks, and other open spaces; and within buildings, the design, function, and use of space and rooms usually impedes physical activity. Cars and other motorised transport are now the predominant means of human transport throughout high- and middle-income countries and in many cities in low-income countries. This influences planning decisions, creating environments that rely on vehicles and make physically active transport less practicable and often unsafe.

Built environments generally discourage breastfeeding. Pressures on women not to breastfeed include lack of supportive environments outside the home. (For discussion of social and emotional support for breastfeeding, see chapters 5 and 6.)

As populations move from rural to urban environments, open spaces such as parks, common ground, and waste grounds where people can enjoy being physically active outdoors are often built upon. Design and use of technology influences building design in ways that affect physical activity choices, with staircases in many modern large buildings not obviously identified, and unappealing. (For evidence on patterns of diet and how these are affected by built external and internal environments, see the previous section and also chapter 5.)

3.4.1 Summary of evidence

3.4.1.1 Breastfeeding

Mothers who breastfeed their babies away from home do so in a wide range of settings. They may desire a quiet, calm, and private space in which to feed their baby, so the availability of and access to dedicated breastfeeding areas in public spaces and work settings are key physical environmental determinants of breastfeeding. Breastfeeding is easier when public facilities, such as shopping centres, travel stations, restaurants, and workplaces, offer pleasant and safe environments for breastfeeding or for expressing milk.[94] (For discussion of the economic, social, and personal factors related to breastfeeding, see chapters 4, 5, and 6, respectively.)

Most high-income countries have legislation or regulations to support working mothers who continue breastfeeding when they return to work.[95] The WHO/UNICEF Baby-Friendly Hospital Initiative has been used as a model for the Baby-Friendly Community Initiative. This includes 10 steps to create baby-friendly communities; step nine calls for local government and civil society to take action in various ways, including the provision of breastfeeding-supportive workplaces.[96]

Environmental factors important in supporting breastfeeding in the work setting include a suitable, dedicated room with a refrigerator and the means to sterilise equipment and allow safe storage of expressed milk,[95 97–102] and access to a crèche.[103] There are no randomised controlled trials evaluating workplace interventions to support breastfeeding for employed women.[95]

3.4.1.2 Overweight and obesity

One review published since the conclusion of the SLR found no evidence for the effectiveness of broader environmental interventions in helping people maintain a healthy weight, or in preventing obesity.[104] Another review concluded that various aspects of the built environment are associated with both physical activity and healthy body weights.[105] Factors promoting obesity include urban sprawl, low intersection density, low residential density, and low land-use mix; these also tend to be associated with sedentary behaviour and lower levels of activity.

3.4.1.3 Physical activity

The central place of cars and other motorised transport throughout high- and middle-income countries and in many cities in low-income countries influences planning decisions, creating environments that rely on vehicles and make physically active transport less practicable and often unsafe.[106] The SLR found only a few studies that examined effectiveness of transportation policies to encourage physical activity. It found evidence that environmental interventions to promote physical activity can be effective. Increasing both the visibility and usability of stairs and access to leisure-time locations increases physical activity.[107 108] There is also evidence that maintenance of facilities to be active, usable public transport systems, and cycling and walking infrastructure are useful, especially in cities at risk of losing this support because of development.[107 109–111]

Age

Children who report greater access to local facilities, paths, and recreation opportunities (fitness and community centres, walking and biking trails) are more active. Access to such facilities and time spent outdoors are consistently related to higher levels of physical activity.[61 87 112] However, access to urban green spaces among middle-aged adults is not associated with increased recreational physical activity or walking,[113 114] possibly because adults perceive some available green spaces as not accessible for them — they may perceive walking in woodland as unsafe and areas of derelict land as unsafe or unattractive.[92 115]

Street environments also have different effects on physical activity in adults and children. Protected *cul-de-sacs* may reduce active walking among adults while facilitating street play for children.[116] Footpaths to school are associated with active commuting behaviour.[117] For younger children, parental transport and parental affluence correlate with

participation in organised sport and recreation.[118] Road safety, traffic volume, and availability of bicycle storage at school are important in determining whether children play outdoors or cycle.[114 119–121]

For adults, environmental characteristics consistently associated with physical activity include the elements of 'walkability'[122–130] and aesthetic factors, safety, and paths and other infrastructure.[120 124] Perceptions are also important: if people perceive walking or cycling to be dangerous, they are less likely to do so, even if the actual risk is low.[131] There is also evidence to suggest that crime levels can deter people from using physically active transportation, even when areas are otherwise easily walkable.[106]

Income

Studies in Scotland and Australia suggest that access to leisure facilities and playgrounds may be highest in low-income areas.[94 132–134] However, other studies from England and the USA report conflicting findings, with higher availability of physical activity facilities in higher-income areas.[114 135–137] A study of adolescents in the USA found that as income and the proportion of white people in the population increased, access to publicly and privately funded recreation increased.[116] This was linked to increased physical activity and reduced obesity among these teens.

Interventions

Two reviews conclude that the available evidence is not sufficient to identify which specific changes would have the most impact on physical activity and health outcomes,[106] or to what extent any interventions are responsible for documented changes.[138] In contrast, another report found that creating footpaths and cycle trails, increasing opportunities for active commuting including public transport; the quality, aesthetic design, and attractiveness of residential areas; providing year-round access to facilities for physical activity and mixed land use; reducing crime or fear of crime for example through better street lighting; and improving road safety could help to create supportive residential environments.[139]

Mixed-use streets — local urban high streets outside the main city centre — have two conflicting roles: to provide both local places to shop without the need for car use and a link for vehicles between different parts of a town or city. They could be improved by reducing the dominance of traffic; allowing the streets to be used in different ways at different times of the day or week; improving access for certain groups — people in wheelchairs and those with pushchairs; providing better street lighting; improving attractiveness and cleanliness; improving and increasing public amenities — toilets and seating; developing design manuals for such streets; and coordinating the provision of public transport.[140]

Cycle infrastructure (tracks, trails, and storage at public transport points) and policies that discourage car use can increase cycling and walking.[104 118 120 141–144] However, there are differences in the ways populations use cycle tracks — North Americans tend to use these facilities more for weekend recreation, whereas Europeans tend to use them for travel as well as recreation.[145]

3.4.2 Evaluation of evidence

This generation is probably the first that has to consciously choose to incorporate physical activity into their lives, and only in the last few generations has breastfeeding been a choice.

A large body of evidence shows that in the modern built environment, transport and recreational physical activity are perceived to be unpleasant or unsafe. This is a cause of physical inactivity and therefore of overweight and obesity, and diseases — including cancer — of which body fatness is a cause. The evidence does not only come from conventionally controlled interventions. The design of cities, transportation systems, and buildings in favour of machines can be seen as a great experiment in inducing physical inactivity. Conversely, impressive and visionary planning and programmes within some cities whose authorities now encourage physical activity have shown the potential for change. In high-income countries, cars are accessible and people appear to be travelling further to education, shops, and workplaces. Therefore, opportunities to replace car journeys with walking or cycling are diminishing as distances become a barrier and people need to engage in increasing amounts of leisure-time physical activity or to incorporate active transport in their journey.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of three options for possible action. These are making breastfeeding accepted and pleasant for the mother within built environments; increasing freely available parks and leisure, play, and sports areas; and reviving active transportation systems.

3.4.2.1 Making breastfeeding accepted and pleasant for the mother within built environments

Political feasibility and acceptability

Political will to support breastfeeding is shown by the fact that the UN Global Strategy for Infant and Young Child Feeding has been adopted by all member states and implementation of policies to encourage breastfeeding in public areas is already happening in some places (see box 3.6).

Potential impact

BENEFITS: The provision of more and better breastfeeding

Box 3.6 Breastfeeding in public places

In Puerto Rico, various public places, including shopping malls, airports, and public service government centres, are required to have accessible areas that are not bathrooms for breastfeeding and nappy (diaper) changing.[146]

In New Zealand, a bill passed in September 2008 requires all employers to provide facilities and breaks for employees who want to breastfeed, wherever reasonable and practicable.[147] Employers who do not comply are liable to penalty (unspecified).

Several US states have for several years had laws requiring employers to provide appropriate space and time for breastmilk expression and storage.[148]

facilities will help to protect mothers against breast cancer and their children (probably) against overweight and obesity. Shops and leisure centres providing facilities for breastfeeding are likely to increase their business from parents with breastfeeding children and improve their reputation for customer friendliness. In the workplace, the provision of breastfeeding facilities results in reduced absenteeism, greater employee retention, reduced training costs,[149] and increased equity, as women who want to breastfeed are able to return to work (also see chapter 5.2).
HARMS: None identified.

General acceptability
Parents who know about the benefits of breastfeeding are likely to welcome dedicated facilities for breastfeeding in public places and places of work. Employers and businesses are likely to respond positively once the economic and other benefits are clear to them.

Cost
For larger businesses, the cost of providing a dedicated breastfeeding room is not likely to be prohibitive. The cost of providing crèche facilities is higher, requiring trained staff, play equipment, and (probably) additional insurance. In smaller businesses, cost may be a limiting factor, including the loss of business due to the space needed for facilities. In such cases, a first step could simply be to make space in a private or quiet area.

Timeframe
A breastfeeding room can be provided quickly, and benefits to parents and infants would be immediate. Providing a crèche in the workplace would require a longer timeframe.

Transferability
In rural areas of low-income countries, many women work on the land and traditionally have breastfed their children openly in the fields and at home. Where customs have changed, a hygienic, covered area in the fields could be constructed. In urban areas of low-income countries, dedicated rooms for breastfeeding could be made available, although there may be fewer resources available.

3.4.2.2 Increase in freely accessible parks and leisure, play, and sports areas

Political feasibility and acceptability
Provision of parks, leisure facilities, and other municipal services for physical activity is generally the responsibility of national or local governments. Improving access to these facilities is likely to be both feasible and acceptable. Private facilities may also be available, and it is likely that there would be political support for these, too, as long as they were in line with local planning policies.

Potential impact
BENEFITS: As already stated, regular sustained physical activity protects against colon cancer and weight increase, overweight, and obesity, probably against cancers of the breast (postmenopause) and endometrium, and also other diseases. As well as providing a place to be active, leisure facilities also provide a place to socialise. This is especially useful if children and young people are given a safe place to play and gather. Access to leisure facilities may be free of charge (parks, play areas), in which case the provision is equitable, although only if all members of a community are able to travel to the facility. With continued funding, parks, play areas, and leisure centres are likely to be sustainable.
HARMS: If leisure facilities charge a fee for entry, they are likely to be more accessible to those with higher incomes; private facilities are likely to be the most expensive.

Box 3.7 Honolulu In-Motion

This pilot programme made physical activity facilities in a high-school available to the wider school community both within and outside school hours. Honolulu is a dense urban area with little access to park land. The school selected was in a community with low socioeconomic status where more than half of students reported living in unsafe neighbourhoods. The programme focused on organised classes that were 'free and available to everyone' and included those aimed at youths (hip-hop, dance competitions, volley ball, etc.), adults (aerobics, yoga, etc.), and the elderly (water exercise). The campus was also opened to walkers at set times.

Although it is not yet clear whether In-Motion increased physical activity levels in the community, the pilot project has had some positive outcomes. It attracted a thousand registered participants and provided physical activity opportunities in an area where these were limited, and survey respondents were generally positive (however, there were very few survey respondents and these may have been biased). The programme also provided a useful knowledge base on which to build future interventions. For example, the importance of word-of-mouth recommendations in attracting wider community members and the necessity of trust and adaptability between key stakeholders were apparent.[150]

General acceptability
Improving access to parks, play areas, and leisure centres is likely to be highly acceptable to people, as long as the improvement costs are not too high (see box 3.7). Private facilities are also likely to be acceptable if entry fees are not so high that they limit access to only those with the highest incomes.

Cost
As already stated, costs may be considerable, requiring funding for urban planning and major building work. Some costs could be covered by awards from grant-giving bodies or charities.

Timeframe
People are likely to begin to use improved facilities fairly quickly, especially if they are free of charge and close to residential centres. It takes longer for people to form new habits that include regular use of parks, play areas, and leisure centres.

Transferability

It is likely that improving access to parks, play areas, and leisure centres could be successful in urban areas of high-, middle-, and low-income countries, if sustainable government or other funding was available. In lower-income countries, governments may not have the funds to improve access to these facilities. High land prices and population density in urban areas may threaten recreational facilities and space unless there are strong planning controls. In rural areas of low- and middle-income countries, people with active ways of life do not need extra recreational activity.

3.4.2.3 Creation and revival of active transportation systems

Political feasibility and acceptability

Many cities and/or planning departments now operate policies to improve the walkability of streets. Such schemes make them safer for pedestrians and cyclists and encourage active transport — which includes the promotion of public transport and discouragement of individual car use.

Potential impact

BENEFITS: As well as the protection against chronic diseases given by physical activity, less use of vehicles improves air quality. Such schemes are also likely to reduce traffic accidents in urban areas, with less congestion given separate cycleways. Limiting car use and investing in public transport will preferentially benefit those who cannot afford cars, so such policies can be equitable.

HARMS: These approaches can penalise those who rely on cars for employment or business. They may also selectively penalise rural dwellers who live too far from public transport connections to rely on them as their predominant means of transport, although this is probably not a substantial issue as such schemes generally operate in urban areas. Policies to increase cycling are equitable for those who have bicycles, whose cost is usually a small fraction of that for any motorised transport. Trails and tracks outside cities are available for all walkers.

Box 3.8 Cities in action

In Bogotá, Colombia, a major initiative has been undertaken to improve the public transport system, restrict the use of private cars, expand and improve bicycle paths, and enhance public space.[151] This includes the use of pedestrian zones and paths reserved exclusively for bicycles, the revitalisation of parks and pavements (sidewalks), and the implementation of the Transmilenio bus rapid transit system. This system, which has improved commuting for 10% of users of public transport, involves new buses, lanes dedicated exclusively to buses, and permanent, easily recognisable stops. As a result, rush hour traffic has decreased and walking and cycling have increased.[152] Every Sunday and holiday, over 120 km of streets are closed to motor vehicles from 7 am to 2 pm and are used by some 2 million people (30 per cent of citizens) for walking, skating, and cycling.

In some locations within the city of São Paulo, Brazil, pathways have been built and widened, tracks for runners and walkers with shade and drinking water have been built, and storage for bicycles has been installed near public transport stations, schools, and workplaces.[153] The *Agita São Paulo* programme, operating since 1996, has been sustained by partnership working, with a coalition of 350 member organisations that each target one or two components of the *Agita* model.[153 154]

In England, three 'Sustainable Travel Demonstration Towns' have been created that increased walking by around 20 per cent and cycling by about 50 per cent in 2 years.[155] The project cost £10 million, and building and improvement works were covered by public money.[156]

In Norway, the Sandnes Municipal Council is putting the activity needs of children first in its Children's Trail programme. Children identify and register the short cuts they use and the areas they use for play and school, and these must be safeguarded in all municipal planning activities.[157]

In the Netherlands and Denmark, the cities of Amsterdam and Copenhagen have put in place a succession of town planning and transportation policies that ensure cycling is put at the heart of the transport system.

Planning and transport.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Making breastfeeding accepted and pleasant within built environments		✔		✔		
Increase in freely accessible parks and leisure and play areas		✔		✔		
Creation and revival of active transportation systems	✔			✔		

General acceptability

Public acceptability of policies to reduce car use is likely to be high only where acceptable and accessible alternatives to the car are in place.[143] Reduced pollution and carbon dioxide emissions through lower levels of car use are likely to be welcomed. Policies that directly discourage car use, such as increased taxation or congestion charging, are generally unpopular with motorists and businesses that rely on cars or lorries.

Cost

The costs of policies and schemes to encourage walking and cycling and also to discourage car use can be high, notably when they involve large-scale planning and building works. Investment is required by national or local governments, perhaps with support from grant-giving bodies. Schemes such as congestion charging can be expensive to set up initially, but the benefits of supporting cycling are much higher, and the costs much lower, than motorised transport.[141] Subsidy of public transport is costly, though costs can be offset or partially offset through taxes on car use and fuel.

Timeframe

People are likely to begin to use improved walking and cycling tracks and trails fairly quickly, especially if they are publicised and are close to residential centres. Over time, these changed environments would probably foster a culture of higher levels of physical activity. Such policies and schemes can take a long time to establish when they involve building works or national or local government approval.

Transferability

Schemes such as those in Bogotá (see box 3.8) can be models for other countries. The *Agita São Paulo* model has already been adopted in Argentina (an upper-middle-income country) and Bolivia (a lower-middle-income country).[153 154 158]

3.5 Workplace and school environments

Workplaces, schools, and other institutional environments can also have an impact on patterns of diet and physical activity, and so in turn on the risk of chronic diseases including cancer and obesity.

Most employed adults spend a large number of their waking hours at work. Employed people may eat at the workplace in canteens, or nearby. Schools and other institutions such as hospitals and prisons supply meals some or all of the time, as do the armed forces. Cafeterias and vending machines in these locations affect diets. Schools can have a major influence on children's ways of life. Much depends on the importance given to theoretical aspects of nutrition in school curricula, and to practical aspects in the form of school meals and available snacks.

Levels of physical activity of employed people, schoolchildren, and those within other institutions are influenced by the available facilities on and off the premises and, in the case of schools, the presence or absence of physical training and recreation and sports facilities.

The physical environmental considerations relating to workplace and school environments are dealt with in chapter 5.

3.6 Conclusions

The nature and quality of the physical environment — climate, terrain, living and natural resources, land use and agriculture, and the built environment — all shape patterns of diet, body composition, physical activity, and associated factors and thus the risk of cancer. Much of the evidence collected in the SLR and from other sources is diverse and not easy to compare or synthesise, and in some areas more research needs to be identified or undertaken.

Climate and terrain, fundamental to the physical environment, largely determine the food systems of pre-industrial societies, and their impact on industrialised food systems remains vital. This now needs special emphasis given continued rapid world population increases and the compelling evidence that arable land is becoming progressively degraded, that sources of water are becoming drained, and that the global climate is changing in ways likely to be unhelpful to public health. Modelling of and research into climate change needs to examine and project its likely impact on food security and on the risk of disease, including cancer. Specifically, prevention of contamination of water supplies with arsenic, a direct cause of lung and (probably) skin cancer, is a priority.

Food systems and supplies determine patterns of diet. Industrialised production of animals increases availability and affordability and thus consumption of meat and processed meat relatively high in fat, and also other foods of animal origin. Policies designed to make food supplies more plant-based, as recommended in the 2007 WCRF/AICR Diet and Cancer Report, need to consider how best to modify the nature of animal production. Specifically, protection and development of smallholdings and of home farming and gardening, especially in lower-income countries, will make supplies of cereals (grains), vegetables, fruits, pulses (legumes), and other fresh foods more secure. Prevention of contamination of crops with aflatoxins, a cause of liver cancer, is another specific priority.

The location of supermarkets and their internal design and product stocking policies affect the accessibility and availability of foods and drinks. The placement and variety of vegetables, fruits, and other fresh and minimally processed foods needs improvement, including in smaller stores and supermarkets serving lower-income communities. A similar point applies to caterers, especially 'fast' and other convenience food and drink outlets of all types.

Throughout the last century, built environments, including city design and transportation systems, have increasingly favoured mechanised transport. As a result, physical activity, particularly walking and cycling, has become less convenient and even dangerous. There is substantial and consistent evidence, including from major government initiatives, that more balanced approaches designed to make cities safe and pleasant for pedestrians and cyclists, both in streets and also in open spaces within cities, are effective. Major investments also need to be made in accessible and affordable sports and recreation facilities designed for whole families to enjoy. Built environments can also be reconfigured to support breastfeeding.

The physical environments of workplaces, and of schools and other institutions, shape patterns of diet as well as of physical activity. Like cities, workplaces have been increasingly designed in ways that discourage physical activity. The installation of machines that vend snacks and soft drinks impedes good nutrition, most of all in schools. There is good evidence summarised and evaluated in chapter 5, that initiatives designed to restrict vending machines and to increase physical activity are effective.

CHAPTER 4

The economic dimension

Economic factors influence the amount, nature, quality, and types of foods and drinks that people consume and their patterns of physical activity. Economic factors include all financial and other material resources, insofar as these directly or indirectly affect patterns of diet, physical activity, and body composition, which they do principally by influencing the availability, accessibility and affordability of food or opportunities for physical activity. Insofar as food manufacturing and processing are economic activities, food and drink processing is included in this chapter.

Fiscal policies and programmes imposed by multinational bodies and by governments distort markets in ways that affect patterns of diet and of physical activity, deliberately or more often inadvertently, in beneficial or adverse ways.

In general, the more money and other resources people have, the greater their freedom of choice of foods and drinks and also opportunities for physical activity. The reverse is also true: absolute and relative poverty of income and other resources constrain choice, although in poorer countries occupational physical activity may be greater. Especially since the 1980s, three related economic phenomena have shaped patterns of diet, physical activity, and body composition. First, disparities of income between and within countries have widened. Second, economic and other forms of globalisation have transformed food systems and thus food supplies and patterns of diet especially in middle- and low-income countries. Third, government subsidies and development of food systems focused on production of animal food products have made healthier foods and drinks more expensive than less healthy ones.

Although there has been a general decline in food prices over the past 50 years, the sharp rises in prices of staple food commodities and products from 2007 and the global economic recession that began in 2008 are making food insecurity and poverty more common and more severe in low-income populations. Food insecurity is likely to remain a problem while prices of staple foods are volatile.

4.1 Economic globalisation

The opening up of the world and in particular middle- and low-income countries to the relatively unrestricted and lightly regulated 'free' flow of capital and trade is known as economic globalisation. This continues to transform the nature of food systems and supplies, and thus of diets. The process is comparable to that which transformed food supplies in Europe in the first phase of industrialisation in the first half of the 19th century, but is now worldwide and occurring faster.

Economic globalisation together with urbanisation has resulted in the homogenisation of food supplies, increased intake of vegetable oils, 'fast food', sugary drinks and often alcoholic drinks, and meat and meat products, and a reduction in the intake of whole grains, fibre, pulses (legumes), vegetables, and fruits. These factors directly or indirectly increase the risk of a number of common cancers.

4.1.1 Summary of evidence

4.1.1.1 Patterns of diet

The systematic literature review (SLR) undertaken for this Report shows that the acceleration of world-scale trade in food, and its manufacture, distribution, marketing, and sale, greatly strengthens transnational food companies.[1 2] This may increase the available variety of foods and drinks,[3–5] but generally makes food supplies more processed and higher in energy.[1 2 6–23] (See box 4.1)

National and international agricultural policies can affect the availability and prices of different foodstuffs. Policies often encourage the production of grains (cereals), dairy products, sugar, and beef but rarely of fruits, vegetables, nuts, pulses (legumes), whole grains, and healthy oils.[24 25] Opposition to the removal of such subsidies in the US farm bill and the resistance of both the European Union (EU) and the USA to removal of agricultural subsidies in the World Trade Organization (WTO) Doha Development Agenda Round have shown the difficulty of tackling this problem.

Studies in Mexico, Poland, Africa, and elsewhere show that foreign direct investment in lower-income countries

increases availability, decreases price, and increases sales of processed foods and drinks.[26]

Transnational food companies collectively spend many billions of US dollars per year on promotion and marketing. This creates cultural change, particularly in lower-income countries such as China and Brazil, and in Asia and Latin America generally, where 'fast food' and other convenience food caterers are growing rapidly.[3 7 27] National and local traditional dietary patterns, which typically are relatively low in energy density, are disappearing and being replaced by 'dietary convergence' towards 'Western' or 'American' patterns.[9 10] For example, in many Chinese cities, fried foods and 'fast foods' are becoming the norm and replacing much healthier traditional modes of food preparation and eating.[28] Consequently, levels of obesity and of cancers of which overweight and obesity are a cause are rising.[23]

Greatly increased numbers of transnational supermarkets in lower-income countries are affecting food availability, accessibility, and pricing in various ways.[2 3 7 8 14 17 23 29–31] For those with the money to buy food in supermarkets, choice is increased and standards of food safety are high. On the other hand, the foods and drinks available, made by transnational manufacturers and their local equivalents, are often more processed and high energy. The methods used by these transnational supermarkets are imitated by national, regional, and local companies. (Also see box 4.4)

4.1.2 Evaluation of evidence

The rapid growth of transnational food and drink manufacturers, distributors, retailers, and caterers enabled by the 'free' flow of capital, services, technology, and trade, especially from high-income countries into middle- and low-income countries, is reshaping food systems and thus diets (see box 4.1). The general effect on the one hand is to increase the variety and improve the safety of food, and on the other hand to increase consumption of processed and 'fast food', sugary drinks and often also alcoholic drinks, and meat and meat products. This economic globalisation therefore tends to increase rates of overweight and obesity, and of related cancers.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of two options for possible action. These are the use of global food trade rules to improve public health, and monitoring the impact of economic globalisation on food systems and chronic diseases including cancer.

4.1.2.1 Use of global food trade rules to improve public health

Political feasibility and acceptability

In some respects, current food trade rules present obstacles to public health. For example, the WHO *Global Strategy on Diet, Physical Activity and Health* states that its implementation should not involve trade-restrictive or trade-distorting practices.[39] Although political pressure and consistent global commitment to alter food trade or exempt it from world trade agreements may bring about change, revision of global food trade rules in favour of public health will be a vast task. Nations that revise international trade rules for foods may risk contravening world trade agreements. Similar action on tobacco shows that global conventions can be feasible (see box 4.2). A movement has developed to exempt tobacco and alcohol from world trade agreements in the interests of public health.[40] If this movement succeeds, it can be developed to cover specified unhealthy foods and non-alcoholic drinks.

Although the Codex Alimentarius Commission sets standards for individual food commodities, it does not address broad issues of nutrition and public health.

Potential impact

BENEFITS: Using trade rules to protect public health beyond the usual focus on infection and food safety will reduce the burden of chronic diseases and will also be socially and economically beneficial. Global trade policies have an impact on practically everybody worldwide, apart from enclosed self-sufficient communities and some other exceptions, and so have the widest possible reach. An integrated approach where chronic diseases are addressed by trade rules will benefit and strengthen WTO and facilitate disease prevention in member countries.

HARMS: There are legal problems. Trade policies that contravene world trade agreements may be overturned and may attract sanctions.

General acceptability

Transnational and other industries are likely to challenge any practices that threaten their business. Voluntary trading practices are likely to be more acceptable, but these still require strong and consistent international political and public pressure and are less effective. Most people are likely to welcome policies that make healthy choices more affordable and accessible to all.

Box 4.1 The globalised food system

The term 'globalised food system' refers to a rapid development in industrialised food systems since the 1980s, characterised by increased concentration of food production, trade, distribution, manufacture, marketing, retailing, and catering in the hands of a steadily smaller number of extremely large and increasingly dominant transnational corporations.[7 32 33]

Industrialised food supplies increasingly comprise packaged, processed food often in the form of 'fast food' and other convenience food relatively high in fat, processed starches, and sugars, as well as progressively more amounts of red and processed meat, oils, sugary drinks, and often alcoholic drinks. This tendency has been accelerated by globalised food systems, which have penetrated even those countries like Japan and South Korea whose policy has been to protect domestic systems by trade barriers that have the effect of making imported goods expensive.

One effect of the globalised industrial food system is the disappearance of many small farms and smaller and local food manufacturers, distributors, retailers, and caterers, whose products cost more than those of transnational and other big corporations. Apart from the loss of livelihoods and businesses, this continues to have an adverse effect on the variety and diversity of food supplies, and also on traditional and local food culture.[33 34] (Also see box 4.3.)

Transnational food, drink, and allied companies have developed energetically marketed global brands.[2 15] While typically having operations in many countries, and sourcing their supplies globally, these companies are almost all headquartered in the USA or Europe.[2] In order to penetrate new markets, they may take over national or local food producers, distributors, wholesalers, retailers, and caterers. In many countries such as China, India, Mexico, Brazil, and South Africa, national or regional companies have emerged or grown by copying the methods of transnational companies. Their operations have also marginalised smaller companies or driven them out of business.

The World Trade Organization

The tendency towards globalisation of food systems has been accelerated by the WTO. Founded in 1995 in succession to the General Agreement on Tariffs and Trade, the WTO in late 2008 had 153 nations as members, collectively responsible for over 95 per cent of world trade. Its declared purpose is to break down barriers to international trade, and it is able to penalise countries that have barriers to trade by imposing trade sanctions. Other international trade agreements, such as the North American Free Trade Agreement (NAFTA) and the Mercosul agreement in southern Latin America, also have enforcement mechanisms.

The WTO has been criticised for favouring more powerful high-income countries at the expense of relatively weak lower-income countries. It is not part of the purpose of WTO to protect public health. The Codex Alimentarius Commission was created in 1963 by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) to develop food standards, guidelines, and related texts such as codes of practice. Codex standards are considered a vital component in promoting food control systems designed to protect consumers and their health, including issues related to international trade,[35] food safety and security, labelling, and additives. However, the chief function of Codex is the safety of and quality standards for individual foods and commodities, not the overall balance of diets.[36]

National governments can use legal and fiscal methods designed to make healthy foods and drinks more available and affordable or unhealthy foods and drinks more expensive and inaccessible, and international agreements can also contribute.[37] However, such actions need to be justified by strong evidence for overriding public health benefit. Fear of WTO sanctions may make less powerful governments reluctant to enact policies designed to improve and maintain public health.[38]

Trade and health

World trade rules can be revised to specify that food commodities and traded foods and drinks are good for human health. This change can be achieved only after governments of the more powerful nations accept that international and population good health is an imperative, requiring international laws and regulations that enable and encourage political and economic decisions in the general public interest. Support from civil society and professional organisations will be required, together with acceptance or at least acquiescence of the food, drink, and associated industries.

Cost

Costs need to be offset against the benefits of improved public health. Neglecting the effect of nutrition on chronic diseases will be costly, as shown by the increasing incidence of chronic diseases, including cancers.

Timeframe

Renegotiation of trade rules will need not only shared political will at head of state and prime ministerial level, but also time. A complete revision of trade rules is likely to involve a whole new round of negotiations, taking at least several years.

Transferability

This is a global proposal.

4.1.2.2 Monitoring the impact of economic globalisation on food systems and chronic diseases including cancer

Political feasibility and acceptability

United Nations (UN) agencies and many countries already monitor economic, dietary, and disease trends. It is feasible to link the three together.

Potential impact

BENEFITS: Using these data to model future trends will help the UN system and national governments to identify causes of change, plan resources, meet future needs, and improve public health, including the prevention of cancer. Data gathered will enable future policy changes to be more strongly based in evidence.

HARMS: None known.

Box 4.2 WHO Framework Convention on Tobacco Control

The WHO Framework Convention on Tobacco Control is the first treaty negotiated under the auspices of WHO.[41] It reaffirms the right of all people to the highest standard of health and focuses on demand reduction strategies.

The Convention was developed in response to the globalisation of epidemic diseases caused by smoking and exposure to tobacco. These have become more serious crises as a result of the opening of new markets by and on behalf of the tobacco industry. Global marketing, transnational tobacco advertising, promotion and sponsorship, and the international movement of contraband and counterfeit cigarettes have also all caused a great increase in smoking and exposure to tobacco in many lower-income countries.

Policies on price and availability
Core provisions include price and tax measures to reduce use of tobacco and non-price measures such as: protection from exposure to tobacco smoke; regulation of the contents of tobacco products; education, communication, training, and public awareness programmes; control of illicit trade in tobacco products; and sales to and by minors.

The Convention has 168 nation states as signatories, including the EU, which makes it the most widely embraced treaty in UN history. However, as of August 2008 it has been ratified by only 20 nation states, including the USA.

General acceptability
Civil society and professional organisations need to be partners. Public acceptability is likely to be high provided data are well handled and personal information is respected.

Cost
The cost of national surveys and statistics is considerable, but the proposal here is mainly to coordinate existing programmes, with additional focus on economic globalisation. It may prove more expensive in the long run to have no monitoring.

Timeframe
This is an ongoing commitment requiring regular review.

Transferability
High-income countries have sufficient resources to collect and analyse relevant data. Part of the responsibility of the UN system is to support lower-income countries in this task.

Economic globalisation.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Use of global food trade rules to improve public health		✔		✔		
Monitoring the impact of economic globalisation on food systems and chronic diseases including cancer		✔			✔	

4.2 Availability and price

Food supplies are shaped by the price and availability of food commodities, which traditionally have been dependent on climate, terrain, and other local factors, but which now are increasingly determined by global markets. Food choices in turn are at least partly shaped by the price and availability of products in the shops.

The production and sale of foods and drinks is not simply a matter of supply and demand. The price and availability of many foods and drinks is affected by pricing policies. These include agriculture support systems that reduce costs to producers and manufacturers and often also to the consumer, and taxes, that artificially increase the price of foods and drinks. Only rarely are these pricing policies devised with public health in mind; an example is taxation on alcoholic drinks. In lower-income countries, staple foods may be subsidised to ensure security of supply.

Although there has been a significant decline in food prices over the past 50 years, particularly in meat and dairy products, beginning around 2007 the cost of foods and drinks has risen, absolutely and also relative to other products. In 2007 the prices of some staple food commodities rose to the highest levels in real terms in 30 years. This has pushed consumers to choose 'economy' lower-price foods and has threatened food security in low-income countries. The global economic recession that began in late 2008 has exacerbated this problem for many countries.

4.2.1 Summary of evidence

4.2.1.1 Patterns of diet

General patterns of diet are shaped by price and availability. Different foods are more or less sensitive to price. Consumption of staple foods does not alter much with price, while purchases of meat, eggs, milk, fish, vegetables, pulses (legumes), sugary drinks and fruits are more price sensitive. Low-income households are more sensitive to changes in price than high-income households.[42–105]

Increasing the availability and decreasing the price of healthy foods increases the amounts consumed, and decreasing the availability and increasing the price of snack foods decreases the amounts consumed.[106–115] One systematic review found an association between food prices and consumption, affordability being the most consistent influence.[116] In Norway from 1980 to 1987, a food and nutrition policy was implemented that made use of food and agriculture subsidies, and dietary changes were achieved in this period in line with the aims of the strategy.[117]

The SLR found that accessible supermarkets are associated with some improved measures of healthy eating[118–121] (also see chapter 3.3.1). In some parts of the USA, access to supermarkets has been found to be reduced in poor neighbourhoods and in areas with higher proportions of African Americans,[122–127] reducing food choice and increasing prices.[128–131] However, in the UK when supermarkets were introduced into low-income areas without any supermarket, the impact on fruit and vegetable intake was very small.[127] (See box 4.4)

A review of 14 papers found a relationship between the type of retail outlet and food price, with prices being lower in supermarkets compared to convenience or small grocery

Box 4.3 Global food prices and global economic recession

Two economic phenomena of 2007 and 2008 whose effects are likely to be long lasting are also likely to have an impact on patterns of diet, body composition, and physical activity in ways that are expected to increase the incidence of some cancers.

In recent decades food prices have generally decreased relative to income in most countries, and national economies have generally expanded. On average, this has been economically beneficial and has increased the availability and affordability of foods and drinks and widened the range of choice. Relatively prosperous people also have more access to facilities for physical activity. These average developments have however tended to mask increasing inequity between and within countries: the poor have become relatively and sometimes even absolutely poorer,[132] and food insecurity has increased in low-income countries and also in impoverished communities within high-income countries.

As from 2007 and then 2008, two sudden changes are reducing available income in general and further widening the gap between economically rich and poor countries, communities, and people.

Sharp rises in food prices

First, as from 2007 the prices of some staple food commodities and products rose sharply. The UN has identified this as a global crisis that in particular further threatens food security in lower-income countries.[133] In late 2008, the prices of some staple commodities remained higher than they were in early 2007.

The global recession

Second, as from late 2008 the international financial crisis that has involved the collapse or nationalisation of banks and other financial institutions, and sharp drops in the value of shares and leading currencies, has led to what is now agreed to be a global economic recession, unlikely to be reversed at least for some years. This will reduce available income and constrain consumer choice for most people in high-income countries.

The effect on lower-income countries and on low-income communities in all countries is likely to be more severe. Many communities who until the recession have suffered occasional food insecurity are likely to be harder hit. Less affluent groups alter their food purchasing patterns to select cheaper, more processed foods and drinks, which are often high in sugar, refined starches or fat, and therefore also in energy. (Also see chapter 4.5)

In summary, international and global economic trends beginning in 2007 and 2008 are likely to widen income and other inequities and increase the burden of some cancers, directly or because of their impact on rates of overweight, obesity, and physical activity.

Box 4.4 Supermarkets

Supermarkets dominate food retailing around the world. They became dominant at first in the USA around the 1960s, then in Europe and other high-income countries around the 1980s, and since 2000 in larger cities throughout the world.[33]

Supermarket chains have their own international and national distribution systems, and may offer own-brand products, for which they specify what they want from producers, including packaging and labelling. Bigger new stores are often built away from city centres, where the cost of sites is cheaper and deliveries easier.

What they sell

Supermarkets stock a wide range of products including foods, drinks, and snacks, fresh, chilled, frozen, dried, bottled, canned, or processed in other ways, as well as pre-prepared ready meals. A large US supermarket may display 20 000–40 000 of the 300 000 edible products on sale in 2005 in the USA.[144] They also often stock other items, such as electrical goods, toys, clothes, or plants. They often provide free car parking facilities for customers, and may have special facilities for children, such as supervised play areas. They may open until late in the evening, or all night, even 7 days a week.

Types of supermarket

Bigger supermarkets are also known as 'hypermarkets'. These may operate in association with department stores, restaurants, banks, filling stations, and other retail shops, on-site or as part of the same built environment. They are designed to enable customers to purchase everything they want in one visit. Some types of store sell relatively basic foods at discounted prices, and others sell large-volume products. 'Mini-markets', smaller convenience stores usually in city centres, sell smaller ranges of foods and soft and alcoholic drinks, often at higher prices.

Supermarket companies

In many countries, the food retail sector is dominated by a few giant companies.[33] Leading chains are big businesses. The US-based Walmart had revenue in 2007 of $US 387 billion, of which groceries comprised about one quarter. It employs over 2 million people and has over 6000 stores, about half in the USA. The biggest European-based chain is Carrefour, with revenue in 2007 of €82 billion, over 450 000 employees, about 4000 stores of all sizes in Europe, and about 1250 hypermarkets and supermarkets in other countries. Outside Europe, Carrefour is the biggest food retailer in Brazil, Argentina, Taiwan, and Indonesia. Tesco is the biggest UK-based chain, with revenue of £47.3 billion in 2008, 280 000 employees, over 2000 stores in the UK, and about 1800 in other countries, including almost 500 in Thailand.[145]

Advantages of supermarkets

Supermarkets have become part of the ways of life of busy employed people who have adequate income, cars, and refrigerators and freezers at home. Most supermarkets include in their stock at least some fresh and lightly processed foods. In some parts of Scotland, for example, fresh fruits and vegetables in good condition were hard to find in any variety until supermarkets opened in the 1980s. Many larger supermarkets offer a sufficiently wide range of products so that customers can readily purchase products consistent with the recommendations of the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report.

Disadvantages of supermarkets

The built environments of supermarkets located away from city centres create additional dependency on motorised transport. Supermarkets have been criticised for contributing to overconsumption of foods and drinks.[33 144] Customers may be encouraged to buy foods and drinks in larger sizes or multipacks, which are cheaper per unit, giving an appearance of better value, even if the additional amount is not needed. Shelves are positioned to make impulse buying more likely, including by children. Only about 10 per cent of people who bring lists into supermarkets buy just what is on the list.[33]

Ironically, when people become impoverished or food insecure, they often have easy access only to convenience stores where prices are relatively high, because these have replaced other local stores.

In addition, the multinational nature of the larger companies means that supermarkets promote globalised food patterns that supplant traditional diets.

stores.[129] In two US studies, where non-traditional large retail formats existed, food prices were cheaper.[130 131]

Modelling studies indicate that increasing prices, for instance by taxation, can decrease the sales of certain foods, including sugary drinks, salty snacks,[84 134] and vegetable oils,[98 135] and the saturated fatty acid content of foods.[136] Likewise, subsidies based on fibre content of foods could be used effectively to increase fibre intake.[136] It is likely that such taxes and subsidies would result in dietary changes that particularly benefit lower-income groups.[73 137–139] Similarly, other price changes associated with global economic factors will also affect consumption (see box 4.3).

The lower the price of processed foods high in sugars, refined starches, fat or salt, and sugary drinks, the more they tend to be consumed.[110] Agricultural subsidies lead to greater production of sugars, starches, fats, and oils and reductions in their prices.[110 135 140]

One systematic review examined the effectiveness of economic instruments in preventing and treating obesity by reducing consumption of processed energy-dense foods,[115] and indirect evidence suggests a causal relationship. Several states and cities in the USA have taxed soft drinks or snack foods.[141 142] Almost half of such local taxes were withdrawn after lobbying from manufacturers.

Other countries have also imposed taxes on certain foods, such as value added tax on 'luxury' food items in the UK. In Mexico, a tax on fat in milk and sugar in drinks aimed at improving health by reducing consumption of sugary drinks and full-fat milk is under consideration.[143]

Cereals (grains) and pulses (legumes)

In the USA, the federal Farm Bill shapes food production by determining which crops the government subsidises. Eight major crops grown in the USA account for 70 to 80 per cent of government subsidy payments. One of these is cotton. The other seven — corn (maize), soya beans, wheat, sorghum, barley, oats, and rice — are food or animal feed commodities.

Like the Common Agriculture Policy of the European

Box 4.5 Alcoholic drinks: the impact of pricing policies and other regulations

Fiscal and other legal measures have been used by governments to control or reduce consumption of alcoholic drinks for many years in many countries. These measures include taxation; prohibition of sale to minors; prohibition of sale in highway filling stations; prohibition or restriction of advertising or sports sponsorship; restrictions on hours of sale, and on premises allowed to sell alcoholic drinks; drink-driving penalties of varying stringency that may include withdrawal of licenses to drive, fines, and prison sentences; and labelling required to state volume of alcohol content or to warn against the ill-effects of alcohol.

Such measures have been instituted for various reasons. Taxation on alcoholic drinks (and on tobacco and its products) can amount to a substantial source of public revenue. Overuse and abuse of alcohol is a major cause of civil disorder. Countries in which average consumption of alcohol is high have high rates of death from liver cirrhosis and cancers of the mouth and throat. Drinking alcohol in pregnancy endangers the fetus. Alcohol is classified as a carcinogen and also as a drug.

Worldwide, alcohol causes 1.8 million deaths (3.2% of total) and the loss of 58.3 million (4% of total) Disability-Adjusted Life Years (DALYs). Unintentional injuries alone account for about one third of the deaths, while neuropsychiatric conditions account for close to 40% of the lost DALYs.[180]

It has been calculated that 4.4% of the global burden of disease is due to alcohol, even when protective effects of low and moderate alcohol consumption on morbidity and mortality have been taken into consideration.[181] Alcohol has been implicated in 26 per cent of all car crashes, 44 per cent of all accidents involving fire or flames, 34 per cent of accidental deaths by drowning, 25 per cent of suicides or self-inflicted injury, and 43 per cent of assaults (other than on children).[182] In São Paulo, Brazil, alcohol has been estimated as being involved in somewhat over half of all homicides.[183]

The global cost of the harmful use of alcohol in 2002 was estimated to be between $US 210 000 million and $US 665 000 million. The health and social consequences tend to affect less-advantaged social groups most and so contribute to disparities in health between and within countries.[181]

'Dry' laws can be unpopular

Islam proscribes alcohol and in some countries and states within countries, sale or consumption of alcoholic drinks is illegal. Elsewhere consumption outside the home is prohibited or restricted.

In the USA, the sale, manufacture, and transportation of alcoholic drinks was illegal between 1920 and 1933. This period of Prohibition, which followed vigorous campaigning by temperance groups, became generally unpopular, partly because the law was widely flouted and encouraged corruption, bribery of police, and organised crime, epitomised by the Al Capone gang of Chicago. Some parts of the USA remain 'dry' or unusually restrictive, usually on the grounds that drunkenness debauches public morals.

Do taxation and restriction work?

Studies summarised in this Report (see text) show that taxes and restrictions on alcoholic drinks affect their sales and consumption.[171–173 176–178] It can be difficult to identify which measures are most effective. Taxation policies are usually accompanied by other policies designed to control consumption of alcohol, and variations in the real cost imposed by tax are usually gradual. As a general rule, governments accompany variations in taxation with other measures that may have the effect of discouraging or else encouraging drinking of alcohol. For example, in the UK levels of taxation of alcoholic drinks, especially of spirits (liquor), are relatively high and drink-driving laws are relatively stringent, but licensing laws that historically restricted the sale of alcoholic drinks in 'public houses' ('pubs') were relaxed in England and Wales in 2003 and in Scotland in 2008. In 2007, levels of 'binge' drinking in Britain were among the highest in Europe, as were rates of employees whose work was impeded by hangovers and other ill-effects of alcohol abuse.

The French example

Historically, rates of illness and death attributable to alcoholic drinks have been very high in France, corresponding to what were very high levels of consumption, most of all of wine. In the mid-20th century, rates of liver cirrhosis and of mouth and throat cancers in France were among the highest in the world. Beginning in the 1960s, government-instituted measures, strengthened since the 1990s, have cut wine consumption in France by almost half. However, heavy and 'binge' drinking especially among young people is now a public health problem in France.

Taken all together, the evidence shows that the higher the cost of alcoholic drinks to the purchaser, and the more stringent the restrictions on their marketing and sale, the lower the levels of consumption and correspondingly the lighter the burden of public order and health problems caused by alcohol, including various cancers. The US experience of Prohibition, and other evidence, indicates that beyond a certain point restrictions may be counterproductive.

Union (EU), this policy affects world markets and has implications for public health. Commodities such as corn (maize) and soya beans cheapened by subsidies are used widely in food processing and for feeding livestock. For this reason, while the prices of vegetables and fruits have increased, the prices of fats and oils, meat products, and soft drinks have remained relatively stable.

The SLR shows that demand for cereals (grains) is relatively inelastic: changes in price have a lower impact on amounts consumed than, for example, for meat or fruits. In contrast, as cereal prices fall animal feed becomes less expensive, and therefore animal products may become cheaper and this may promote their consumption.[146]

Vegetables and fruits

In most high-income communities, the availability of vegetables and fruits has increased, especially for seasonal produce, much of which is now available all year round. In the UK and USA, prices of vegetables and fruits have decreased relative to consumer price indices, including food indices, since the 1980s.[147 148] Despite this, most people in most countries fail to meet targets for the amounts of vegetables and fruits eaten.[149]

In preparation for the Republic of Slovenia's accession to the EU, the Slovenian government conducted a health impact assessment of incorporating the EU's Common Agricultural Policy into its national agriculture policy.[150] At the same

time the country was developing a national food and nutrition action plan, which included a recommendation to increase fruit and vegetable consumption. It was estimated that implementing this recommendation could reduce the risk of cancer in Slovenia by 6 per cent. The impact assessment suggested that with the Common Agriculture Policy in operation, the government would not be able to put in place policy to meet the recommendations for increased fruit and vegetable consumption.[151]

Meat and dairy products

Agricultural policies that subsidise meat or dairy products directly, or indirectly through cheaper animal feed, make these foods cheaper and tend to increase the amounts purchased and consumed. Removal of such subsidies has the reverse effect.[152–156]

Like the United States Farm Policy, the EU's Common Agriculture Policy distorts world food prices and therefore trade.[26 150] It maintains artificially high farm gate prices of beef, animal fats, and sugars.[26 157–166]

Fats and oils

The availability of plant oils (for instance, soya bean, seed, and palm oil) increased in the second half of the 20th century compared with other edible fats, such as fish oils, butter, or lard.

In China, average edible oil intake tripled between 1989 and 2000.[167 168] Conversely, price rises beginning in 2007 are likely to lead to a fall, or at least a slowing of the rise, in consumption of edible oil.[169 170]

Alcoholic drinks

Increasing the price of alcoholic drinks by taxation reduces their sales and consumption[171 172] (see box 4.5). Policies restricting the supply and availability of alcohol are effective in reducing the harm caused by alcohol.[173] As well as taxation, these include imposition of a minimum legal drinking age, reduced hours of sale, and policies on the number, type, or location of sales outlets. Drink-driving countermeasures are also effective when vigorously enforced.[174–179] Studies show that taxation is cost-effective; tobacco control is a clear example (see box 4.6). In regions with high-risk alcohol use, such as most European countries, taxation has the greatest and most cost-effective impact on reducing the average burden of high-risk alcohol use.[176–178]

Soft drinks and snacks

Subsidies of corn (maize) in North America make high-fructose corn syrup, and therefore soft drinks sweetened with this syrup, artificially cheap.[184–186] Mexico is considering the imposition of taxes on the fat content of milk and the sugar content of soft drinks.[143] In the USA in 2000, there were 11 local taxes on soft drinks and eight further taxes targeted at snacks or confectionery (candy) and soft drinks.[141] A total of 19 such schemes operated in the USA and Canada in 2000, but a further 12 had been withdrawn after lobbying from manufacturers.[110]

Box 4.6 Tobacco: the impact of price control and other factors

Fiscal and other legal measures designed to protect public health are effective in areas other than food and drink. One clear example is smoking and other exposure to tobacco (also see boxes 2.3 and 4.2). This evidence is relevant to considerations of public policy on food and drink, as is that on fiscal and other legal measures applied to alcoholic drinks.

Taxation of tobacco works

Taxing cigarettes and other tobacco products is effective in reducing the number of smokers, lowering the numbers of cigarettes smoked, decreasing the duration of smoking, and discouraging people from starting to smoke.[110 187 188] In the USA and other high-income countries, a 10 per cent increase in cigarette prices is estimated to produce a 3–5 per cent reduction in smoking among adults.[187 189] Young smokers may be more sensitive to price,[187] and lower-income countries also show greater price sensitivity.[187 190] Reducing the cost of products that help users to quit tobacco products has also been shown to be both effective and cost-effective.[110]

Tobacco control laws also work

Legal measures designed to control and reduce tobacco consumption are also effective. Many countries have restricted advertising and marketing of tobacco products since the 1970s. Countries whose policies are more stringent can expect approximately 5 per cent lower tobacco use.[191] The cost of restriction and prohibition is low, although it has been vehemently resisted by the tobacco industry.[110] Warnings on labels and promotion of tobacco products are most effective when these are graphic and prominent.[192–196] Government-sponsored advertising designed to discourage smoking especially among young people can be effective.[197]

Restriction and prohibition of smoking in workplaces, restaurants, and bars has been put in place in several European countries since 2004, including Ireland, Norway, Italy, Sweden, the UK, and France. These reduce exposure to 'second-hand smoke' and have also raised public consciousness of the dangers of smoking.[198–200] Evidence is emerging that these laws reduce the number of cigarettes people smoke, and may also reduce the number of people who smoke.[200 201] The evidence on restriction of access such as legal age limits on buying cigarettes is less conclusive.[110]

4.2.1.2 Physical activity

The use of public money to build highways and improve city transportation systems makes cars more affordable, so reducing transport-related physical activity. The cost of some forms of leisure-time physical activity, particularly indoor activities, is often out of the reach of low-income households.

Choice of means of transport is influenced by its cost.[202] Although walking is free of direct costs, and cycling relatively cheap, transport policies and personal incomes can be important determinants of whether and how much people use cars, which can determine rates of walking and cycling.

Financial incentives offered to companies to provide schemes to promote physical activity are feasible and predicted to be economically efficient.[203] There is evidence to support no-cost exercise facilities such as the UK Free Swimming initiatives, delivered at local authority pools, which

target certain groups such as children, disadvantaged people, and older people.[204–206] In the UK,value added tax on cycle helmets was abolished in 2003. Community sports clubs also receive concessions.[207]

The SLR shows that exercise referral schemes can be effective among those who complete the schemes, but drop-out rates are high.[208 209] One review found that these schemes have positive effects on physical activity in the short term (6–12 weeks), but not in the longer term (over 12 weeks).[210] The schemes make exercise facilities available to those who need it at no cost for a fixed period only, after which usual market rates apply.[211] Exercise referral may be more effective for those who are overweight but not obese, and for those initially not completely sedentary.[208 209]

Box 4.7 Subsidised vegetables and fruits

A study in the USA tested the effectiveness of giving vouchers for vegetables and fruits, either from farmers' markets or supermarkets, to mothers living on low incomes. The vouchers were given for 6 months. Participants were followed up for a further 6 months, and then their diets were compared with those of a control group. The amounts of vegetables and fruits eaten increased, and the increase was sustained after the vouchers were discontinued.[213] Comparable results have been obtained in São Paulo, Brazil.[214] A UK phone poll found that over four fifths of respondents support subsidies on the price of vegetables and fruits.[215]

4.2.2 Evaluation of evidence

Examination of the evidence shows that the price or availability of foods and drinks and of opportunities for physical activity are in many cases affected by public policies and practices that distort supply and demand. Policies and actions that make some foods and drinks, and also motorised transport, artificially cheap have not been put in place with their effects on public health in mind. Taxation of and restrictions on alcoholic drinks have been imposed partly to improve public health and are effective, as are taxation of and restriction on tobacco.

The evidence shows that fiscal measures are powerful tools to alter patterns of diet and physical activity, even when not designed to do so. Therefore existing economic policies are one determinant of current behaviours.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of four options for possible action. These are the removal of agricultural and other subsidies that damage public health; imposition or increase of taxes and other disincentives on unhealthy foods and drinks and on private vehicles; increased cost and restriction of availability of alcoholic drinks; and financial and other support for local authorities, employers, and health professionals who promote or prescribe healthy diets and physical activity. (For options designed to improve availability of healthy diets and of physical activity in schools and other institutions and in workplaces, see chapter 5.) Evidence for a further option, financial and other support for communities and families to encourage healthy diets and physical activity, was insubstantial and so this option has not been evaluated.

4.2.2.1 Removal of agricultural and other subsidies that damage public health

Political feasibility and acceptability

In principle, most leading nations are pledged to support free trade, which implies the removal of price support for foods and drinks at all stages of food systems, from farm to market. In practice this policy is distorted at all levels, from government subsidies of corn (maize) and therefore high-fructose corn syrup in the USA to 'loss-leaders' — soft drinks and other processed products in supermarkets; removal of these subsidies is politically difficult.[212] This policy option is not proposing abolition of taxes and subsidies, both of which can be used to encourage healthy dietary patterns, but simply that subsidies of unhealthy foods be removed. This is likely to be resisted by powerful governments and industry. Additionally, subsidies on purchase prices for consumers can be effective. (See box 4.7)

Potential impact

BENEFITS: The consequences of unhealthy patterns of diet and of physical inactivity are set out in the 2007 WCRF/AICR Diet and Cancer Report. A number of serious chronic diseases, including some common cancers, are among these consequences. The potential benefits of removing subsidies are high. Public health will improve. Taxpayers' money will be saved. The livelihoods of farmers in countries where food production is not subsidised will to some extent be protected.

HARMS: Farmers already under pressure whose livelihood depends on subsidies will need either to change what they produce or else risk going out of business.

General acceptability

The economic policy of 'a level playing field' is officially accepted and a policy designed to stop unhealthy products being made artificially cheap is likely to be generally popular with all actors that do not have vested interests.

Cost

Withdrawal of subsidies saves public money. Subsidies to US corn (maize) farmers alone exceeded $US 25 billion between 2002 and 2007,[216] and to US rice producers exceed $US 1 billion per year, while those to European farmers in 2005 amounted to €48.5 billion.[217]

Timeframe

It is possible to implement a phased scheme of withdrawal of subsidies from one product and then another beginning with the next round of trade talks and completed say in 5 years.

Transferability

Bearing in mind the impact of food subsidies on farmers and on national economies where food is not subsidised, the scheme is necessarily global.

4.2.2.2 Imposition or increase of taxes and other disincentives on unhealthy foods and drinks and on private vehicles

Political feasibility and acceptability

This option is in many ways the reverse of the previous option. It comes from the position that the global epidemics of overweight and obesity and of physical inactivity, with all their consequences including on rates of cancer, are now so serious that fiscal and other policies need to be used to promote healthier diet and physical activity patterns. There is already some precedent in addition to that of alcoholic drinks, in congestion charges and road tolls for cars (see boxes 4.5 and 4.8). Social and political pressures to impose health-related taxes and other disincentives on foods, drinks, and cars will need to be strong and sustained to be feasible.[218]

Potential impact

BENEFITS: The consequences of unhealthy diets and of physical inactivity have already been described. The combined withdrawal of subsidies and where needed the imposition of taxes and other disincentives, with the purpose of increasing consumption of healthy foods and drinks and increasing physical activity, has great potential impact — how big obviously depends on the scale of the programmes. The economic burden of disease will be decreased, as will healthcare costs and employee sick leave. Taxes generate revenue. Low-income communities and families might gain most benefit.[137]
HARMS: Taxes on cheap processed high-energy foods may be troublesome for those on low incomes, despite the likelihood that their diets would benefit the most. Similarly, additional taxes, charges, and other measures designed to reduce use of cars and therefore encourage walking and cycling will be troublesome for people on lower incomes who depend on cars for transport. This could be resolved by a voucher scheme.

General acceptability

Most parents are likely to support restricting the availability of unhealthy food and drink choices to children. Taxes on unhealthy foods and drinks consumed by adults may only be acceptable when part of a general pricing policy designed to stimulate healthier food choices.[218]

Cost

Existing taxes on unhealthy foods and drinks generate income for local or national government.[141] Income-neutral schemes can be used, offsetting the cost of subsidies on high-fibre foods, vegetables, and fruits with income from taxes on processed foods high in sugar, refined starches, fat or salt, and sugary drinks.[137] Tax income can also be used to finance supportive media campaigns, community support programmes, or employer incentives. Assessment of tax schemes needs to include expected reductions in healthcare costs, reduced sick leave for workers, and reduction in costs of treating chronic diseases, including cancer.

Timeframe

Experience with tobacco policy suggests that taxation and other restriction can initially set some major targets and become more comprehensive as public acceptability increases.

Transferability

Governments will need to ensure that tax and other pricing policy is agreed internationally, to avoid unfair competition. National taxation and other fiscal and formal policies that make imported products relatively cheap will not be accepted by industry.

Box 4.8 Congestion charging

Congestion charging was introduced into central London, UK, in February 2003. Drivers entering a central London charging zone pay to drive or park on roads in the city between 7 am and 6.30 pm Monday to Friday, excluding public holidays. The charge was introduced alongside a range of other complementary measures including enhanced bus services and additional cycling infrastructure such as cycle lanes and more cycle parking at key destinations.

The main justification for the charge was to reduce congestion in central London. Transport for London's (TfL's) monitoring report showed that there has been an average 26 per cent reduction in congestion inside the charging zone since the introduction of the scheme. The scheme has also brought about considerable additional benefits to public health that were not originally envisaged. Of particular note is the increase in cycling across the city. TfL has reported a 66% increase in cycling within the central charging zone in 2007 compared to 2002.[219] The extension of the charging zone in 2007 resulted in an increase in walking by 4% and cycling by 15%.[219] Many visitors to London also report the city to be more amenable to walking since the charge was introduced, although TfL have not reported data on levels of walking in the city.

4.2.2.3 Increase in cost and restriction of availability of alcoholic drinks

Political feasibility and acceptability

A number of interventions have been shown to be effective in reducing alcohol use, yet their level of implementation remains low in all but a handful of countries and their potential effect on population-level health has rarely been assessed. By contrast, some interventions without clearly established effects continue to be widely used including, for example, mass media public information campaigns and school-based education aimed at reducing alcohol consumption.[221]

This suggests that political feasibility may be higher for less-effective policies. Despite this, some countries do have legislative and price-based measures to control alcohol use, so effective measures can be politically feasible.

Potential impact

BENEFITS: Policies that reduce alcohol use — particularly where they reduce dangerously high alcohol use — will prevent healthcare expenses associated with several chronic diseases, as well as alcohol-related damage and trauma from accidents and violence. Reduced alcohol use will also bring

social benefits.[181 221 222] Revenues from taxation can be used for public good.

HARMS: More stringent policies, such as prohibition or rationing of alcohol, may increase black market sales of alcohol or poisoning from home-produced alcohol.[221]

General acceptability

There are several social and personal factors that may reduce acceptability, including alcohol dependence, social pressures, and aggressive alcohol marketing and promotion. But there are many good practices that can be replicated with political commitment.[222] Education and mass media campaigns, while unlikely to be effective at changing alcohol intake on their own, may be useful in raising awareness and increasing acceptability of legislative measures to reduce alcohol use.[181 222] Policies that aim to protect young people from alcohol are likely to be acceptable to the public. However, the alcohol industry may lobby against measures that they see as threatening.

Cost

In all but the areas with lowest drinking levels (East and South Asia and the Pacific), taxation is the most cost-effective policy for reducing alcohol use.[221 222] Reduced access to sales outlets and protection of young people are also likely to be cost-effective.[221 222] Economic savings in healthcare and other costs to society should be included in this consideration.

Timeframe

The timeframe for implementation is likely to depend on the existing social structure, popular support, and the level of alcohol legislation already in place in any nation. The timeframe for effect of increased price or reduced availability of alcohol should be rapid, with consequent improvements to health (and society) following on.

Transferability

The ideal policy approach to prevention of alcohol abuse will vary depending on prevalent drinking levels and national infrastructure. Nations should be able to follow best practice policies from other countries with similar situations.

4.2.2.4 Financial and other support for local authorities, employers, and health professionals who promote or prescribe healthy diets and physical activity

Political feasibility and acceptability

Both employer and health professional schemes are likely to be feasible and acceptable, although both involve expenditure of public money. Governments can offer financial incentives to companies and health professionals that offer such schemes, or financial disincentives against those that do not. Given sufficient public support, governments can subsidise leisure centres or provide vouchers to those on low incomes.[203] Several regional governments, such as some within Australia and the UK, already provide subsidised leisure centres, gymnasiums, and swimming pools. A modelling study found that fiscal inducements to make organisations and institutions take more responsibility for the health of their employees were likely to reduce the rate of increase of obesity in the UK.[218]

Potential impact

BENEFITS: As said above, healthy patterns of diet and regular physical activity, as well as enhancing well-being, protect against many diseases including cancer. Making exercise facilities more widely available may change social norms. Such schemes can be targeted at low-income households.[203] Increasing physical activity will reduce the risk of various chronic diseases and enhance well-being.

HARMS: None evident.

Availability and price.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Removal of agricultural and other subsidies that damage public health	✔			✔		
Imposition or increase of taxes and other disincentives on unhealthy foods and drinks and on private vehicles		✔		✔		
Increase in cost and restricition of availability of alcoholic drinks	✔			✔		
Financial and other support for local authorities, employers, and health professionals who promote or prescribe healthy diets and physical activity		✔			✔	

Box 4.9 Walking the Way to Health

Many people find they need social and practical support to begin walking regularly to benefit their health. In England, the Walking the Way to Health project promotes regular walking through the provision of group walks in the green spaces near where people live.[220] Walks are led by qualified leaders who have received training in planning and leading the walks and making sure that repeat attendances are high. The walks are usually about 3–5 miles and tend to avoid hilly areas or other obstacles that may put off inexperienced walkers. The Walking the Way to Health project started with led walks from one doctor's surgery in the late 1980s, and by 2008 there were over 525 health walk schemes in the UK.[220] Many people attend walks on the recommendation of their general practitioner (primary care physician), and see it as an alternative to exercise in a gym.

General acceptability

Employers may dislike such schemes unless their cost-effectiveness is clear. That said, the rise in employer schemes to encourage healthy living, and in 'healthy-choice' promotions by food retailers, suggests that benefits are perceived, and so government incentives for such schemes may be attractive. A UK phone poll suggested that four fifths of respondents support subsidies on, or provision of free, exercise facilities.[215]

Cost

Employer schemes are likely to be cost-effective, due to the possible reduction in sick leave and increased efficiency. Small businesses can be encouraged with government-provided financial incentives/bursaries. Increased physical activity will reduce costs of healthcare and sick leave. Government-sponsored walking groups (see box 4.9) and cycling clubs provide affordable physical activity opportunities at low costs.

Timeframe

This depends on the scale of the programmes and the responsiveness of government and beneficiaries. Subsidised existing exercise facilities, or establishment of walking or cycling clubs, can be put in place quickly. Other schemes will take longer. Accompanying public awareness and education campaigns will make any schemes more effective.

Transferability

Programmes will work best when they complement and enhance existing programmes. For example, employers' schemes are more likely to be put in place in countries with established protection of employees' rights.

4.3 Food and drink processing

Insofar as food manufacturing and processing are economic activities, food and drink processing is included in this chapter.

Most foods and drinks sold in supermarkets and other shops in most countries are processed in various ways. Processed and packaged food is typically manufactured to high safety standards. Industrialised food systems usually provide adequate or abundant foods and drinks to those with the money for purchase. However, dietary patterns made up mostly from manufactured foods tend to be high in processed fats or oils, or refined starches or sugars, and so also to be high in energy, and also tend to contain a substantial amount of added salt.

Some methods of processing, such as salting in general, salting, smoking, and curing to make processed meats, and the Cantonese method of salting and fermenting fish, are a probable cause of some cancers. Conversely, processes such as drying, freezing and refrigeration, and steaming make some foods, including pulses (legumes), cereals (grains), vegetables and fruits, available all year round, and so can be seen as protective against various cancers.

A further consequence of food and drink processing is that manufacturers and caterers control the physical size of the product presented for sale. Since the 1980s, manufactured products have often been sold in larger portion sizes, sometimes substantially so.

4.3.1 Summary of evidence

4.3.1.1 Patterns of diet

Although food processing methods may directly influence cancer risk, there is little evidence on policies and actions relating to this (but see box 4.10).

Nutrition labelling

Practically all countries use legislation or guidelines to control information on the labels of processed food. This can include ingredients, nutrition information, or nutrition or health claims. Food labels can also be used as marketing tools, important for brand recognition and influencing consumer choice (for food and drink advertising and marketing, see chapter 4.4).

Guidelines to industry issued by governments or developed within industry may help to make processed foods and drinks lower in sugar, fat or salt.[223] Health claims and nutrition labelling influence consumer choice.[224 225] People who make use of nutritional information consume healthier diets.[226] However, labels may be confusing, misleading, and poorly understood.[227]

Health claims and nutrition labelling are one influence on consumer choice and dietary practices.[224 225 228] Use of

nutrition information is associated with healthier diets,[226] though labels may also be confusing.[227] Clear, uniform labelling helps people to make healthier choices.[229] Food labelling and nutrition information is more effective and equitable when accompanied by education and information programmes.[227 230] In New York City, there is legislation to require information on energy content of food bought outside the home.[231]

Portion sizes

Portion sizes of foods and drinks prepared and served in the home are usually determined by the person consuming, or cooking and serving. Portion sizes of processed and packaged foods and drinks are determined by the manufacturer or caterer. In theory consumers can limit the amount they eat and drink. In practice, the bigger the portion size, the more foods and drinks are consumed. Frequency of consumption is also an important factor.

The packages of many processed and notably 'fast food' and other convenience meals, dishes, snacks, foods, and drinks have become steadily bigger since the late 1970s, at first in the USA and then, with the rapid growth of the transnational food and drink industry, throughout the world.[232–235] 'Super-size' foods and drinks are usually cheaper per volume than smaller sizes. Processed foods, 'fast food', and sugary drinks are a probable cause of overweight and obesity, and therefore of cancers the risk of which is increased by overweight and obesity. Even when smaller portion sizes are provided, sometimes increased frequency of consumption is recommended by the manufacturer or they are provided in multipacks.

Studies other than those within the SLR show that when foods and drinks are presented to people in larger portion sizes, people consume more energy[236–240] and so are liable to gain weight and become or stay overweight or obese.[240] The combination of large portion sizes, sugary drinks, and processed energy-dense foods is likely to cause weight increase.[241] Correspondingly, reductions in portion size and the energy density of processed foods leads to decreases in energy intake.[242]

Salt

Unprocessed foods characteristically contain little salt. Around 80–90 per cent of the salt consumed in most countries comes from processed food, with almost all the remainder added in cooking or at table.

Where there is public and political pressure to reduce the salt content of processed foods, usually to reduce rates of hypertension and stroke, manufacturers have introduced voluntary reductions.[243] Average daily salt intake in the UK fell from 9.5 grams in 2000 to 8.6 grams in 2008.[244 245]

4.3.2 Evaluation of evidence

The methods used to process foods and drinks, and also the ingredients used in their formulation, are important determinants of their nutritional quality and, given that most foods and drinks consumed are processed, of overall dietary quality. The more sugar, refined starches, and fat contained in processed foods, the higher in energy they are, and such products are generally lower in overall nutritional quality. Many processed foods are also salted or salty.

Reformulation of processed dishes, meals, snacks, foods, and drinks so that they are more nutrient dense and lower in energy will help to protect against overweight and obesity.

Initiatives undertaken by industry to encourage beneficial and harmless methods of food processing that enhance or preserve nutritional quality, and to reformulate processed foods and drinks, need to be encouraged by governments, civil society organisations, professional organisations, and other actors.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of three options for possible action. These are reformulation of processed meals, dishes, snacks, foods, and drinks to contain less sugar, refined starches, fat, and salt; introduction or strengthening of standard uniform

Box 4.10 Methods of food and drink processing

The term 'processing' is commonly taken to refer to techniques used by food manufacturers to modify or create foods and drinks that are attractive, enjoyable, profitable, and safe and often to increase their durability or 'shelf-life'. In a broader sense of the word, food production, preservation, and preparation including cooking are all forms of processing.

The significance of processing

In this broader sense, some forms of processing are or may be directly relevant to the risk of cancer. Processes such as drying, freezing, and steaming can be seen as harmless or actually beneficial because they preserve nourishing food, make it available year round, and may make it more palatable. Some processed products have or may have the effect of protecting against cancer: tomato products such as pastes and ketchups, which probably protect against prostate cancer, render the lycopene in them more bioavailable than in whole tomatoes.

Conversely, meat processed using salt, smoking, curing, or preservatives is a cause of colorectal cancer. The Cantonese method of salting fish, which also involves fermentation, is probably a cause of nasopharyngeal cancer. Salty, salted, and salt-preserved foods are probably a cause of stomach cancer.

Use of high-temperature cooking and in particular the direct use of flame and burning of food produce carcinogens, but the animal and other evidence cannot be assumed to apply to humans consuming normal diets.

Many forms of processing are indirectly relevant to the risk of cancer. Most processed foods contain fat, sugar, or salt, often in substantial quantity varying with the nature of the product, and also refined starch. Cosmetic additives (colours and flavours) together with preservatives enable the creation of a vast number of processed foods, including 'fast food' and other convenience dishes, snacks, and foods, a large proportion of which are high in sugar, refined starches or fat, and of sugary drinks. Hydrogenation, the process that turns liquid oils into solid fats with a longer shelf-life that are used in the production of many processed foods and drinks, creates *trans*-fatty acids, which are a cause of cardiovascular disease. (See chapter 4 of the 2007 WCRF/AICR Diet and Cancer Report for more information and details.)

explicit systems of food labelling; and reduction of portion sizes of processed meals, dishes, snacks, foods, and drinks. A fourth possible option is replacement of harmful by beneficial methods of food and drink processing, but there is a lack of evidence explicitly addressing this point, so it has not been evaluated.

4.3.2.1 Reformulation of processed meals, dishes, snacks, foods, and drinks to contain less sugar, refined starches, fat, and salt

Political feasibility and acceptability
Voluntary measures to reformulate processed foods are already in place in a number of countries, in response to the accumulation of evidence indicating the need for healthier food, and growing professional and public pressure for more healthy choices and less 'hidden' sugar, refined starches, fat, and salt (see box 4.11). As with other measures, governments are generally reluctant to impose statutory requirements, and in many countries regulation of the compositional standards of foods and drinks — often imposed for reasons that would not be considered particularly relevant now — have been dismantled. Manufacturers and caterers prefer self-regulation — guidelines devised by themselves, usually in consultation with government and perhaps with some civil society involvement.

Potential impact
BENEFITS: Reformulation of processed foods on an international and national scale has enormous potential to improve patterns of diets. The policy is equitable, with the greatest health benefits for those who eat the most processed foods.
HARMS: Products may be reformulated with small reductions of fat, sugar, or salt so that 'improved' processed foods and drinks remain basically unhealthy. Reformulation by reduction of fat often leads to an increase in sugar, for instance in yoghurt and other dairy products, so that the changed product sometimes has a higher energy content than the original.

Box 4.11 Food reformulation in Europe

In 2005 the European Commission launched a Platform for Action on voluntary measurable reductions in the fat, sugar, and salt content of processed foods and drinks, together with improved product information. Several improvements have been made and monitored.[246]

By the end of 2007, Unilever had removed 2750 tonnes of saturated fatty acids, 170 tonnes of salt, and 5000 tonnes of sugar from its products. PepsiCo has reduced the saturated fatty acids and sodium content in snack products in its northern Europe and UK markets. The Casino Group, a member of the EuroCommerce group operating in France, has removed 140 tonnes of sugar, 23 tonnes of salt, and 173 tonnes of fats from its products.

The UK Food Standards Agency set voluntary targets for the reduction of the salt content of processed foods in 2006. Two years later several major retailers, caterers, and manufacturers had made progress,[247] and average daily salt intake in the UK had fallen (see chapter 4.3.1).[244 245]

General acceptability
Actions currently being taken by some large food manufacturers suggest that they are prepared to improve the nutritional quality of their products in response to public pressure and a sense that if they do not, they may be bound by law to do so. People who consume a lot of processed foods and drinks are likely to welcome convenient healthy changes.

Cost
Total costs, as with many of the policy options outlined in this Report, depend on the scale of operation. The costs of reformulation of existing products and development of new products is borne by industry and passed on to consumers. In some cases reformulation may be cheaper, for instance replacing sugar with artificial sweeteners. Regulations that require enforcement are relatively expensive, but greater population health benefits may offset these costs.

Timeframe
Manufacturers are constantly developing new products and can reformulate products relatively quickly.

Transferability
Many of the companies reformulating their products are transnational and can make these changes internationally. Government voluntary guidelines are also readily transferable, adapted to national and local circumstances.

4.3.2.2 Introduction or strengthening of standard uniform explicit systems of food labelling

Political feasibility and acceptability
Standard systems of food labelling are used in most countries. The need for standardised labelling is accepted, if only for commercial reasons. Mandatory systems that explicitly identify the most relevant aspects of processed food are not yet standard or common. The number of national regulations and voluntary guidelines already in place suggests that fuller schemes are both feasible and acceptable (for an example see box 4.12). One of the major problems is that these guidelines need to be constantly reviewed and updated to address new marketing approaches. In some countries manufacturers are working with the scientific community to provide accurate and helpful food labelling.

Potential impact
BENEFITS: Clear, simple, uniform, and explicit nutrition labelling will be effective, is likely to reach the widest range of people, and is the most equitable.
HARMS: Unclear or complicated labelling is likely to be useful only to exceptionally health-conscious customers, and no use to those who are either less well informed or too busy to study labels.

General acceptability
New food labelling and nutrition information will be more acceptable when accompanied by information and education campaigns.[227 230]

Box 4.12 'Traffic light' labels in the UK

In 2007 the UK Food Standards Agency (FSA) initiated a voluntary nutrition labelling scheme designed to give 'at a glance' information on the fat, saturated fatty acid, sugar, and salt content of processed foods. The scheme has been taken up by eight retailers, with combined sales of more than 40 per cent of the UK market, as well as by 16 manufacturers. The FSA scheme is also supported by professional bodies, health charities, and consumer organisations.

The FSA has raised awareness with a campaign using television advertising, posters, magazine and newspaper articles, and printed booklets for food buyers. Preliminary sales data suggest that consumers are making use of this 'traffic light' labelling. The UK supermarket Sainsbury's compared sales of products within food categories before and after 'traffic light' labels were introduced and found that overall there was a 15 per cent increase in sales of healthier products and a 12 per cent decrease in sales of less healthy products. Data from the UK supermarket Waitrose show a significant increase in sales of 'healthy' choices (more green 'traffic lights') and a decrease in sales of less healthy choices (more red) in sandwiches and ready meals.[246 248]

Cost
Changes to labelling systems are not expensive.

Timeframe
Collaboration with manufacturers and retailers, directly and through their representative organisations, means that new and improved labelling schemes can be put in place fairly quickly.

Transferability
Nations can monitor and share best practice in nutrition labelling, and transnational food companies can readily implement changes internationally.

Box 4.13 Portion sizes in Connecticut

In Connecticut, USA, nutrient content standards for foods served in schools were set in January 2008 and revised for July 2009 to include portion size. Portion sizes are based on those recommended by the US Department of Agriculture and the US Food and Drug Administration. The standard for snacks and desserts states that portion sizes should be reasonable and served in a single-serving package or a package that does not exceed the maximum portion size, to discourage consumption of multiple servings.[254]

4.3.2.3 Reduction of portion sizes of processed meals, dishes, snacks, foods, and drinks

Political feasibility and acceptability
In a number of countries including the USA, the UK, and Brazil, government publications give information on portion sizes which can be incorporated into nutrition standards for schools or other institutions (see box 4.13). Information on controlling portion size is a common feature of healthy-eating education programmes.[249–252] In the USA between 2002 and 2006, some companies continued to increase the portion sizes of some of their products.[144] Some multinational 'fast food' restaurants serve bigger portion sizes in the USA than in their European outlets.[253]

The New York City scheme for energy labelling of restaurant meals suggests that these schemes are politically feasible.

Potential impact
BENEFITS: Limiting portion sizes is likely to protect against weight increase and obesity, and therefore against those cancers of which overweight and obesity are a cause. Reducing or controlling chronic diseases in a population will decrease healthcare costs, loss of earnings, sick leave, and other associated economic burdens.
HARMS: Families on low incomes may depend on meals, foods, and drinks presented in discount price 'super-sizes'.

Food and drink processing.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Reformulation of processed meals, dishes, snacks, foods, and drinks to contain less sugar, refined starches, fat, and salt		✔		✔		
Introduction or strengthening of standard uniform explicit systems of food labelling		✔			✔	
Reduction of portion sizes of processed meals, dishes, snacks, foods, and drinks	✔			✔		

General acceptability
Regulation to limit portion sizes would be difficult to achieve. Success will probably depend on voluntary agreements and a shift in public mood parallel to that which now makes small automobiles fashionable as well as practical.

Cost
The profits of some food manufacturers are built on the large portion size strategy and may well drop if this policy is curtailed.

Timeframe
Agreements made between government and food manufacturers to reduce portion sizes will take perhaps 2–3 years.

Transferability
Transnational food and drink manufacturing and catering companies can transfer policies.

4.4 Product advertising and marketing

Energetic and even aggressive advertising and marketing of processed foods and drinks is a global phenomenon. Transnational and other major food, drink, and associated companies altogether spend many billions of US dollars per year on advertising and marketing. Spending is decreasing in high-income countries and increasing in lower-income countries. The annual advertising and marketing budgets of the largest transnational companies approach or exceed $US 1 billion per year, and their annual sales revenues exceed the annual gross domestic product of many smaller countries.

Advertising is just part of the overall marketing strategies of food and drink manufacturers, retailers, caterers, and allied trades. (For portion sizes and food labelling, see chapter 4.3.)

Advertising and marketing influence choice, especially in children. Codes of practice and legislation control some of the ways in which industry sells to consumers, for instance by specifying how foods and drinks are advertised, promoted, and labelled.

4.4.2 Summary of evidence

4.4.1.1 Patterns of diet

The SLR shows that food advertising and marketing, generally for processed, 'fast food' and other convenience foods, and for sugary drinks, influence the choice of foods and drinks. The evidence is particularly strong for causal links between television advertising for and the choice of processed foods and sugary drinks, in particular advertising aimed at children. Most evidence comes from high-income countries; this is supported by evidence from lower-income countries.[255–259]

One review within the SLR conducted for this Report found that children enjoy food promotion and that it influences their food and drink preferences. This effect works at both brand and category levels.[255] Advertisements appear as slots on children's channels and programmes and use material especially attractive to children such as 'super-heroes' and other cartoon characters. Extensive use is also made of promotional material on product packages and in-store displays. Increasing use is made of internet advertising and marketing, much available on mobile telephones.[260–262]

A systematic review of studies of food advertising to children shows that most advertising is for sugared breakfast cereals, 'fast food', soft drinks, confectionery, and savoury snacks.[256] These advertisements are targeted at children all over the world. The review shows that children enjoy such advertisements as among their favourite television items, and want to consume the promoted foods. Parents, particularly those from low-income backgrounds, often buy such foods. Children in lower-income countries may be more vulnerable to processed food and drink advertising and promotion. 'Fast food' marketing may also influence what parents feed their children by 'normalising' it.

Relatively little advertising and promotion is for healthy foods and drinks. 'Fast food' restaurants claiming to be

healthier than their competitors may attract more customers.[263] The SLR found that promotions used for and in supermarkets affect food consumption. In the USA, the Californian '5 a Day for Better Health' campaign promoted consumption of fruits and vegetables through mass media activities and point-of-purchase information provided by retailers over 2 years.[264] Vegetable intake increased by one and a half servings a week, although fruit intake fell by half a serving a week. There was no significant change in combined fruit and vegetable consumption. The 6-year evaluation of the US national '5 a Day for Better Health' campaign found an increase of one and a half servings a week for combined vegetable and fruit consumption.[265] As in California, the information was provided through the media and by supermarkets.

4.4.1.2 Overweight and obesity

A review of obesity prevention found that promotional campaigns can increase awareness of what foods and drinks make up healthy diets and can prompt people to change their diets.[266] The review also highlighted the benefit of point-of-purchase schemes in shops, supermarkets, restaurants, and cafes, particularly when supported by more information and promotion.

Another review found good evidence for the effectiveness of point-of-sale labelling in cafeterias and supermarkets and provision of nutrition information on restaurant menus, as well as for nutrition labelling.[110] A shelf-labelling programme run at 18 supermarkets serving minority communities in Detroit, USA, found that this approach influenced food choices.[267] Nearly 30 per cent of those leaving the stores were aware of the programme, with awareness significantly higher among African Americans. Of the people aware of the programme, 56 per cent reported using the shelf labels.

4.4.1.3 Breastfeeding

Marketing of infant formula products affects breastfeeding practice. The WHO International Code of Marketing of Breast Milk Substitutes was agreed in 1981 in response to declining rates of breastfeeding due, in part, to the promotion of breastmilk substitutes.[268] As a code it carries no regulatory force. Direct advertising to the public of breastmilk substitutes competes unfairly with breastfeeding, which is not advertised.[269 270] In 1997, a study by the Interagency Group on Breastfeeding Monitoring found that some companies were not following the code.[271] Similarly, in 2007 the International Baby Food Action Network published a report detailing ongoing violations of the code, with further updates available on their website.[272 273]

One review of interventions to promote initiation of breastfeeding found that these were most effective in the pre- and postnatal periods.[274] A systematic review found that preventing the use of hospital discharge packs containing samples of and information on breastmilk substitutes improved duration of breastfeeding.[275] Conversely, providing promotional materials during early pregnancy on infant feeding from infant formula companies retards breastfeeding duration.

4.4.1.4 Physical activity

In one review of promotional campaigns designed to promote physical activity, it was not clear whether or not media interventions influence people to participate in physical activity.[266] General promotion of active travel was not an effective way to increase physical activity. There was some evidence that targeting motivated subgroups of the population increases the effectiveness of such campaigns. Further to this, a later systematic review found strong evidence for the efficacy of targeted social marketing campaigns to promote active travel.[276]

4.4.2 Evaluation of evidence

Effective policies and actions designed to protect the health of children have compelling justification. Early life experiences are crucial to later development and to susceptibility to chronic diseases including cancer. A mass of evidence, some summarised above, shows that targeting children with television advertisements and other promotion of sugary foods and drinks, 'fast food', and other convenience foods shapes the choices of children and their parents, and is probably a cause of overweight and obesity in childhood and then in adult life.

For these and other reasons there is also compelling justification for policies and actions that restrict or prohibit such advertising and marketing. As has already been stated, legal and fiscal policies, often seen in a negative light, can enable and encourage healthy ways of life. At the same time, public and private funds can be invested in campaigns for healthy foods and drinks, as well as clear uniform explicit processed food and drink labelling (see chapter 4.3).

There is little evidence on the effectiveness of advertising and marketing of healthy foods and drinks, probably simply because there is not much of it. Collaboration with the transnational and other large food and drink manufacturing, catering, and associated industries and their representative and allied organisations to move advertising and marketing away from unhealthy and towards healthy foods and drinks and associated products, including for physical activity, is essential.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of three options for possible action. These are restriction or prohibition of advertising and marketing of unhealthy processed foods to children; stricter controls on advertising and marketing of infant formula and weaning foods; and promotion and marketing of healthy ways of life.

4.4.2.1 Restriction or prohibition of advertising and marketing of unhealthy processed foods to children

Political feasibility and acceptability

Governments have been averse to formal intervention in the food and drink 'markets' designed to protect public health, preferring industry self-regulation. This mood may be changed by the moves made by governments to intervene in the financial markets, for example by supporting and nationalising banks. There is now public pressure in many countries to restrict or if necessary prohibit advertising and marketing

Box 4.14 The effect of restriction of food advertising

Advertising to children has been banned in Quebec, Sweden, and Norway since 1980, 1991, and 1992, respectively.[277] As yet there are no known systematic studies to show the impact of these bans. A complication is cross-border advertising on international television channels and other forms of promotion (such as in-store promotions). In Quebec, reduced exposure to advertising resulted in fewer sugary 'children's' cereals being purchased, particularly in French-speaking households, which are less exposed to advertising on English-language channels from the USA.[278]

The UK has also introduced legislation to restrict television advertising of specified foods and drinks to children during television shows aimed at under-16s.[279]

Country case studies of the effect of bans on advertising of tobacco products can be illustrative. Tobacco brand recognition and ever-smoking rates among children (aged 8–11) are lower following restrictions on tobacco advertisements in Hong Kong.[280]

of processed foods and drinks to children (see box 4.14). This is a growing movement, and in some countries legislators have been responsive. Since the 1990s the food, drink, and advertising industries have lobbied energetically against restriction, but more recently several food manufacturers have voluntarily reduced the exposure of children to marketing of their products. Industry and — perhaps to a lesser extent — legislators and regulators are likely to continue to resist strict restriction or prohibition. Two issues are to define what is 'unhealthy food' and what counts as advertising and marketing to children. Both can be specified.

Potential impact

BENEFITS: Advertising of unhealthy processed foods and drinks to children, particularly on television, is probably a cause of childhood overweight and obesity. Overall restriction is likely to be of most benefit to the most susceptible groups.

HARMS: Restriction of advertising means loss of revenue to broadcast and print media and to advertising agents, and reduced sales. Restrictions can also be circumvented by increased marketing on the internet, which is inherently resistant to regulation.

General acceptability

There are now many campaigns, some by civil society organisations, to reduce marketing aimed directly at children in many countries. The tension is with industry, and currently with legislators and regulators. Total prohibition will be most fiercely resisted by industry — including the broadcast and advertising industries.

Cost

There will be costs to industry — how high depends on the degree of restriction and industry's chosen response to it.

Timeframe

The time needed to put restrictions in place largely depends on the willingness of legislators and regulators to direct and guide industry. This in turn depends on the strength and constancy of pressure from parents, citizens, and civil society organisations.

Transferability

Cross-border media and the internet are two reasons why restriction needs to be coordinated on an international basis, in response to the global strategies of transnational industry.

4.4.2.2 Stricter controls on advertising and marketing of infant formula and weaning foods

Political feasibility and acceptability

Many of the points in this section are analogous or similar to those in chapter 4.4.2.1. Regulations to prohibit promotion of breastmilk substitutes already exist in 65 countries, and many countries also regulate advertising and marketing of complementary foods during weaning (see box 4.15). Regulation is clearly feasible and already widely accepted.

Potential impact

BENEFITS: Regulation affects all levels of society, with greatest benefit to vulnerable groups of the population who may be most influenced by advertising. Restriction of advertising and promotion increases breastfeeding rates and duration.

HARMS: If breastmilk substitutes became hard to find, this will disadvantage infants born to mothers who are unable to establish breastfeeding. Pressure on mothers who struggle to breastfeed is upsetting to them.

General acceptability

The fact that many countries have existing legislation to encourage breastfeeding makes public acceptability likely. The infant formula and baby food industry generally accepts legislative frameworks when it is clear that governments, working through UN agencies and on a national basis, are resolute.

Cost

Breastmilk is free and suitably prepared fresh weaning foods are cheaper than processed products. The costs of restrictions depend on the level of enforcement required to monitor compliance. The stricter the restriction, the more the sales of infant formula and of weaning foods will decrease.

Box 4.15 Infant formula: examples of restrictions

The Iranian government controls import and sale of breastmilk substitutes. Formula is available only by prescription, and the tins must carry a generic label. No brand names, pictures, or promotional messages are allowed.

Indian national legislation specifies that tins of infant formula must carry a conspicuous warning about the potential harm caused by artificial feeding, placed on the central panel of the label.

In Papua New Guinea, sale of feeding bottles, cups, teats, and dummies is strictly controlled and there is a ban on advertising these products, as well as breastmilk substitutes.[281]

Timeframe
The timeframe will vary between nations. Where legislation is clear, and public and political will is resolute, implementation may take less than 1 year.

Transferability
Enforcement and monitoring depend on available national infrastructure.

4.4.2.3 Promotion and marketing of healthy ways of life

Political feasibility and acceptability
Many of the points in this section are similar to those in chapters 4.4.2.1 and 4.4.2.2. Governments usually formally support the principle of programmes designed to improve public health but, so far, publicly funded campaigns usually have relatively very modest budgets.

Potential impact
BENEFITS: Substantial and sustained advertising and publicity campaigns typically have a big impact (for examples see box 4.16). Their effectiveness depends on their scale and quality, and on sustained activity. Retailers are likely to respond to campaigns that increase demand for healthy products but there is a great imbalance with most expenditure on advertising and marketing of unhealthy foods and drinks. An indirect benefit of increased public awareness is to make subsequent legislation more acceptable.
HARMS: None known.

General acceptability
Public information, marketing, advertising, and media relations activities to promote healthy ways of life, including healthy diets and sustained physical activity, are in place in many countries. These may be sponsored by government or by health professional or civil society organisations (such as WCRF and AICR). Food retailers frequently mount healthy food promotions. Many popular books are on healthy living, which is also prominently featured in the broadcast and print media.

Box 4.16 Positive marketing campaigns

The '1% or less' campaign in West Virginia, USA, aims to persuade people to switch to lower-fat milks. Different methods are used, all involving positive marketing. The campaigns remain effective up to 6 months after their conclusion.[282] Campaigns that attract news coverage and include public relations work are the most effective.[283 284]

There are parallels with tobacco policy. Positive publicly funded advertising designed to discourage smoking in young people works, but not always long term.[197 285] Public awareness and education initiatives can also raise public awareness, a step in the direction of actual change.[286]

Cost
Effective advertising and marketing campaigns aimed at national and other large populations over a sustained period of time are expensive. The need for substantial expenditure will diminish when the volume of advertising and marketing of unhealthy foods and drinks, which competes with and contradicts healthy messages, is reduced.

Timeframe
Indefinite. Initial campaigns involving electronic, broadcast, and print advertising and promotion, public relations, full use of the internet, and school and community activities will take perhaps 1 year to organise. Evidence from Canada's 'ParticipACTION' physical activity campaign shows the value of sustained campaigning over 20 years.[287]

Transferability
As with the sections above, it is advisable that national governments work with UN and other international bodies to plan a global campaign, to be modified in response to national and local circumstances and needs.

Product advertising and marketing.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Restriction or prohibition of advertising and marketing of unhealthy processed foods to children	✔				✔	
Stricter controls on advertising and marketing of infant formula and weaning foods	✔			✔		
Promotion and marketing of healthy ways of life		✔			✔	

4.5 Income status and equity

As a general rule, the more money people have, the greater their freedom of choice in the foods and drinks they purchase and consume. In any population, as overall average income rises, the absolute amount of money spent on foods and drinks increases, while the amount relative to other expenditure decreases. Fewer people cook their own food, instead choosing to buy and consume pre-prepared and other 'convenience' foods and drinks.

The reverse is also true. As income available for food purchasing decreases, purchase and consumption of processed foods, many of which are high in sugar, refined starches, or fat and so high in energy, and of sugary drinks tends to increase. This is because those responsible for household food supplies in families with little money select cheap, 'filling' foods that provide adequate energy, rather than more expensive fresh and other more generally nourishing food.

In high-income countries and in urban areas generally, those on the lowest incomes tend to consume more processed food and are more likely to be overweight and obese and to be less physically active. (For social status, see chapter 5.)

4.5.1 Summary of evidence

4.5.1.1 Patterns of diet

A systematic review found that lower socioeconomic status was associated with poor general dietary quality.[116] When using income alone as a marker of socioeconomic status, the association remained but was weaker.

Lower-income households tend to have a lower consumption of fruits, vegetables, meat, and dairy products and higher consumption of cereals, sweets, and added fats.[136 140 288]

Vegetables and fruits

There is some evidence from the SLR that the higher the income, the greater the consumption of vegetables and fruits. The influence of income and food price on purchase and consumption of vegetables and fruits was studied in São Paulo, Brazil.[214] Both rose as family income and the price of other foods increased.

Red and processed meat

The SLR shows that red or processed meat consumption tends to increase with increased income.[62 289–303] Some studies show that higher-quality, or more expensive, meats are bought, rather than more meat in general.[62 297 298 300] In the UK, processed meat consumption was higher in low-income groups than in the general population.[304]

4.5.1.2 Breastfeeding

Many studies show that in high-income countries, duration of breastfeeding increases as income rises.[305–309] However, income may be a marker of education status, types of employment that enable breastfeeding, and other factors. Returning to work predicts cessation of breastfeeding in higher- as well as lower-income countries and communities.[310–313] Extensive breastfeeding remains usual in the lowest-income urban and rural communities in lower-income countries, if only because of lack of money for infant formula.[307 314 315] One review found that paying participants to attend group classes increased rates of breastfeeding.[274]

4.5.1.3 Overweight and obesity

Low socioeconomic status increases the risk of obesity in all but the lowest-income countries. Historically, the opposite has been true. One systematic review found that in general, lower-income neighbourhoods have a higher prevalence of overweight and obesity.[116] The study concludes that interventions that raise socioeconomic status, for example by more and better education, may reduce overweight and obesity. In a modelling study, policy measures aimed at reducing obesity were most effective in a social environment that reduced income inequity.[218]

4.5.1.4 Physical activity

In general, low-income women, as well as young people and older people, are least active.[316] Higher-income groups are more likely to take part in leisure-time physical activity, including sport, whereas transport and occupational physical activity is higher in lower-income groups doing manual work who do not own cars.[317] Lower-income families and communities have poorer access to healthcare and poorer health, which impedes physical activity, and also live in environments less likely to encourage physical activity.[318]

4.5.2 Evaluation of evidence

Evidence on income and income disparity is difficult to interpret. Much depends not only on the absolute degree of prosperity or poverty but also on the differential rates between people within societies, and on the setting. Prosperity and poverty are relative as well as absolute, and in many settings income of itself is not a good indicator of health status.

The evidence shows that reduction of absolute poverty and inequities of income in any setting will improve health, and in particular will lead to lower levels of overweight and obesity and associated diseases including a number of cancers.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of one option for possible action. This is the reduction of absolute poverty and of income inequities, in all societies.

4.5.2.1 Reduction of absolute poverty and of income inequities, in all societies

Political feasibility and acceptability

The UN Millennium Development Goals supported by all member states include the policy of halving absolute poverty between 1990 and 2015. In principle therefore, all governments are committed to reduce poverty. Policies and initiatives designed to reduce poverty and income inequity through redistributive taxation, subsidies on food staples such as

Box 4.17 Poverty reduction in Brazil

In Brazil, on average a middle-income country, the gap in income between economically rich and poor people is very wide, and the number and proportion of people living in absolute poverty, particularly in the northern and northeastern states, is high. Historically, in Brazil and universally, poverty has been a prime cause not only of micronutrient deficiencies and infectious diseases, but also of underweight and emaciation. Now, in Brazil as elsewhere, overweight and obesity have increasingly become conditions of the poor rather than the rich.

Stunting is an indicator of food insecurity and poverty. Between 1996 and 2006 the percentage of stunted children in the northeast dropped from 22.1 per cent to 5.8 per cent. The main reasons for this remarkable change include an increase in the income of the poor (achieved mainly through income transfer programmes) and a strong expansion of basic education, primary healthcare, and safe water supply.[319]

Box 4.18 Reducing inequity

The report from the WHO Commission on Social Determinants of Health (see box 5.12) includes the best available evidence for the effects on health of reducing inequity, including many examples of best practice.[132]

For example, in India, The National Rural Employment Guarantee Act of 2005 obliges the Indian government to provide 100 days of work, at minimum wage, to one family member per household for impoverished rural households. While its implementation is relatively recent and there have been procedural difficulties, there is evidence to show that it has had a positive impact where it has been implemented properly. It has provided wage security for poor rural families, aided economic empowerment of women, and created public assets, all of which have the potential to improve health.[132 322]

bread, food distribution, food voucher schemes, distribution of money to buy food, and mandatory minimum wages are in place in many countries (for examples see boxes 4.17 and 4.18). This option implies a strengthening of those initiatives that are known to work. Reduction of income inequities will, given current trends, be difficult to achieve at international or national levels. Economic globalisation and other factors are, however, tending to increase income inequities between and within countries.

Potential impact

Benefits: Decreasing absolute poverty and income inequity will also decrease the number of food-insecure populations and communities. Reduction in income inequity is likely to reduce rates of overweight and obesity and associated diseases, including cancer. It will also have other general social and economic benefits. For example, poverty and inequity are causes of violence and crime.

HARMS: Global, international, and national initiatives that reduce absolute and relative poverty go against the current political and economic grain, and will impede current trends in economic globalisation. Governments whose national policies to improve income equity and reduce absolute poverty include measures designed to resist the free flow of capital to and from their countries will suffer sanctions.

General acceptability

Most people are likely to prefer to live in equitable societies. General acceptability will depend on social conditions, the strength of representation of impoverished communities, responsiveness of governments, and willingness at international level to build protection of public health into global and regional trade and other agreements.

Cost

Communities lifted out of misery and poverty will be more productive and will contribute more to local and national social, cultural, and economic development. The costs of inequity and the benefits of its reduction need to be calculated bearing all relevant factors in mind.[320]

Timeframe

The UN Millennium Development Goals[321] and other large-scale initiatives designed to reduce inequity, poverty, and misery are necessarily strategic in nature and likely to take generations to be fully effective, even if or when backed by concerted political will in the more powerful nation states.

Transferability

Policies to reduce inequity in income are possible in most nations — though the details and targets will vary depending on the existing conditions. It is possible for nations to share best practice and to adapt policies to fit the conditions particular to them.

Income status and equity.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Reduction of absolute poverty and of income inequities, in all societies		✔		✔		

4.6 Conclusions

Economic factors are major determinants of food systems and supplies, and thus of the foods and drinks that populations and people consume, as well as of patterns of physical activity. The evidence shows that fiscal policies and actions have a major impact on the nature and quality of the foods and drinks people purchase and consume. Policies and interventions that affect the price, availability, and accessibility of foods and drinks alter consumption patterns, whether or not they are designed to do so. The examples of tobacco control policies and programmes, and also policies that increase the price of alcoholic drinks — within the remit of this Report — demonstrate that such actions influence people's choices, that they are or become accepted, and that they are effective.

All relevant economic policies need to be examined for their impact on public health in general and risk of chronic diseases, including cancer, in particular. This includes the phenomenon of economic globalisation, which has a profound impact on food systems and supplies throughout the world, and therefore on patterns of diet, and also on urban design and transport, and so on physical activity levels.

Although there has been a general decline in food prices over the past 50 years, the sharp rises in the price of some staple food commodities that took place around 2007, and the global economic recession that began in late 2008, may lead to less healthy food choices, and also to increased food insecurity among impoverished populations. These recent phenomena await systematic study. In many high-income countries the proportion of disposable income available for food has increased over the last century which offers an opportunity for improving the quality of the diet.

Many foods and drinks are cheaper or more expensive than they would be in a genuine free market. Some pricing policies are put in place in order to make food supplies secure, or for other public health reasons. Most are not. Pricing policies need to have the general effect of making healthy food choices easier. Often this means removal of price support systems that make unhealthy foods and drinks artificially cheap, or that penalise producers of healthy food. Pricing policies can also involve measures to subsidise the price of healthy foods and drinks, or to tax or otherwise raise the price of less healthy foods and drinks, as done in most countries with alcoholic drinks. Similar approaches to design of buildings and open spaces, and to transport policy, can influence patterns of physical activity.

Reformulation of processed foods and drinks so that they contain less sugar, refined starches and fat, and are therefore lower in energy, and also less salt, can be an effective way to reduce the risk of chronic diseases, including cancers. Such initiatives imply a lead being taken by major manufacturers, retailers, and caterers, supervised or coordinated by governments and government agencies with the support of civil society organisations. Such initiatives require support with uniform, clear, explicit product labelling and other forms of marketing.

Legal, fiscal, and other formal policies and actions designed to protect public health can be seen negatively as authoritarian, or positively as enabling and encouraging. Access to adequate food and water is regarded as a basic human right. The case for regulation and restriction of commercial and other practices harmful to the health of children is compelling. There is strong evidence that the restriction of advertising and marketing of processed foods and drinks to children is likely to promote healthy diets, and so improve public health in general and prevent chronic diseases including cancer. Stricter application of regulations and codes concerning the marketing of infant formula will effectively increase breastfeeding rates. Publicly funded advertising of and publicity for healthy foods and drinks is likely to be effective if well resourced and sustained.

The UN Millennium Development Goals include a pledge by all nations to reduce absolute poverty throughout the world. This, and also reduction of income inequities between and within nations, is a vast task that implies changes to many current political and economic policies.

The evidence informing this chapter indicates that some of the policy and action options set out here are of special importance. The enactment of international and national fiscal policies designed to protect public health is likely, over time, to reduce rates of overweight and obesity and of serious chronic diseases including cancer. This is a major challenge first of all to multinational — including UN — agencies, and to national governments.

CHAPTER 5

The social dimension

Ways of life and personal habits throughout life are influenced by social factors including ethnic background, culture, and other values, such as those that come from custom, religion, family, and other affinities and associations. The social environments of school and then of work influence personal preferences and may constrain choices, as do social status and equity. Government and civil society organisations, and other formal and informal embodiments of society, crucially influence population health and well-being. (Family influences are covered in the next chapter.)

Even more than for other parts of this Report, the social dimension covers a particularly wide and varied set of factors. For instance, it includes issues relating to socioeconomic variables, ethnic influences, and legislation. The term 'social' in this Report is not defined according to any single one of these areas, but rather is drawn broadly so as to encompass them all, as far as possible.

5.1 Ethnicity and culture

Traditional and established cultures and values of different populations, including different ethnic groups, are expressed in the form of many distinct ways of life, including a vast variety of food cultures and cuisines. Some of these traditions remain, and some are protected, but many have become eroded by industrialised food systems and ways of life. By contrast, modern culture within high-income countries and in cities throughout the world is relatively homogeneous, while differences in religious, ethical, and other social values remain. Many traditional food systems and ways of life have aspects that correspond to current recommendations for healthy ways of life, though historically the people who consumed them, particularly in resource-depleted areas, lived relatively short lives.

5.1.1 Summary of evidence

5.1.1.1 Patterns of diet

Dietary and physical activity patterns are powerfully shaped by ethnicity, culture, and other social networks and values (see boxes 5.1 and 5.2). This is a vast field that has generated a heterogeneous literature, much not accessible to electronic searches, with some apparently contradictory findings. (See boxes 1.7 and 5.1)

The systematic literature review (SLR) found five studies that controlled for socioeconomic status. These show that in the USA, African and Hispanic Americans consume more red meat and less vegetables than non-Hispanic white Americans, although this may not be so for first-generation immigrants.[9–13] Two studies in New Zealand unadjusted for socioeconomic status suggest that Pacific Islanders consume more red meat than Maori and European New Zealanders.[14 15] Studies in Australian Aborigines suggest that reverting to a gatherer–hunter diet and lifestyle (with increased physical activity and lean wild meat) was followed by a reduction in major risk factors for chronic disease.[16] Studies of migrant communities also show that culture can influence diets.[17–19] Traditional food systems generate low rates of chronic diseases. South Korea, now a high-income country, has retained many aspects of its traditional diet. Average consumption of

vegetables and fruits is higher, and of fat lower, and rates of overweight and obesity are lower than in countries with comparable average incomes.[20 21] Other examples of surviving healthy food systems include countries in some parts of the Mediterranean littoral, Iran, and Zhejiang province in China.[22]

5.1.1.2 Breastfeeding

Traditionally, breastfeeding has been universal. From the mid-20th century it became largely replaced by formula feeding, except in populations without money to buy breastmilk substitutes. Now, higher average rates of breastfeeding are found not only in such low-income communities, but also among more highly educated and aware populations in higher-income countries. Rates of breastfeeding in Europe vary greatly, with high rates in Scandinavia and lower rates in the UK. Rates in countries in the former USSR where ways of life remain relatively traditional, such as Uzbekistan and Kyrgyzstan in Central Asia, are high, although exclusive breastfeeding remains uncommon.[28]

Breastfeeding rates vary inconsistently with ethnic group.[29–35] One study in the USA has found that immigrant mothers of various races and ethnicities initiate breastfeeding more often than mothers born in the USA.[36] Public perceptions of acceptability of long-term breastfeeding also influence the duration of breastfeeding.[37]

5.1.1.3 Overweight and obesity

Social attitudes to body fatness vary in different parts of the world. In food-insecure populations, fat people are often

Box 5.1 The cultural and historical significance of food

There is more to food than simply its relevance to physical health and disease. Those who attempt to shape and change patterns of diet with the intention of reducing risk of disease, including cancer, need to be aware of and respect prevailing or underlying attitudes and beliefs about food in its cultural context. While health professionals mainly perceive nutrition as a biological or a biochemical discipline, most people do not think of food primarily as a way to avoid chronic diseases.[1]

People who have grown up within a particular culture, whether one in which meals are based on rice or cassava or on meat or meat products, do not readily change their habits simply because of health advice. 'Prescriptions' of diets identified as healthy that include different foods, or balance of foods, from the usual are unlikely to be followed and sustained. Further, foods such as meat historically seen as of special value not simply because of culinary or nutritional characteristics, but because of relative scarcity, may still be prized even when abundantly available.[2]

Traditional diets

Food substitutions recommended for nutritional reasons may not carry the same cultural significance as the traditional food. Effective substitutions for staple foods may be particularly difficult.[3 4]

Traditional attitudes to and beliefs about diets and foods are often not based in a modern scientific or biological context. The classification of food into 'hot' and 'cold', common to Indian and Chinese systems of traditional medicine,[5] or according to their 'humoral' qualities, as in the European tradition,[6] has a philosophical rather than a physiological foundation, but even so, has value within the cultural context. Furthermore, attempts to displace such traditions with a more biological foundation can challenge people's perceptions of their own cultural identity.

Traditional patterns of diet are partly a function of climate and terrain, but have also been developed over a long period by societies who depended on successful local food systems to support themselves. The traditional lack of distinction in Indian, Chinese, and other including classic Greek and Roman traditions between food and medicine is founded in the recognition that maintenance of health depends on appropriate foods and diets.[6]

Foods, drinks, and nutrients

Traditional diets may often have scientifically demonstrable benefits. For example, many traditional diets combine a staple cereal (grain) with a staple pulse (legume) and thus ensure an adequate dietary supply of all essential amino acids. Again, the original practice in preparation of rice in Asia was not to strip all its outer layers, as is done now, but to parboil it, which retains micronutrients to a greater extent.[7]

The prevailing nutritional convention, to focus not so much on foods and drinks as such as on their chemical constituents, is recent. This approach, which has been called 'nutritionism',[8] is now familiar in most countries but lacks meaning for people with respect to cultural and traditional uses of food. Also, groupings such as 'carbohydrate' and 'protein', which cannot be seen as such in food, while now familiar, are confusing to ordinary people. For these and other reasons, the 2007 WCRF/AICR Diet and Cancer Report focuses on foods and drinks rather than on their chemical constituents, and the Report has called for more research to be undertaken on whole dietary patterns within social settings.

Box 5.2 Traditional food systems

Traditional food systems vary with geography. For example, traditional foods in India and northern Asia are highly spiced[23]; Inuit traditional diets are almost entirely animal-based.[24] Traditional Mediterranean diets include wine and olive oil alongside a varied intake of vegetables, fruits, fish, legumes, nuts, cereal, and some meat.[25] Several traditional diets, such as those of Japan and Portugal, are highly salty.

Foods are usually locally sourced and sustainable and include a large variety of seasonal produce and a significant proportion of wild animal products. Gatherer–hunter societies are observed to have better health than agricultural peoples outside high-income countries.[26 27] These traditions often also involve high levels of physical activity (see chapter 5.1.4).

admired and preferred. In parts of the world where there is more than enough to eat, thinner people tend to be preferred.

Cultural norms for acceptable or normal weights and sizes are changing, particularly in children.[38–41] Cultures that traditionally value body fatness include some where the increase in childhood overweight and obesity is now very rapid.[42 43] In Cree communities in northern Quebec, greater body size is still considered a sign of robustness and strength.[44] In North Africa, where obesity is increasing fast especially in women, female body fatness is viewed as beautiful and a sign of fertility and prosperity.[33 42] In the USA, the diets of less-acculturated Hispanic Americans were more healthy in several respects than those of their more-acculturated counterparts.[45]

5.1.1.4 Physical activity

The shift from traditional and usually rural to industrial and usually urban ways of life has sharply reduced average levels of physical activity throughout the world. With mechanisation, almost all people become basically sedentary at work, and often also in any leisure time.

Physical activity varies with ethnic background.[46–49] In some cultures, dance and other physical activity is an essential ritual. In the USA, the ways of life of Amish communities remain essentially pre-industrial. Their religion enjoins them to avoid machines. As a result, their daily energy turnover is 400–600 kilocalories higher than the average in the USA.[50 51]

Ownership of vehicles is a sign of social status.[52 53] As a result, people become less physically active. In Chinese cities, cars are replacing bicycles, and obesity is higher in households with cars.[54] The switch from active to sedentary ways of life in China has resulted in a drop in daily average energy turnover estimated at over 400 kilocalories.[55] In some countries such as Denmark and the Netherlands, cycling is a social norm and rates of overweight and obesity are relatively low.

5.1.2 Evaluation of evidence

Evidence from the SLR on the associated areas of ethnicity, culture, and values, including religious and other ethical systems, was limited. Many studies in these rich fields are published in informal and other literature not accessed by the SLR commissioned for this Report. (See box 1.7)

Long-established and traditional food systems and ways of life are not healthy simply because of being long established. Nevertheless, many have features that correspond to some of the recommendations of the 2007 WCRF/AICR Diet and Cancer Report.[56] Traditional culture and values, representing as they do long experiments in adaptation to local conditions, warrant sensitive consideration as part of policy.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of three options for possible action. These are examination of the impact of ethnic, cultural, and other values on patterns of diet, body fatness, and physical activity; maintenance of the healthy aspects of traditional ways of life; and promotion of the culture of breastfeeding.

5.1.2.1 Examination of the impact of ethnic, cultural, and other values on patterns of diet, body fatness, and physical activity

Political feasibility and acceptability

Governments are more likely to support work on the impact of ethnic, cultural, and other social values on human health when evidence of their relative benefits and harms is better understood. Governments of countries with unbroken traditions are likely to be most sympathetic. A great variety of cultures within India and China, often shaped by religious and other beliefs, are expressions of the civilisation of these parts of the world.

Potential impact

BENEFITS: Established social values preserve social cohesion, and a sense of community improves health and well-being.[57] Some of the traditional food cultures and cuisines in states of India and provinces of China, and elsewhere in Asia, have deep religious, philosophical, or ethical roots, as do those of the countries of the Mediterranean littoral.

HARMS: If examination of the impact of social values leads to their preservation, this might impede economic growth, although this has not proved to be so in Japan or South Korea. There are potentially negative and positive elements in any culture and preserving the former could be harmful.

General acceptability

Public and general acceptability of movements to understand and appreciate social values and their impact on public health will depend on awareness of their importance, and on whether governments and civil society organisations take a lead, preferably with the acceptance of the food, drink, and allied industries.

Costs

Study of the relevance of ethnic, cultural, and other social values need not be expensive. In fact, safeguarding health-promoting elements in an existing food culture may prove inexpensive. The key factor is official and general recognition of their importance.

Timeframe
Countries in which established cultural values are most appreciated and followed are especially valuable subjects of study. In countries where such values have been eroded or eradicated, research would be valuable for generating new knowledge of positive aspects of local foods and local food culture.

Transferability
The character of cultural, ethical, and other social values varies with the civilisations of which they are a part, but a general move to examine their impact on patterns of diet, physical activity, body composition, and health can be worldwide.

5.1.2.2 Maintenance of the healthy aspects of traditional ways of life

Political feasibility and acceptability
Identifying, protecting, and promoting healthy traditions is likely to be acceptable to national and local governments, particularly when these protect the interests of people in rural areas and provide livelihoods and employment. The existence of policies to protect traditional food systems, such as those of the Mediterranean littoral,[58] South Korea (see box 5.3), and Zhejiang province, China,[22] or established active ways of life, such as everyday cycling,[59] suggest that they can be politically feasible.

Potential impact
BENEFITS: Maintenance and promotion of healthy aspects of traditional patterns of diet and physical activity can help control overweight and obesity and chronic diseases, including cancer. Encouragement of family farms and smallholdings and of horticulture also provides livelihoods, encourages local economies, helps communities to become relatively self-sufficient, and is likely to result in relatively diverse and nourishing diets.[63]
HARMS: Identification of the healthy aspects of traditional diets and ways of life, if this implies rejection of other aspects, is liable to be disruptive. Because some peoples express their perception of self worth through traditional ways of life, including patterns of diet and physical activity, challenges to any aspect of them might be seen as a challenge to their human dignity and self respect.

Box 5.3 Traditional food systems in South Korea

South Korea, a high-income country,[60] has undergone rapid social change and economic development since the 1970s, but rates of overweight and obesity and of chronic diseases remain lower than in countries of comparable average income. This is thought to be because the country has protected its traditional food systems, which are relatively high in vegetables and fruits and low in fat.[61] The South Korean government has taken the lead, together with professional and civil society organisations. The government has long advised against the importation of 'Western' diets, and promotes traditional food culture and cuisine, for example by giving newly married women training in the preparation of traditional dishes.[62]

Box 5.4 Breastfeeding in the Gambia

In African societies, as in other countries, the attitudes of men (as fathers and partners and also as traditional tribal elders) strongly influence whether or not a mother will continue to breastfeed her child.[65]

In the Gambia, a small West African country, an intervention to develop the United Nations Baby-Friendly Community Initiative has raised the rate of initiation of breastfeeding on the first day of life from 60 to 100 per cent and decreased the introduction of complementary feeding at 4 months from 90 per cent to nearly zero.[70]

General acceptability
Promotion of healthy traditions is likely to be acceptable to communities as long as maintaining these ways of life does not widen inequalities. People may feel that if they are encouraged to keep up 'old' ways of life, they may miss out on new technologies and their potential benefits. Involvement of communities in the protection of their traditional ways of life is essential.

Cost
The cost of actions to identify, protect, and promote healthy traditions will vary considerably. Without price support from governments, farmers may not be able to cultivate traditional or indigenous staple crops.[64]

Timeframe
Support of traditional ways of life can start immediately and needs to be maintained. Once eroded or lost, traditions cannot easily be revived.[64]

Transferability
Healthy traditions still exist in many countries, regions, and communities. Agricultural traditions are transferable to other regions with similar climate and terrain. Traditions in culture and cuisine are often shared between different societies.[63]

5.1.2.3 Promotion of the culture of breastfeeding

Political feasibility and acceptability
With general acceptance that breastfeeding is beneficial to the health of children and their mothers, its promotion is likely to be feasible and acceptable. As a result of the United Nations (UN) Global Strategy on Infant and Young Child Feeding, formally accepted by the infant formula industry, many countries have strengthened national policies on breastfeeding.[65 66] Many countries have also adopted UN Baby-Friendly Hospital or UN Baby-Friendly Community Initiatives, designed to promote breastfeeding[67] (for an example see box 5.4). In Northern Ireland, which has the lowest breastfeeding rate in Europe,[68] the Health Promotion Agency has run successful campaigns to break down the barriers to breastfeeding in public.[69]

Potential impact

BENEFITS: Moving towards the achievement of the UN Global Strategy,[71] with its emphasis on the social as well as personal importance of breastfeeding, will have a major impact on public health and on population well-being, most of all in lower-income countries where water supplies are often unsafe. The fact that breastfeeding protects the mother against breast cancer, and probably protects her children against overweight and obesity, is an additional benefit.

HARMS: Mothers unable to breastfeed, or who do not want to do so, may feel discriminated against.

General acceptability

Social acceptability of breastfeeding influences whether mothers choose to breastfeed and for how long, and also influences the attitudes of their partners.[65] Public acceptance of the social as well as personal desirability of long-term exclusive breastfeeding will take time, but can change dramatically.[37]

Cost

The cost of promoting breastfeeding depends on the methods used, the size of the target audience, and the intensity of the programmes. Costs at any level are likely to be offset by public health benefits. Mothers who breastfeed need not buy formula.

Timeframe

The culture of breastfeeding is now being promoted by many governments. Translation into environments outside the home in which mothers feel safe, comfortable, and supported when they breastfeed will take time — in some countries, perhaps another generation.[37]

Transferability

The culture of breastfeeding was universal until a few generations ago. The most effective programmes are culture specific.

5.2 School and work

Children spend much of their time at school, as do employed adults at work. The nature and quality of food supplied or available in schools and workplaces, and facilities and opportunities for recreation and sport, have an impact on patterns of diet and physical activity. What is eaten at school and in the workplace, and the amount of physical activity in these settings, make up a substantial proportion of overall diets and physical activity. Also, habits learned at school, and the overall school and workplace environment, influence behaviour outside these settings. Schools here also include pre-school institutions. Universities are not included here. (Also see chapter 6)

5.2.1 Summary of evidence

5.2.1.1 Patterns of diet

The food and drink consumed by children at school and by employed people in the workplace amount to a major part of overall diets. When nourishing school meals are supplied, children's overall diets are generally healthier compared with those that include foods and drinks consumed at school that is supplied by parents or caterers, or from vending machines. The same applies when employed people make use of canteens offering healthy food, whose prices may be supported by employers.

Schools

The SLR shows that school-based interventions in Chile can improve diet.[72] A further trial found that school-based actions increase nutritional awareness, although diet was not assessed.[73] A review, itself incorporating a systematic review of the evidence on urban health and healthy body weights, concluded that the school environment is a good setting for

Ethnicity and culture.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Examination of the impact of ethnic, cultural, and other values on patterns of diet, body fatness, and physical activity		✔				✔
Maintenance of the healthy aspects of traditional ways of life		✔		✔		
Promotion of the culture of breastfeeding		✔		✔		

interventions to promote healthy eating.[74] Examples of such interventions include the provision of healthy choices in vending machines and point-of-purchase nutrition information.[74] Other reviews also found that effective school-based environmental interventions make healthy options available and restrict the availability of competitive foods.[75 76] One trial found that school-based actions increase nutritional awareness.[73] A study from the USA successfully promoted sales of healthy-choice foods in school cafeterias.[77]

Workplaces

The SLR shows that workplaces are important settings for influencing diets. It identified six previous literature reviews, of which four found positive effects,[78–81] while two were inconclusive.[82 83] The SLR also included 17 primary studies set in workplaces,[84–101] of which 10 were randomised controlled trials.[84–93] Changes included the alteration of vending machine contents or availability and changes in the cafeteria to enhance the availability and prominence of healthy foods. A meta-analysis possible on eight trials for intake of vegetables and fruits showed an increase of 0.18 servings per day.[84–87 89–91 93] All but one[88] of nine studies reported a decrease in fat intake.[86–88 90 92–94 97 101] One review found that interventions involving health screening, counselling, and environmental changes improved nutrition among employees during the intervention.[102]

5.2.1.2 Breastfeeding

Employed women are more likely to continue breastfeeding when employers allow for this and provide time and space for breastfeeding.

Longer maternity leave and enabling workplace policies promote breastfeeding.[103–105] The reverse also applies.[106–108]

5.2.1.3 Overweight and obesity

'Fast food' and other convenience foods, including pre-prepared processed dishes, tend to be higher in energy than specially prepared meals, especially when these follow nutritional specifications. Sugary drinks are also a probable cause of overweight and obesity; children who consume sugary drinks are more likely to be overweight or obese.[109]

Schools

Many countries, including the UK,[92] have evidence-based recommendations on nutrition in schools. In Otago, New Zealand, the 2-year APPLE intervention used a combination of activity coordinators and basic nutrition education in schools.[110–112] It reduced the rate of excess weight gain in primary school-age children and increased participation in physical activity. The Be Active Eat Well intervention in Colac, Australia, targeted children aged 4–12 and reduced excess weight gain by building community capacity to promote healthy eating and physical activity.[113] Other studies have not shown an effect.

Workplaces

A randomised controlled trial from Japan of a worksite-based individual programme was effective at achieving weight loss in employees, though the intervention was expensive.[114]

5.2.1.4 Physical activity

Levels of physical activity of schoolchildren and employed people are influenced by the available facilities on and off the premises and, in the case of schools, the presence or absence of physical training and recreation and sports facilities.

Schools

The SLR showed strong evidence from a review of nine school-based trials for the efficacy of whole-school, integrated interventions to increase physical activity in children.[115]

Another review assessed 57 studies.[116] For adolescents, it found strong evidence for the effectiveness of school-based interventions that also involved family or community elements. Evidence for younger children was limited or absent. A review of active travel interventions, mostly among primary schoolchildren, found that promotion of cycling leads to large self-reported increases in cycling, particularly if supported by parents and the local community.[117] It also found that mapping safe routes to school and walk and bike days, involving the curriculum, parents, and the community, can increase self-reported walking and cycling.

A review of interventions targeting adolescent girls found some evidence for interventions in school settings to promote physical activity.[118] For those targeting only physical activity, interventions outside physical education lessons can lead to moderate-to-large increases in physical activity for up to 6 months. Another review found evidence of more physical activity among children under 13 from interventions involving both schools and the family and/or community agencies.[119]

Workplaces

The SLR included three reviews on workplace interventions.[120–122] They showed limited evidence for a drop in absenteeism.[120 122] Other reviews found that supportive workplaces encourage active commuting.[123] Reviews and a randomised controlled trial[124] found that when encouraged, people walk more at work, and that barriers to cycling to and from work include lack of cycle paths and facilities to lock up bicycles.[124–127] Stair use is encouraged by motivational signs and music.[127] People with physically active jobs are less likely to engage in recreational activity than people with sedentary jobs.[125 126]

5.2.2 Evaluation of evidence

Provision of healthy foods and drinks and of regular physical activity in schools is of fundamental importance. This includes the supply of healthy school meals and of facilities for recreation, exercise, and sport in and out of school hours. Much the same also applies to institutions other than schools, such as hospitals, homes providing care, prisons, and armed forces facilities. In schools, nutrition and physical activity are also of vital importance as academic subjects. The provision of healthy food and of facilities for physical activity is also important in workplaces.

The evidence shows that isolated interventions, even when meticulously carried out, may not have much effect

Box 5.5 Health-Promoting Schools

Since 1995, the World Health Organization (WHO) has been encouraging 'Health-Promoting Schools' through its regional networks in Europe, the Americas, and the Western Pacific. Although definitions vary, depending on need and circumstance, a health-promoting school can be characterised as one constantly strengthening its capacity as a healthy setting for living, learning, and working.[128]

For example, in Slovenia, students were involved in setting priorities for improving the school's health-promoting status. This led to improvements in the school environment, with many trees, shrubs, and flowers being planted and a small basketball court established. It also featured health-promoting projects, such as an activity day and experiments to measure harmful components in tobacco smoke.[129]

In the Western Pacific, a series of guidelines for schools was published in 1999 as part of the 'Healthy Islands' initiative.[130] The guidelines include practical advice to schools on how to be health promoting, including the importance of involving the wider community and improving the overall ethos of the school.

In Columbia, one school gave chicks to pairs of primary schoolchildren to raise. The results mirrored life, with some chicks running away or abandoned and some 'couples' separating, leaving single parents. This was just one of many experimental approaches to health promotion in schools running throughout the Americas. Children are learning healthy habits in interesting and original ways, improving their diets and increasing their physical activity, building self-esteem and avoiding risky behaviours, and helping to improve living conditions in their communities by participating in 'ecology days' and recycling programmes.[131]

sometimes even during the intervention, with the possible exception of programmes designed to increase physical activity. However, concerted programmes are needed at national and local levels, supported by governments and enacted as formal regulations. Less formal programmes are more effective when they involve the family, colleagues, and the community and are sustained. Responsibility rests with institution governors, private employers, and, in particular in the case of state schools and public employment, with governments. A key question is whether standards for practical and academic diet and physical activity in schools can be set and followed successfully on the basis of voluntary agreements and codes, or whether these should be the subject of legislation (for which, see chapter 5.4).

Taking the evidence all together, *the Panel has chosen* to consider evaluation of four options for possible action. These are introduction or strengthening of academic and practical nutrition and physical activity in school curricula; introduction or maintenance of nutrition standards for school meals; restriction of access to unhealthy foods, drinks, and snacks in schools, other institutions, and workplaces; and encouragement of healthy eating and regular physical activity and facilities for breastfeeding in workplaces.

5.2.2.1 Introduction or strengthening of academic and practical nutrition and physical activity in school curricula

Political feasibility and acceptability

A number of governments and school authorities are now restoring academic and practical nutrition and physical activity in school curricula. It is important that these changes are introduced as part of a concerted package, with explicit reasons, and that support is given by government both to state and private schools. A key issue is whether promotion of healthy diet and physical activity in schools should be voluntary or mandatory. (See chapter 5.4)

Potential impact

BENEFITS: The national benefit of a primary and secondary education system that produces healthy, fit, and productive school leavers is potentially immense. Such children and young adults will contribute more to economic activity and also be better protected against chronic diseases, including cancer.

HARMS: Compulsory study and practice of nutrition and physical activity displace other subjects from the curriculum. Sports and recreation take up time outside normal school hours — this may be seen as a loss or as a benefit.

General acceptability

Most parents and students are likely to welcome or accept diet and nutrition, and school meals and physical activity in the formal curriculum (see boxes 5.5 and 5.6) or outside it (see box 5.7). Some teachers may find inclusion of these subjects challenging, given all the demands on their time.

Cost

The cost of restoring school kitchens, and of restoring sports and recreation grounds to their former state, will be high and possibly impractical without substantial support from public funds. The cost of appropriately trained staff will also be high. The cost of restored and new academic curricula, devised in association with national expert bodies, will be low. Overall costing needs to take into account social and public health benefits.

Box 5.6 Active schoolchildren in Chile

In Chile, primary schoolchildren in five schools in three cities were targeted with a campaign to improve health.[72] As part of the 6-month intervention, meetings were held with private owners of school lunch kiosks to encourage the sale of healthier foods. Other elements of the intervention were nutrition education for parents and children, 90 minutes of additional physical activity each week, and encouragement of physical activity during breaks (recesses).

Measures of adiposity showed statistically significant improvements in boys but not girls in the intervention group. Levels of physical fitness improved significantly in both boys and girls in the intervention group.

Box 5.7 Community learning centres

These have been established by various national governments, supported by the UN Education, Science and Culture Organization (UNESCO). They are based in villages or slum areas and use methods that work outside the formal education system. The type of education provided depends on local need.

In the Asia-Pacific region, examples include provision of agricultural skills and sports activities (Viet Nam)[132]; food-processing skills (Philippines)[133]; local culture and indigenous knowledge (Nepal)[134]; and soccer, volleyball, and home farming (Papua New Guinea).[135]

Timeframe
This strategic objective needs to be phased in over a period of say 5–15 years. Opportunistic actions, such as facilities shared with other schools and institutions, can speed the process.

Transferability
Examples of success need to be recorded and made known to other schools, in the same and other countries, with allowance for local circumstances.

5.2.2.2 Introduction or maintenance of nutrition standards for school meals

Political feasibility and acceptability
The reintroduction of healthy meals for children in schools is a major undertaking, but can be politically feasible (see boxes 5.8 and 5.9). It requires action and support from government, effective advocacy from civil society organisations, support from teachers, school governors, health professionals, and the media, and general support from parents and carers. (On the issue of whether standards should be voluntary or mandatory, see chapter 5.4.)

Potential impact
BENEFITS: Provision of nourishing meals to children in primary and preferably also secondary schools may improve the behaviour and academic performance of pupils, as well as reduce rates of overweight and obesity, and of undernutrition.
HARMS: None other than issues of cost. However, if these foods are unpopular, students may elect to go outside school to buy their favoured snacks. This may make them vulnerable to harm. There may also be increased wastage from healthy foods, which tend to have a shorter shelf-life than more highly processed foods.

General acceptability
Children and parents accustomed to a 'free-for-all' in which schools take little responsibility for what pupils eat and drink while at school will take time to adjust to a new system where food and drink is an intrinsic part of the education system.

Cost
The provision of meals to children in school is a major expense, involving the restoration of kitchens and the employment of trained staff. These costs should be weighed against the benefits of better-educated and healthier schoolchildren.

Timeframe
National plans to reintroduce nourishing school meals are strategic and can be expected to take perhaps 5–15 years to be fully effective.

Transferability
Examples of best practice should be made known nationally and internationally.

5.2.2.3 Restriction of access to unhealthy foods, drinks, and snacks in schools, other insitutions, and workplaces

Political feasibility and acceptability
This issue is politically sensitive. The prevailing political ideology in most countries now favours deregulation and derestriction. In the UK, for example, proposals that government should intervene in commercial transactions between the food and drink manufacturing and catering industries have been denigrated as 'nanny state' policy. This attitude has changed in the school context, partly because of the epidemic of overweight and obesity among children and young people and partly because those responsible for schools clearly have a duty to protect the health and welfare of children. The financial and economic tumult beginning in September 2008 may also make derestriction less popular. In general, governments still need encouragement to accept that restrictions and regulations can enable and empower people and are not merely negative.

Potential impact
BENEFITS: Decreasing availability of processed foods high in sugar, refined starches, fat or salt, and of sugary drinks will reduce overweight and obesity, and the cancers of which these factors are a cause.
HARMS: None other than cost.

General acceptability
Where it is accepted that sugary drinks and processed foods and snacks high in energy make children overweight and obese, it is likely that school authorities and parents will support the restriction of unhealthy foods and drinks (see box 5.10). If changes are not popular, students are more likely to purchase food off-site.

Cost
Unhealthy foods and drinks are commonly contained in vending machines supplied by transnational food and drink companies, who pay schools and other institutions fees on which they may become dependent.[145] Loss of funds from such sources needs to be compensated with money from public sources.

Timeframe
Removal of vending machines, or substitution of healthy for unhealthy snacks, takes little time.

Box 5.8 Nutrition standards for school food in the UK

In England, nutrition standards were reintroduced for foods available in schools in May 2006, though with staggered dates for when many of the standards come into effect for school meals. These include restrictions on confectionery and deep-fried foods, serving more vegetables and fruits, and making nuts, seeds, fruit, and vegetables with no added salt, fat, or sugar the only snacks available.[136] Food-based standards have been followed by nutrient-based standards.[137]

The standards are implemented through the School Food Trust, set up by the Government in 2005 to promote the education and health of children and young people by improving the quality of food supplied and consumed in schools.[138] The Trust was set up in response to a long-running campaign by the Caroline Walker Trust and other civil society organisations and the standards based on the guidelines that they had already set in place.[139 140] The implementation and funding became politically feasible partly due to these campaigns, but also through a high-profile media campaign that evoked enormous public support.[141]

In Scotland, regulations for nutritional requirements for foods and drinks in schools were approved by the Scottish Parliament in June 2008 and include both food- and nutrient-based standards.[142] These regulations build on the changes to school meals that were introduced by the earlier 'Hungry for Success' initiative.[143]

Box 5.9 Meals in Brazilian state schools

Brazil has what may be the most comprehensive government programme designed to improve and sustain the quality of food consumed by primary schoolchildren. In the 1990s, food supplied to government schools by the federal authorities in Brazil was routed through Brasília, the capital city. As a result, the staples consumed in schools were 'store food' with a long shelf-life, such as rice and beans, and school meals tended to be unpalatable and high in sugar, refined starches, fat, and salt.

Partly to avoid misappropriation, and also for reasons of public health, new laws passed in 2000 by the government decentralised the system. The government also stipulated that 70 per cent of the budget for school meals, then amounting to the equivalent of $US 500 million per year for 34 million children, be spent on fresh vegetables and fruits and other minimally processed foods, preferably locally sourced from within the country's 5561 municipalities, from local cooperatives and family farms.[144] These laws are not regarded as politically controversial. Networks of public health professionals have been set up to advise municipal authorities how best to apply the laws in local settings.

Transferability

Most interventions have been carried out in high-income countries, but are transferable.

5.2.2.4 Encouragement of healthy eating and regular physical activity and facilities for breastfeeding in workplaces

Political feasibility and acceptability

Many employers provide nourishing food, often at subsidised prices. Many also promote physical activity at work. Government endorsement of such schemes would be politically feasible. It is less likely that governments would support mandatory requirements unless pressed to do so by civil society and professional organisations. Employers prefer voluntary codes, such as those that facilitate breastfeeding but do not include legislation requiring extended maternity leave. (Also see chapter 5.4)

Potential impact

BENEFITS: Increasing the availability of healthy foods and drinks and correspondingly decreasing availability of unhealthy alternatives is effective in reducing weight increase, overweight, and obesity and the cancers of which these factors are a cause. Increasing the availability of healthy foods is liable also to reduce the risk of other chronic diseases. Women who see their employers as being interested in their family's welfare will be more motivated and productive.[146] Maternity leave provision improves employee retention.[103 104 146 147] Sustained physical activity also reduces the risk of chronic diseases. Workplace initiatives, including simple provisions such as cycle racks and shower facilities, are most effective when part of programmes designed to enhance general health.[123 148 149]

HARMS: Working women who take prolonged maternity leave may lose income or career opportunities.[150] Employers that resent paying costs related to maternity leave may avoid employing women of child-bearing age. The cost of building and maintaining some exercise facilities may be high. In addition, providing such exercise facilities may leave employers open to legal action arising from injuries.

General acceptability

These initiatives (for examples see box 5.11) are most likely to be accepted when offered as a whole package, with explicit explanation and encouragement from government. Canteen facilities are usually popular, especially if the price of meals is supported. Parents and potential parents will welcome extended maternity leave, which may however be resisted by

Box 5.10 Better snacks in schools

In the Treatwell 5-a-day Study in the USA, availability of fruit and vegetables was increased in vending machines and break rooms, which increased intake of vegetables and fruits.[85]

The Trying Alternative Cafeteria Options in Schools (TACOS), run in Minneapolis, USA, offered more low-fat foods, backed by student promotions, and increased sales of lower-fat foods.[77]

employers. Most employees will probably welcome moves to support them in becoming more physically active.

Cost

Installation of canteens and of recreation and sports facilities is expensive, as is extension of maternity leave. Major developments like these are likely to be beyond the scope of small businesses. However, simple initiatives, such as provision of fruits rather than more processed snacks or water rather than sugary drinks in meetings, reserving a room for breastfeeding, more use of stairs, and access to a shower, are helpful.[149 155] At any level of expense, the costings need to make allowance for likely benefits to the employer, such as fewer days off sick and increased productivity. Financial incentives from governments would also help.[149 156] Once built or improved, canteens and facilities for physical activity can be used more widely, including by the local community.

Timeframe

Simple initiatives can begin almost immediately. Changes that involve redesign of workplaces will take more time and money. Employers can extend maternity leave flexibly.

Transferability

As with other recommendations made in this Report, the results of these initiatives are best recorded and monitored for the benefit of employers and staff and also as examples of good practice that can be adopted elsewhere.

Box 5.11 Promoting healthy food, breastfeeding, and physical activity at work

The Australian National Workplace Health Project adds low-fat, high-fibre foods to vending machines. This scheme was effective at reducing fat intake.[93]

Point-of-purchase prompts were used to support changes to foods offered in worksite studies in Seattle, USA,[84] where fruit and vegetable intakes increased, and in New Zealand, where consumption of vegetables increased and of fat decreased.[101]

A UN International Labour Organization (ILO) healthy factories project based in Cambodia aims to improve working conditions in the country's garment factories. Many of the workers are single young women from rural areas. The project addresses lack of awareness among managers and workers of rights to maternity leave and breastfeeding breaks. It has succeeded in implementing factory-based training and has provided information materials, and also a television soap opera featuring maternity protection at work.[151]

At a US naval base, new cycle paths and exercise facilities have been provided and small improvements in fitness recorded.[152]

In Finland, improved facilities (new changing, showering, and drying rooms) have meant more people cycle and walk to work.[153]

When gym and sports facilities have been upgraded across Royal Australian Air Force bases, more servicemen have become regularly vigorously active.[154]

School and work.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Introduction or strengthening of academic and practical nutrition and physical activity in school curricula*		✔		✔		
Introduction or maintenance of nutrition standards for school meals*		✔				✔
Restriction of access to unhealthy foods, drinks, and snacks in schools, other institutions, and workplaces *		✔		✔		
Encouragement of healthy eating and regular physical activity and facilities for breastfeeding in workplaces		✔		✔		

*Also see chapter 5.4

5.3 Social status and equity

All societies, at all levels from local to national, are socially stratified to a greater or lesser extent. Relative social status of people and of populations may be measured in terms of money or other material possessions, or by educational attainment, type of occupation, or other factors. However measured, the further up the social scale, generally the more choices people have; destitution limits or eliminates choice. People with most choice may or may not choose wisely.

Social status is now well recognised as a determinant of population health. People and communities of higher status are liable to have better education, more money, and more access to pleasant and rewarding activities and to travel more, and are often (but not always) better adjusted and happier and, in general, more successful and better able to adjust to situations of stress. The effects of social status are relative as well as absolute: people of lower social status are more likely to suffer from chronic and other diseases and to die younger, compared with those of higher social status, even when their status is high compared with most people in other countries. Much of the evidence here concerns economic as well as social status (also see chapter 4). Equity between sexes and ethnic, religious, or other groups is an important issue, but there is little direct evidence relating to food, nutrition, and physical activity.

5.3.1 Summary of evidence

5.3.1.1 Patterns of diet

In many high-income and urban communities, people of lower social status tend to consume more pre-prepared meals, and eating away from home has become common.[157 158] Pre-prepared restaurant and snack-bar food and 'fast food' tend to be higher in sugar, refined starches, fat or salt, and are often served in larger portion sizes.[158 159]

The SLR found that associations between social or economic status, usually bracketed as socioeconomic status, and dietary patterns was not consistent around the world. Other studies[160–166] show that higher socioeconomic status in high-income countries is associated with relatively high intakes of vegetables, fruits, and whole grains. National survey data from the UK confirm that people of low socioeconomic status have relatively low intakes of vegetables and fruits.[160 165 167] The SLR indicates that, in higher-income countries at least, better-educated people eat less red meat and more vegetables.[12]

5.3.1.2 Breastfeeding

The extent and duration of breastfeeding show different patterns in higher- and lower-income countries.[168] High rates of breastfeeding among impoverished communities in low-income countries are partly because of unbroken traditions, partly because of encouragement by community workers, and partly because of lack of money to purchase infant formula.

Women of high socioeconomic status in high-income countries are more likely to breastfeed their children exclusively and extensively.[32 169] The reverse is true in lower-income countries.[30 32 105 169–171] In the USA, women of low socioeconomic status are more likely to return to work soon after the birth of their child.[103–105] Much of the evidence does not distinguish between social and economic status.

5.3.1.3 Overweight and obesity

For most of the last century, when most adults were not overweight, adult obesity was uncommon, and few children were overweight, people of higher social class tended to be fatter. The reverse is now true: lower social class communities are more likely to be overweight and obese. In lower-income countries, nutritional deficiencies and nutrition-related infectious diseases especially of children now exist side by side with obesity in the same communities and families.[172 173]

The SLR used two previous reviews.[174 175] Information up to 1989 showed higher rates of obesity in women of low socioeconomic status in high-income countries, and lower rates in low- to middle-income countries.[174] However, data from 1989–2004 show that high rates of obesity are now more common among adults and especially women of low socioeconomic status.[175] Other reviews show rapidly rising rates of weight increase in adults, and adiposity in children, in high-income countries.[176 177] A community intervention study showed reductions in social gradients with body mass index.[178]

In most countries since the 1980s, and especially in 'market economies', social and economic inequalities have widened, as have relative rates of overweight and obesity.[179] In England, Asian children are more likely to be obese than white children.[180] Two additional studies show that people of low educational level are more likely to be obese.[181 182] Again, much of the evidence does not separate social from economic status.

5.3.1.4 Physical activity

A similar switch is evident with physical activity. In the past, lower social class people were often occupationally active and walked or cycled to and from work. This remains true for a small minority in high-income countries and a much higher proportion within lower-income populations. Now, in high-income countries and also in cities throughout the world, occupations are principally sedentary and higher social class people are more likely to be recreationally active.

The SLR shows that urban higher social class adults are more likely to be physically active.[47 183 184] Other studies in the USA show that low levels of physical activity are more common among poorly educated people.[176 185] Other studies agree.[186–189] Again, a number of studies do not distinguish between aspects of social and economic status.

The picture in children is less clear, and several reviews have failed to find a consistent relationship between overall levels of physical activity and various measures of social, economic, or educational status.[190]

5.3.2 Evaluation of evidence

Social status and equity have been and remain in a state of transformation throughout the world. In most 'market economies', the rich have become richer to a greater extent than the less well off, so that the poor have become relatively and quite often absolutely more impoverished. These changes are economic and also social in nature. They have had dramatic impacts on patterns of diet, physical activity, and body composition, and thus on the risk of cancer and other chronic diseases.

Money is not the only measure of status. Social as distinct from economic status can be measured in terms of relative position within a given society, freedom of expression and choice, protection against danger and disease, access to ideas, information, education, and travel, degree of security, and more broadly, of confidence, happiness, and hope for the family, the community, and the future. The relative integrity of the fabric of any society is of extreme importance as a determinant of health and well-being, and of degrees of protection against disease — including cancer. Humans are evidently adapted to thrive on uncertainty, but extreme insecurity, whether caused by famine, invasion, chronic impoverishment, or unemployment — or widening gaps in social inequities — endanger health.

Currently one billion people survive in slums — tenements, shacks, trailers, shanty-towns, and *favelas*. This estimate is projected to double by 2030.[191] The social exclusion of slum-dwellers is unjust and also dangerous.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of one option for possible action. This is reduction of social inequities.

5.3.2.1 Reduction of social inequities

Political feasibility and acceptability

Reducing and sustaining reduction in social inequities at any level requires continued political will and committed partnership of all actors. This is probably feasible only when leading national governments pledge to restore a more equitable world, beginning with their own countries, and institute policies and programmes that will have these effects, including increases in social equity and thus in better population health and well-being. The establishment of the WHO Commission on Social Determinants of Health, and its 2008 report, are promising evidence of incipient acceptance of the need for structural approaches to address this. (See box 5.12)

Meanwhile, many initiatives are being taken at international, national, and local level and by industry, employers, professional organisations, civil society, and other actors.

Box 5.12 WHO Commission on Social Determinants of Health

Widening health inequities within and between countries have the effect also of widening the gaps between healthy and sick populations. In countries at all levels of income, health and illness follow a social gradient: the lower the social as well as economic position, the worse the health.

The Commission on Social Determinants of Health was set up by WHO in 2005 to collate global evidence, raise societal debate, and recommend policies with the goal of improving health and reducing health inequities. A key aim of the Commission, which was chaired by Michael Marmot (also chair of the Panel responsible for the current report), has been to focus attention on social determinants of health and health equity and to turn knowledge into bases for action.[192]

The Commission's report, published in 2008, sets out recommendations for action that are guided by three principles.[193] These are to improve the conditions of daily life (the circumstances in which people are born, grow, live, work, and age); to tackle the inequitable distribution of power, money, and resources (that drive the conditions of daily life globally, nationally, and locally); and to measure the problem, evaluate action, expand the knowledge base, develop a trained workforce, and raise public awareness.

Potential impact

BENEFITS: Social equity applies to child care, education, health services, housing, employment, taxes, pensions, and many other aspects of life. It does not mean equality, but greater fairness. Increased social equity is likely to reduce rates of chronic diseases, including cancer. Equitable lower-income countries and societies are likely to suffer less disease of all types.

HARMS. Inasmuch as increased equity means redistribution of wealth and resources, those who currently have the highest social status may lose some of their privileges. On the other hand, people at all social and economic levels may value living in a more equitable society.

Social setting, status, and equity.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Reduction of social inequities	✔			✔		

General acceptability
Privileged people may oppose moves to make their society more equitable if they see personal loss and do not value equity.

Cost
Making education, employment, housing, and other major aspects of society more equitable involves redistribution of social benefits and entitlements. Cost analyses need to allow for savings that result from reducing the harms that come from social inequity and exclusion, such as addiction, crime, low productivity, and high rates of diseases that are expensive to treat.

Timeframe
Social equity needs to be an indefinite strategy.

Transferability
Ambitious strategies require continual monitoring and adjustment. Lessons learned can be passed on to other societies.

5.4 Multinational bodies and governments

This section includes multinational bodies such as United Nations agencies, multinational governments such as the European Community, and national, provincial, and local governments.

Relevant United Nations and other multinational bodies, such as the Codex Alimentarius Commission and the World Trade Organization, and international and national governments enact laws, regulations, standards, codes, and guidelines that affect food systems and supplies and therefore what people eat and drink. In Europe, European Union directives and regulations become national laws, as do North American Free Trade Association and Mercosul regulations in North America and southern Latin America.

United Nations agencies also issue strategies approved by assembled nation states, of which two currently concern diet, physical activity, and health; and infant and young child feeding. These are influential especially in lower-income countries. United Nations agencies and many national governments also issue guidelines, or make regulations, on food and nutrition, food labelling, overweight and obesity, breastfeeding, disease prevention, and physical activity.

Major improvements in public health and safety usually involve legislation designed to enable, protect, and encourage as well as to discourage, restrict, or prohibit. With some exceptions, since the 1980s many governments have sought to reduce public health legislation in favour of voluntary codes of practice agreed by industry and other actors, which may be promoted by publicly and also privately funded education and information campaigns and programmes. However, many effective laws and regulations remain in force whose purpose is to protect public health and safety.

5.4.1 Summary of evidence

5.4.1.1 Patterns of diet

The SLR identified mixed evidence for efficacy of programmes sourced and backed by government. In Singapore, smoking has decreased and regular physical activity increased, but hypertension and high blood cholesterol levels have continued to increase and rates of diabetes and obesity have not decreased.[194 195] In Mauritius, smoking has been reduced, there has been no change in diabetes, and hypertension and obesity levels have continued to increase, while alcohol intake has dropped in men.[196] In both cases, increases in obesity and hypertension might have been faster without the interventions. The degree to which these examples can be extrapolated to the rest of the world is unclear.

In 2004, the UK Government launched a Food and Health

Action Plan.[197] This set out to work with the food and drink industry to improve food labelling, increase the availability of healthy foods, and reduce the availability of unhealthy foods and drinks, including alcohol. It aimed to improve food in schools, with a particular focus on young people, and to reduce health inequalities. An independent assessment 2 years after the launch highlighted a few areas of success, such as improved nutritional control of school meals and the launch of a 'traffic light' labelling programme.[198 199] However, the government-sponsored labelling was not universally used, and controls on advertising to children were less than intended.[198 199]

In South Korea, unusually for a country that has gone through the nutrition transition, relatively high vegetable consumption has been ascribed partly to the preservation of the traditional diet.[200] In April 2002, the Ministry of Health and Welfare, working with the Korean Food and Drug Administration, put in place the Comprehensive Health Promotion Policy, with health goals including improvement of the nutritional status of South Koreans. The plan includes several nutrition interventions such as revision and dissemination of dietary guidelines, enforcement of mandatory nutrition labelling on processed and packaged foods, provision of nutrition services to groups at risk, and nutrition information to the public, as well as breastfeeding promotion. The aims for 2010 include designating zones around schools where 'junk food' may not be sold, regulating 'junk food' advertising, and lowering the level of sugars, sodium, and *trans*-fatty acids in children's favourite foods.[201]

Alcoholic drinks

Legal and fiscal policies designed to control access to and intake of alcoholic drinks and to raise revenue are enacted in most countries. Some national and provincial governments prohibit or restrict sale or consumption of alcoholic drinks. Laws may include bans on sale to minors; bans on sale at certain times (as with the UK licensing laws, now relaxed) or in certain places (filling stations, for example, or sometimes everywhere except licensed liquor shops); and requirement for manufacturers to include advice or warnings on product labels. In most countries it is illegal to drive with blood levels of alcohol above specified levels, and punishment of drivers responsible for traffic incidents when over these limits are more severe. Governments frequently also publish reports and guides on alcohol overuse and abuse, on safe limits of alcohol intake, and on alcoholism.

Increasing the prices of alcoholic drinks through taxation reduces their sales and consumption.[202 203] Policies that restrict both the supply and availability of alcohol are especially effective in reducing health and social harm caused by alcohol.[204] These include taxation, minimum legal drinking age, reduced hours of sale, and policies on number, type, or location of sales outlets. Drink-driving countermeasures are also effective if vigorously enforced.[205–210] In regions with high-risk alcohol use, such as most European countries, taxation has the greatest and most cost-effective impact on reducing the average burden of high-risk alcohol use.[207–209] (For more on alcoholic drinks see chapter 4.2.1.1 and box 4.5.)

5.4.1.2 Breastfeeding

Laws, regulations, and guidelines designed to promote breastfeeding and to discourage mothers from feeding their babies with infant formula are issued in practically all countries. Governments of many lower-income countries tend to specify and when possible enforce more stringent laws, especially where water supplies are unsafe or where there is evidence of infant formula manufacturers engaging in inappropriate marketing. UN codes of practice include those on baby-friendly hospitals and communities, on the marketing of breastmilk substitutes, and more recently the UN Global Strategy on Infant and Young Child Feeding, endorsed by the Panel responsible for this Report as a means to prevent breast cancer in mothers and overweight and obesity in children.

Longer maternity leave, workplace breastfeeding policies, and jobs that enable mothers to breastfeed their child when they need to, all promote breastfeeding.[104 105] Therefore national employment policies can increase breastfeeding. In addition, supportive environments, professional and lay support, and education initiatives, both pre- and postnatally, all increase initiation and duration of breastfeeding.[30 35 67 211–213] Many of these initiatives can be government led, either through guidelines or legislation. Legislation that prohibits the promotion of breastmilk substitutes also increases breastfeeding.[214]

5.4.1.3 Overweight and obesity

Many governments at national and local levels are developing policies to control and prevent overweight and obesity. This is in response to the rapid rise in incidence of overweight and obesity in adult populations and also in children and young people, in high-income countries and also in cities throughout the world.

Two government-led initiatives from Singapore and Mauritius that included an aim of reducing obesity have been evaluated.[194–196] A number of other, as yet unevaluated, initiatives to prevent or reduce weight gain and obesity were in place in a number of countries at the time of completion of the review. These include laws to regulate food product sales in (among others) Brazil, Brunei, Japan, Malaysia, Saudi Arabia and other members of the Cooperation Council for the Arab States of the Gulf, and Singapore;[215] using the state school system to promote physical activity and healthy diets to prevent childhood obesity in Mexico and Brazil; and the 'Mexico takes Measure' programme.[216]

Similarly there are many initiatives from North America, Europe, and Australasia, as yet unevaluated. These include school-system-based activity and nutrition regulations to tackle childhood obesity, such as in Canada;[217] guidelines for local or regional authorities to implement, such as the 'Healthy People 2010' initiative in the USA and the obesity guidelines and childhood obesity initiatives issued by the Australian government health department;[218 219] and wide-scale cross-departmental government campaigns, such as the 'Healthy Weight, Healthy Lives' campaign in England.[220] Such initiatives could in time provide evidence for future development of effective public health measures.[221 222]

5.4.1.4 Physical activity

Governments at national and municipal level can readily enact programmes designed to encourage physical activity. As mentioned, these can include slowing traffic or closing roads to traffic, widening pavements (sidewalks), installation of lanes reserved for bicycles, restoration of abandoned railway routes as walkways, improvements of parks and open spaces, and redesign or refurbishing of public buildings. They can also include increased funding and resources for recreation, games, and sports for children in and out of schools.

Government-led interventions to increase physical activity can be effective. These include restoration of compulsory physical education in schools, together with community-wide education, school-based physical education, and enhanced access to places for physical activity.[155 223] Effective campaigns often involve the media.[155 224–226] Successful interventions are multifactorial and multi-actor.[105 227] Best practice in population-wide physical activity policy intervention is comprehensive, multi-disciplinary, and aimed across the life course.[228]

5.4.2 Evaluation of evidence

Legal and fiscal measures, such as those used in various areas of public health, for example for control of consumption of alcoholic drinks and breastmilk substitutes, clearly work. Evidence supports the view that if a product or service is more available and affordable, people will consume or use it more, whereas if it is less available and affordable, people will consume or use less of it — even in cases, as with tobacco and alcohol, where a product may be addictive.

Education and information programmes, whether sourced by government or other agencies, are an important part of any comprehensive approach, but by themselves are not particularly effective. The increase in consumption of sugary drinks and of convenient processed and 'fast food', the decline in physical activity, and the consequent rapid rise in overweight and obesity in higher-income countries and in cities throughout the world, now amounts to a global public health emergency that requires government intervention and sustained support at head of state and prime ministerial levels.

Specifically, government intervention needs to take the form of appropriate legal and fiscal measures designed to make healthy choices more affordable, accessible, and acceptable. This can begin by review of existing legislation to ensure that it is likely to improve public health. An immediate responsibility of government is to ensure that children in schools are fed well and are physically active and learn the value of good nutrition, recreation, and sport academically as well as practically. The same applies to other institutions such as hospitals, care homes, prisons, and armed forces facilities, and to government as an employer.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of three options for possible action. These are legislation to protect and improve population nutrition and physical activity, control obesity, and thus prevent cancer; regulation of policies on food, nutrition, and physical activity in schools and other institutions; and information and education campaigns backed by legislation and voluntary codes.

5.4.2.1 Legislation to protect and improve population nutrition and physical activity, control obesity, and thus prevent cancer

Political feasibility and acceptability

As already stated the evidence supports a conclusion that the rise in overweight and obesity, and in diseases including cancer with causes in common with overweight and obesity, now amounts to a world public health crisis that requires government intervention. Laws and regulations can enable and encourage as well as discourage and prohibit (see box 5.13). They can be supported by voluntary codes when these work.

A first step could be a review of existing relevant legislation to ensure that it is likely to improve public health, or at least not to have harmful effects. Acceptability depends on perception both of politicians and the public that overweight and obesity, and diseases with environmental, economic, and social causes in common with overweight and obesity, can and need to be controlled by public health measures involving legislation.

The rapid rise of overweight and obesity in children has now strengthened political will to this end. Much effective action will be at international level and thus will require negotiation between governments. In the case of breastfeeding, the UN ILO Maternity Protection Convention 2000 (No 183) requires member states to give 14 weeks of maternity leave, including 6 weeks of compulsory postnatal leave.[151] By July 2008, only 15 member states had ratified the convention, suggesting that legislation for substantial maternity leave is politically sensitive.[229]

Box 5.13 Public health legislation

Legislation can be and is used effectively to protect public health, for instance by controls on the use of guns, drugs, and tobacco and on infection and road safety. (Also see chapters 2 and 4)

Laws that affect food systems and supplies are used throughout the world. Many of these concern control of fraud and standards for food safety — microbiological and chemical — and food labelling. Laws on compositional standards for foods and drinks, usually put in place to combat fraud rather than to improve public health, have been relaxed in many countries in favour of more explicit ingredient labelling.

In the USA and Europe, agriculture is heavily subsidised, with the result that many commodities and foods are produced (though not necessarily sold) artificially cheaply. Such price support schemes were designed to protect farmers, not public health. In many countries, some staple foods such as bread are subsidised, usually to ensure security of supply, and some foods or drinks are taxed, again usually not for public health reasons. Many cities have also enacted laws designed to make walking, cycling, and other physical activity safer and more accessible and pleasant.

Potential impact

BENEFITS: National economies prosper more when their populations are healthier.[230] When populations are unhealthy it is hard for nations to prosper.

HARMS: Equitable legislation designed to make it easier for people to enjoy healthy diets, remain physically active, and to stay a healthy weight, and for mothers to breastfeed, will be generally beneficial. Sections of industry whose products become more expensive or less accessible will become less profitable. Many such companies are able to develop new product ranges or to diversify. Campaigns based mainly on information tend to be taken up preferentially by better-educated sections of society and so may to some degree increase inequity.

General acceptability

Once governments declare their commitment to improve public health and to use legislation to do so, and once the public is well aware that serious diseases including cancer can be controlled and prevented most effectively by use of legal and fiscal methods, legislation is likely to become generally acceptable. Industry may welcome unambiguous leadership from government.

Cost

There are costs to taxpayers of generating, implementing, and enforcing legislation. Legislative costs may be less than alternative measures. Plans for legislation need to take into account the cost benefits of reduced unemployment, higher productivity, lower healthcare costs, increased international competitiveness, and other factors. Results need to be monitored to identify which measures evidently do or do not work well, to make improvements, and to collect evidence.

Timeframe

This is an indefinite strategy.

Transferability

Much legislation to improve and protect public health is transferable, provided it is adapted to local conditions.

5.4.2.2 Regulation of policies on food, nutrition, and physical activity in schools and other institutions

Political feasibility and acceptability

Governments may or may not accept the need for legislation specifically designed to promote healthy nutrition and regular physical activity and to prevent and control overweight and obesity in schools and other institutions. In general, governments in countries identified as 'market economies' prefer to encourage voluntary codes and to stop short of legislation. However, by themselves, voluntary codes have not been shown to be effective. Indeed, the rapid rise of overweight and obesity particularly among schoolchildren can be seen as an unplanned and uncontrolled experiment whose results indicate that lack of regulation has proved to be damaging to public health and that voluntary agreements are ineffective. Legislation is required to protect the health inparticular of children, and of people in other institutional settings such as hospitals, care homes, prisons, and armed forces facilities. (Also see chapter 5.2)

Potential impact

BENEFITS: Taken all together, the evidence shows that public health is most effectively protected by appropriate legislation. Once various countries use legislation as the main driving force to improve public health, its effectiveness can be compared against unregulated countries and those relying on codes of practice and information and education programmes.

HARMS: None, unless regulation and legislation are seen as inherently undesirable.

General acceptability

The evidence pointing to the conclusion that health, especially of children, needs protection by the use of legislation is strong. Industry prefers voluntary codes, often drawn up jointly with government. However, there is evidence that enabling legislative frameworks come to be seen as helpful by industry because they create 'a level playing field' in which the most responsible actors are not out-done by relatively unscrupulous competitors.

Cost

The cost of legislation depends on its scale and on its implications and consequences. For example, mandatory nutrition standards for school meals might increase the cost of foods and drinks supplied to schoolchildren. Similarly, mandatory requirements for recreation, physical activity, and sports facilities in schools will often imply reconstruction of the built environment of schools or purchase or rent of open space, as well as more teachers with appropriate qualifications. As often stated in the policy and action options outlined in these chapters, a proper account of the cost of major public health reforms needs to include calculations of cost benefits resulting from improved population health.

Timeframe

Major public health reforms are necessarily strategic and may take 5–10 years to be put fully into effect.

Transferability

Laws governing public health are in principle international.

5.4.2.3 Information and education campaigns backed by legislation and voluntary codes

Political feasibility and acceptability

Concerted government-sponsored and -backed information and education campaigns, explaining and facilitating legislation and voluntary codes, may well be the most feasible and effective way to improve public health. Similarly, policies and actions designed specifically to prevent cancer are likely to be most effective when part of international and national programmes to improve and maintain population health. This integrated approach is likely to be more politically acceptable.

Potential impact

BENEFITS: Once part of concerted integrated plans, information and education programmes will be more useful.

HARMS: None, unless the campaigns are not part of concerted programmes.

General acceptability

Governments' commitment to the improvement of public health, including the use of legislation, will become more generally acceptable when backed by information and education campaigns.

Cost

The cost of the campaigns will depend on their scale. As already stated, a full account will include calculations of cost benefits.

Timeframe

Given the linkage, the same as for legislation (see chapter 5.4.2.2).

Transferability

The general principle — that ensuring through legislative and other measures that the public is well informed on issues relating to food, nutrition, and physical activity is a good in its own right and a valuable adjunct to other programmes to improve nutrition — applies globally. The details of individual regulation and programmes will need to be determined locally.

5.5 Civil society

Civil society organisations can be comparable in importance to governments, industry, and the media in influencing population attitudes and behaviour. They include non-governmental organisations, consumer representative organisations, charities, political parties, and religious groups. Civil society as used here does not include industry or its representative and allied organisations. (For people at personal, family, and close-knit community level, see chapter 6.)

5.5.1 Summary of evidence

5.5.1.1 Patterns of diet

The SLR, which itself incorporated earlier systematic reviews, identified some evidence of efficacy of various programmes aimed at improving overall diets.[75 80 81 95 231–247] Some studies report increased vegetable and fruit consumption[239 246] and decreased fat intake.[95 236–238 240–242 244 245] However, many studies failed to show a significant effect on diets.[75 232–235 247]

An earlier systematic review assessed 10 large-scale multifactorial cohort studies, including in the USA the Pawtucket Heart Health Program, the Stanford Five-City Project, and the Minnesota Heart Health Project. Six studies reported a significant decrease in dietary fat intake, while four showed no significant effect. Three further analyses showed a small significant increase in vegetable (but not fruit) intake, from the Californian '5-a-day for better health' campaign; a small significant increase in vegetables and fruits, from the nationwide US '5-a-day for better health'

Multinational bodies and governments.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Legislation to protect and improve population nutrition and physical activity, control obesity, and thus prevent cancer		✔		✔		
Regulation of policies on food, nutrition, and physical activity in schools and other institutions*		✔		✔		
Information and education campaigns backed by legislation and voluntary codes		✔			✔	

*Also see chapter 5.2

campaign; and a significant increase in vegetables and fruits, low-fat milk, wholemeal bread, chicken, and fish and a significant decrease in butter and fried foods intake, from the Heartbeat Wales campaign.[233 239–243]

The SLR included five primary studies,[248–252] all from North America, using churches as a community hub; three of these were randomised controlled trials.[248 250 252] Three studies[248–250] showed increased intake of vegetables and fruits, while two showed a decrease in fat intake.[248 252]

5.5.1.2 Breastfeeding

A Cochrane review of 34 trials from 14 countries found that all forms of extra support for breastfeeding increase duration of breastfeeding.[211] Face-to-face support is likely to be more effective than telephone support; lay support is associated with breastfeeding initiation and exclusive breastfeeding, while professional support can prolong the duration.[211] Mothers who are HIV positive need more support. UN baby-friendly hospital policies, such as rooming-in (where the baby is allowed to stay with the mother 24 hours a day)[30 67]and hospitals with staff that can provide breastfeeding support in minority languages, are helpful.[35]

5.5.1.3 Overweight and obesity

Findings from several community-based obesity prevention programmes targeting children have indicated some success. One, Shape Up Somerville, in Massachusetts, USA, increased physical activity options and availability of 'healthful' foods at home, in school, in the community, and in partnership with local legislators, restaurants, and healthcare providers.[253]

5.5.1.4 Physical activity

The SLR found that community interventions can increase physical activity levels, at least in the short term,[155 227 254] but perhaps not in a church setting.[255] Community support helps,[155] especially among disadvantaged families.[256]

5.5.2 Evaluation of evidence

Interventions carried out by nutrition scientists, epidemiologists, and other researchers in the community can change dietary patterns. How effective they are, and to what extent the changes are sustained after the intervention ends, varies greatly. Isolated interventions generally have little if any lasting effect. Interventions that are multifactorial, involving changes in physical activity as well, and that not only address the wider environment but also involve family, friends, and colleagues are more effective. Programmes that are sustained and have support from all interested actors, including government at appropriate levels, civil society organisations, professional organisations, industry, employers, and the media, are most effective. These general remarks also apply to breastfeeding, overweight and obesity, and physical activity.

Civil society organisations working in the public interest also have a wider responsibility, as advocates and watchdogs. In the environmental field, international organisations such as Friends of the Earth and Greenpeace continue to have a major influence on government and industry policy and practice, as do organisations such as Oxfam and Save the Children in the fields of social justice and famine relief. Most of the evidence evaluated below on advocacy is by analogy, bearing in mind the effectiveness of such organisations. (Also see box 8.3)

Taking the evidence all together, *the Panel has chosen* to consider evaluation of two options for possible action. These are advocacy and pressure to encourage governments, industry, employers, and other actors to improve public health; and interventions in the community, schools, and workplaces.

5.5.2.1 Advocacy and pressure to encourage governments, industry, employers, and other actors to improve public health

Political feasibility and acceptability

Action by civil society, including public advocacy and direct action, is accepted by most democratic governments. In less democratic countries, their work may be supervised or curtailed. Thus in Africa, some governments legislate to regulate civil society activity, and in some countries activity seen to be against the interests of the ruling regime may be illegal or dangerous.[257 258] The European Union welcomes involvement of civil society organisations in shaping cancer prevention and control policies.[259 260]

Potential impact

BENEFITS: Representative and accountable civil society organisations now amount to an additional estate within democratic countries. Their advocacy and support is often essential to the success of public policies and programmes (see box 5.14). Well set-up organisations are permanent, which gives them strength of continuity.[261]

HARMS: When they are properly representative, there are no losses except to vested interests. Some vociferous civil society organisations may not be representative of the groups they claim to serve.

Box 5.14 Civil society action: two examples

Trans-fatty acids

In the USA, the Center for Science in the Public Interest (CSPI) and other civil society organisations, supported by a network of committed nutrition scientists and epidemiologists, has campaigned successfully to restrict or prohibit the use of *trans*-fatty acids in processed foods. The public knew little about this food ingredient and its malign effects on cardiovascular disease until CSPI with its supporters campaigned on the issue.[262] As from 2006 in New York City, the use of *trans*-fatty acids in restaurant and unpackaged foods has been banned.[263]

Cycling

In the UK, Sustrans has successfully created a national cycle network in partnership with many local authorities and national government, especially as a means of healthy and active commuting, and is working with governments to develop other policies that encourage physical activity.[264 265]

Box 5.15 Civil society in the community: the Catholic Church in Brazil

The *Pastoral da Criança* in Brazil was established following a meeting in 1982 between James Grant, then Director of UNICEF, and Dom Paulo Evaristo Arns, then Cardinal Archbishop of São Paulo. It is a nationwide organisation of the Catholic church and involves over 150 000 volunteers in over 3500 municipalities, ministering to millions of children.

As part of its work to enable sustainable livelihoods, the *Pastoral* shows communities how to make best use of local freely available foods, including indigenous and established vegetables, roots, tubers, cereals (grains), and pulses (legumes). The *Pastoral* also makes use of a powder made from cassava leaves, rice (or wheat) bran, eggshells (sometimes omitted), and nuts and seeds as a supplement that can be made in the communities with simple equipment and marketed locally. Although the safety of this *multimistura* (multi-mixture) has been questioned, it is estimated that up to one in six of all Brazilian children have consumed it.

The effectiveness of the *Pastoral* is in its community roots, the scale of its network, and its good relations with government at federal, state, and municipal levels. Its director, Zilda Arns, has been nominated three times by the federal government for a Nobel Peace Prize.

Box 5.16 Civil society in the community: active cities

In the USA, Liveable City, a San Francisco-based campaign organisation, led the proposal for reform of the planning code to protect streets in the downtown area from excessive traffic, driveway cuts, and dead street frontages. This action culminated in the city's Board of Supervisors approving reforms of parking legislation in May 2006.[268]

In New Zealand, Living Streets Aotearoa, a national advocacy organisation, promotes physical activity through programmes such as Making Children Count, with a focus on children walking to school. In 2007 the organisation successfully lobbied Wellington city council to include in its annual plan a requirement for an annual performance measure of the percentage of primary schoolchildren walking to school.[269]

General acceptability
In most countries, citizens are accustomed to having their interests represented by civil society organisations.

Cost
Civil society organisations, whether charitable by status or not, characteristically progress work at low costs. Their revenue usually comes from subscriptions, grants, donations, and legacies.

Timeframe
Many civil society organisations are now engaged in actions designed to improve public health, some in the areas covered by this Report, and need more recognition and support. Opportunistic actions can be mounted quickly. Strategic actions take longer.

Transferability
Many large civil society organisations work internationally or globally, and know how to adapt their programmes and messages.[266]

5.5.2.2 Interventions in the community, schools, and workplaces

Political feasibility and acceptability
In open societies, community interventions and initiatives are typically feasible and accepted. (See boxes 5.15 and 5.16)

Potential impact
BENEFITS: Community interventions are likely to be more effective and sustainable than those aimed at people as collections of individuals because they can harness the power of the community itself.[267] Interventions carried out by scientists may be effective in themselves, and also provide evidence for the potential effectiveness of scaled-up policies and actions to be initiated by governments and other actors.
HARMS: Interventions and initiatives felt by a community to be impositions will not work and may have a negative effect.[267]

Civil society.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Advocacy and pressure to encourage governments, industry, employers, and other actors to improve public health		✔			✔	
Interventions in the community, schools, and workplaces	✔				✔	

General acceptability
Some people may resist initiatives designed to protect community and personal health. Indications are that most people welcome such initiatives.

Cost
Action originated by communities can cost little or nothing except in time and effort, often given voluntarily. Interventions devised by scientists, usually funded with public money or other grants, though expensive, can be justified by their potential benefits.[270]

Timeframe
Very variable depending on the nature of the initiative.

Transferability
Scientific interventions are designed to be repeated in other contexts. International lay organisations usually take care to make their initiatives adaptable.

5.6 Conclusions

Once, most work was physically active and lower social class communities often did not have enough to eat. Now, much work, and almost all work in cities throughout the world, is basically sedentary. Also, most people, especially in higher-income populations and cities, now have enough or more than enough to eat, increasingly drinks are sugared, and an increasing amount of food is pre-prepared and processed. For most populations, patterns of diet and physical activity, and of overweight and obesity, have shifted, often dramatically, since the early 1980s. At the same time, many impoverished populations, variously estimated to amount to between one sixth and one third of the global population, remain food insecure. These are massive international social issues.

Culture and values shape patterns of diet and physical activity, body composition, and breastfeeding practice. These social determinants of public health are causes of and targets for change in health. Traditional food cultures and values, many aspects of which promote health, have now become or are vulnerable to being eroded or displaced by industrialised systems. The significance of ethnicity and of traditional culture and values, including religious and other ethical systems, on public health is not yet clear. Where there is reason to believe that these social factors, traditional or more recent, have healthy effects, they need to be protected and promoted and their effects monitored.

An immediate responsibility of government is to ensure that schoolchildren are fed well and are physically active, and learn the value of good nutrition, recreation, and sport, academically as well as practically. Nutrition and physical activity need to be formal subjects in the school curriculum. Nutrition standards for foods and drinks supplied to children in school need to be mandatory, as do physical education, recreation, and sport. These are essential during school years and as education for adult life. The quality of foods and drinks available in workplaces together with opportunities for employed mothers to breastfeed, and for physical activity, are also important. The same applies to hospitals, care homes, prisons, and armed forces facilities, and to government itself as an employer.

Privileged minorities are able to eat well, to ensure the health of their children, and to be relatively physically active and less overweight. Absolute and relative social inequity is a cause of general ill-health, overweight and obesity, and vulnerability to common cancers. Social and associated inequities between and within nations are wrong and not to be tolerated.

When interventions address the wider context and involve the whole community they are more effective. Such interventions also provide essential evidence that may justify scaled-up policies and programmes initiated by governments. Interventions that are sustained and supported by all interested actors, including public interest groups, government at appropriate levels, professional groups, the media, and industry, can be effective. Any effect of isolated interventions that are relatively short term, and focused mainly or only on the populations studied, is likely to be insubstantial or transient.

Civil society organisations are essential actors. The support

and leadership of these organisations is crucial to the success of any major public health programme. Their success in encouraging government and industry in the environmental area, in partnership with academics and professional organisations, is impressive. There are also compelling examples of civil society organisations having a crucial impact in areas covered by or close to the topic of this Report.

The increase in consumption of sugary drinks and processed and pre-prepared, energy-dense 'fast food', the decline in physical activity, and the consequent rapid rise in overweight and obesity in higher-income countries and in cities throughout the world is now a global public health emergency. This requires government intervention and sustained support at head of state and prime ministerial levels. Specifically, government intervention needs to take the form of appropriate legal and fiscal measures designed to make healthy choices more affordable, accessible, and acceptable.

CHAPTER 6

The personal dimension

The previous chapters show that environmental, economic, and social factors influence or even largely determine people's ways of life, including what they habitually eat and drink, how active they are, and their degree of body fatness. These factors therefore also affect the risk of cancer.

This chapter shows that personal factors concern people as individuals, and also as members of families, of close-knit groups such as extended families, and of local communities such as clubs and traditional villages. Families have agreements that may be regarded as policies to be carried out by one family member or else shared within the family, a common example being shopping and food preparation, and agreements to eat together.

Personal factors covered in this chapter include family habits and values; personal knowledge, attitudes, and beliefs; physical states of health, well-being, physical fitness, and disease, and also mental and emotional states; and personal characteristics that cannot be changed but which need to be taken into account, such as age, height, and sex.

6.1 Individuals, families, and communities

Ways of life are learned within the family and the immediate community and influenced by peers and wider external factors including the media. Children learn from parents, other family members, friends, and their carers, as well as in more formal educational settings. Adults' behaviours are often modified, reinforced, or rejected by partners and other family members, especially when these are close such as mothers. Friends, as well as experiences during childhood, are also important influences. Older people living with younger family members are influenced by them.

In some countries, individual values have become dominant, and contemporary ways of life are characterised by dispersion of family networks, marital disharmony, busy work schedules and geographical mobility. By contrast, in other countries people traditionally stay in the same place and see themselves as members of families and communities such as the village, tribe, or clan, and not just as individuals. In these settings, the family may remain the most important influence on behaviour throughout life, although mass migration from rural areas into cities weakens traditional family ties. In Africa especially, the AIDS epidemic has increased the number of children being raised by grandparents. Wars and other conflicts also often break up families, as well as causing food insecurity or even destitution.

6.1.1 Summary of evidence

6.1.1.1 Patterns of diet

The systematic literature review (SLR) found that interventions to improve diets are more effective when other family members are involved.[1] There was some evidence that parenting styles, and the presence of children within the family, influence family diets.[2 3] More specific evidence on family influence on consumption of vegetables and fruits or meat[4–8] was inconsistent or sparse. Since the conclusion of the SLR, this evidence base has grown and suggests that the family is an important environment for influencing children's eating habits, with parental examples being particularly important.[9]

A key period for parents and carers to establish good nutritional habits in children is between the ages of 2 and 5 years.[2 10]

The family, whatever its structure, provides the environment in which children learn about food and eat most of their meals. Both genetics and environment can and do influence children's risk of weight gain, overweight, and obesity. However, it is clear that family ways of life can influence eating behaviours.[11] From infancy onwards, parents and other carers decide what food is available in the home and provide the setting where foods are eaten.[11] People have an in-built preference for sweet and perhaps salty foods. Acceptance of other foods is learned; for example, parent-led exposure can increase children's acceptance of vegetables.[11 12] As children grow older, and through adolescence, they gain more control over what they eat and drink. Despite this, parental influence remains important: by example, by rule-setting, by food availability, and by family meal-times.[11 13–15] Some parenting practices, such as restricting palatable foods, pressuring children to eat all the food on their plate, and offering foods as rewards, have been suggested to encourage overeating. Such practices can prompt children to attend to external cues, such as the availability of food or the amount remaining on the plate, and divert them from internal cues of hunger and satiety.[11 16–18]

6.1.1.2 Breastfeeding

A mother's attitude to breastfeeding (covered in more detail in 6.2.2.2) can be influenced by close family members. In particular, initiation and duration of breastfeeding are influenced by the partner's attitude and also by the mother's mother.[19] Involving fathers in breastfeeding education improves breastfeeding rates.[20–23]

6.1.1.3 Overweight and obesity

The 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report has established that sedentary activities such as watching television contribute to weight gain, overweight, and obesity, particularly in children.[24 25] Overweight children are more likely to have overweight or obese parents. Determining factors may be partly learned as well as inherited.[26] Parental knowledge and attitudes to obesity are also influential.[27 28] Family-based interventions to improve weight maintenance through diet and activity can be effective for both adults and children. Studies other than those in the SLR show that children who eat meals with the family are less likely to be obese.[29 30] Watching television while eating family meals is linked to relatively low quality of diet. When children watch television while eating alone, their diets are poorer still.[31]

Family mealtimes, eating breakfast, and avoiding watching television while consuming convenience food, all protect against overweight and obesity.[30 32–35] Involving families in interventions to encourage healthy ways of life increases the efficacy of the intervention.[36]

6.1.1.4 Physical activity

The SLR and other studies have found that family involvement makes interventions designed to increase physical activity more effective.[36a] Parental and social support increases physical activity levels among children.[37–42]

6.1.2 Evaluation of evidence

The importance of the family and other close associates has tended to be somewhat overlooked in research into factors

Box 6.1 Personal dietary guidelines

The 2007 WCRF/AICR Diet and Cancer Report includes personal recommendations as well as public health goals. As in this Report, the personal recommendations are designed for people 'as communities and families as well as individuals'. Addressing personal guidelines to people as close-knit group members and not only as individuals originated with a report written to guide governments in Latin America. Its approach in this respect was summarised in the phrase 'The family eats from the same pot'.[51] The first official dietary guidelines issued by the Brazilian federal government adopted this approach.[52]

Considering people as members of families and of social networks has a number of benefits. It recognises the fact that in a family it is often one person who habitually purchases food and (not always the same person) who prepares it. This approach encourages home cooking and family meals. Applied to physical activity, it encourages the mutual support known to promote recreational activity whether within the family or other social networks. It also discourages solitary purchase and consumption of food out of or inside the home, which is more likely to be pre-prepared, 'fast' or 'convenience', or processed energy-dense products. It also encourages people who live alone to enjoy meals in association with others.

that shape patterns of diet and physical activity, body composition, length and duration of breastfeeding, and no doubt other aspects of personal ways of life. The evidence, though relatively sparse, is generally consistent. People are more likely to eat and drink healthily, sustain physical activity, and control their weight, and mothers are more likely to continue to breastfeed their children, when supported by family, friends, and other close associates. (See box 6.1)

Research in which people are studied as group members and not just as collections of individuals needs to be undertaken. Taking the evidence all together, *the Panel has chosen* to consider evaluation of four options for possible action. These are encouragement of regular shopping for and preparation and cooking of meals; inclusion of partners and other family members in breastfeeding support; building regular physical activity into everyday life; and a more general option, support of relevant civil society organisations. The fifth option, design of interventions to involve families and clubs, was insufficiently supported by the evidence gathered for this Report, and was not evaluated.

6.1.2.1 Encouragement of regular preparation and cooking of meals

Political feasibility and acceptability

Increasingly, the value of family meals, for general social reasons as well as those of public health, is accepted. The World Health Organization (WHO) Global Strategy on Diet, Physical Activity and Health[43] includes recognition of the value of traditional and other family-based food cultures, as do the 'Choosing Health' White Paper[44] and 'Healthy Weight, Healthy Lives, A Cross Government Strategy'[45] in the UK and 'Feeding our Futures' in New Zealand.[46] Other schemes exist in other countries.[47–50]

Potential impact

BENEFITS: The preparation, cooking, and communal sharing of meals, as exemplified by families, teach healthy eating habits early in life.[53] Home-made meals tend to be lower in energy than pre-prepared and other 'fast food' and drink, and so protect against weight increase, overweight, and obesity, the cancers for which these factors are a cause, and other chronic diseases such as diabetes and cardiovascular disease. Eating meals together at home has been linked to better quality of diet.[32 54] Children in homes where preparation and cooking are enjoyed as part of family life are more likely themselves to value and enjoy good food.[55] (See box 6.2). People who live alone will not usually be eating meals with others, but will still benefit from preparing and cooking meals at home.

HARMS: Shopping for and preparing and cooking family meals takes time. This can be seen as a benefit rather than a harm, as it may displace more sedentary activities and is socially constructive.

General acceptability

Emphasis on the family is generally likely to bring family members closer together.

Cost

There is no direct relationship between the quality and cost of diets. Many processed and pre-prepared foods that are high in fat, refined starches, sugar, or salt may be inexpensive on a per-item basis. Healthier versions of such foods may carry a price premium. Such less expensive foods are often relatively low in micronutrients, compared to fresh or home-prepared products. Preparing food from basic ingredients can better preserve micronutrient content, and the cost of the raw ingredients is lower. Consequently, it is possible to spend little and eat a healthy diet, or to spend more on a less healthy diet. The converse is also true — it depends on what is selected.

Timeframe

Reorientation of public health policies so that these are family and community centred, within a generally supportive culture, will take time in countries whose public values are currently focused on people as individuals. The family- and community-based approach is natural in most traditional societies and in many lower-income countries.

Transferability

This approach applies to all societies. Basic messages on shopping for and preparation and cooking of food are much the same in most societies.

6.1.2.2 Inclusion of partners and other family members in breastfeeding support

Political feasibility and acceptability

The United Nations (UN) Baby-Friendly Hospital Initiative already encourages breastfeeding support groups.[56] Involving partners and other family members in support of breastfeeding is likely to be welcomed politically.

Potential impact

BENEFITS: WHO recommends exclusive breastfeeding for 6 months and to continue with breastfeeding for up to 2 years of age or beyond, supplemented with adequate and safe complementary foods.[57] Breastfeeding protects against breast cancer in the mother and being breastfed probably protects children against excessive weight gain.

HARMS: Women or partners who have negative feelings about breastfeeding may feel unfairly pressured by programmes

Box 6.2 Get Cooking!

In the UK, the Food Standards Agency has developed a series of programmes designed to encourage the preparation and cooking of food at home. In parallel, children aged 11–14 will be given compulsory cooking lessons as from 2011 or, in schools with existing facilities, immediately.

These initiatives originated with the 'Get Cooking!' campaign launched by the civil society organisation Sustain (then the National Food Alliance) in 1994, in partnership with the Department of Health. By 2008, the campaign had encouraged the creation of several community schemes.

Box 6.3 Five stars for the Lone Star state

In the USA, the Texas Department of Health has initiated a father-to-father breastfeeding support pilot programme. A study of the programme found that breastfeeding initiation rates increase at clinics where fathers give advice on breastfeeding and parenting to other fathers.[58] The study concluded that 'father-to-father' breastfeeding education was successful in educating and empowering fathers, enabling them to support their breastfeeding family members. A second study found that mothers with partners participating in the programme were more likely still to be breastfeeding when their children were 6 months old.[59]

designed to encourage partner and family support for breastfeeding.

General acceptability
Including partners and families in breastfeeding is likely to be acceptable to most people. (See box 6.3)

Cost
Increasing the rate of breastfeeding is likely to be cost-effective. One US study published in the mid 1990s estimated that the healthcare costs for diseases and ailments that are more common in formula-fed children could amount to $US 1 billion per year in the USA. Breastfeeding does not carry the costs associated with formula feeding.[60]

Timeframe
Many health professionals now involve partners and other family members in ante-natal programmes designed to encourage breastfeeding. With support from other actors such as government ministries of education and relevant health professional organisations, such initiatives can be enhanced immediately.

Transferability
The basic messages for any action to promote breastfeeding are basically the same, and can readily be adapted to be culture specific.

6.1.2.3 Building regular physical activity into everyday life

Political feasibility and acceptability
The importance for health of regular physical activity is now accepted throughout the world. The issue is whether governments are prepared to put major public health programmes in place, especially when these involve change in built environments, that will make it safe, easy, and enjoyable for people to be physically active now that the physical activity inherent in most occupations in the past has largely disappeared. The message that physical activity is vital is supported by the food and drink industries and their representative organisations.

Potential impact
BENEFITS: Regular sustained moderate and vigorous physical activity protects against colon cancer and probably against postmenopausal and endometrial cancer. It also protects against overweight and obesity and thus the cancers of which these are causes. It further protects against cardiovascular disease and a range of other chronic physical diseases, is good for psychological health, and improves general well-being.
HARMS: Some disabled and otherwise physically impeded people, and many elderly people, may gain relatively limited benefit from physical activity initiatives in relation to cancer prevention. In addition, the food manufacturing industry is likely to continue to support sport and recreation, which may distract attention from processed energy-dense food and sugary drinks as causes of overweight and obesity.

General acceptability
There is now general awareness and acceptance that sustained physical activity is a vital part of healthy ways of life.

Cost
A classic public health approach to increasing physical activity involves a new attitude to the built environment (see chapter 3). This will include priority being given to walking, cycling, and other everyday forms of physical activity; the protection and development of parks, other open spaces, and wilderness areas; and buildings designed to encourage activity. Self-funding and profitable fitness and health centres are valuable, but are available and affordable only for a small proportion of people, and in any case do not build physical activity into everyday life as, for example, walking or cycling to and from work does. The overall costs of reshaping built environments will be high, as are other major public health programmes such as provision of safe water and reduction of urban pollution. Some costs may be shared with industry, but in general the improvement of public health requires public money.

Timeframe
There are already many smaller and opportunistic initiatives in place. Others can readily be started.

Transferability
The basic principles of public health initiatives designed to increase physical activity are universal.

6.1.2.4 Support of relevant civil society organisations

Political feasibility and acceptability
Civil society organisations are often lead actors in the development of public policy. In some fields, notably the environment, they have for many years been partners with governments in the development and planning of public policies, while retaining their responsibility as advocates and watchdogs. In the field of this Report, international civil society organisations concerned with alcohol use and abuse, and with breastfeeding, also work closely with UN and other international organisations and with national governments. Politicians and civil servants often see civil society representatives as essential colleagues. Public health

Box 6.4 Action in support of healthy food systems

Many civil society, including consumer, organisations are concerned to protect and promote healthy food systems or diets that protect against disease. On a global level, the People's Health Movement, founded in 2000 as a result of a gathering in Bangladesh of nearly 1500 people from 92 countries, has as part of its purpose the protection of family farming and gardening and sustainable rural livelihoods, most of all in lower-income countries.[61] The UN system currently includes a Standing Committee on Nutrition, also concerned with global food policy, whose membership includes civil society organisations.[62]

In the USA, the Center for Science in the Public Interest, set up in 1971, is principally concerned to protect the interests of food customers and consumers, and publishes a monthly journal with a wide circulation.[63] In the UK, Sustain, founded in 1985, is an umbrella group representing over 100 national organisations involved with agriculture, food, and nutrition policy. Sustain has mounted a series of effective campaigns, for example, concerned with the marketing of processed food and drink to children, with promotion of cooking skills in schools, and with the impact of diet on psychological health.[64]

initiatives convened by many governments include professional and academic experts as well as public interest groups in the design of policy and action plans.

Potential impact

BENEFITS: Policies and actions at international to local level are much more likely to be effective and to protect public health when representative and accountable civil society organisations work as partners with other actors. (See box 6.4). On a more personal level, initiatives that involve clubs and associations, and more formal organisations, are more likely to be effective, and people, as members of associations or organisations, are themselves more likely to maintain healthy patterns of diet and physical activity and healthy ways of life generally. People can empower themselves and their families and colleagues by acting as citizens and becoming energetic members of civil society organisations, which include professional, religious, and other groups working in the public interest.

HARMS: Vested interests might suffer losses depending on the nature of the action demanded. When civil society organisations are appropriately accountable and representative of their members, there are no harms or losses.

Acceptability

Leading civil society organisations have gained high public credibility and command media attention on a level with government and industry. In lower-income countries, people are accustomed to working as members of clubs and associations and as community members.

Cost

Civil society organisations often work on a voluntary basis. Initiatives in which they are partners are likely to be economical.

Timeframe

In most of the areas covered by this Report, effective civil society organisations already exist.

Transferability

The issues covered by this Report, while global, need to be framed in ways that work in different settings and cultures.

Individuals, families, and communities. Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Encouragement of regular preparing and cooking of meals		✔			✔	
Inclusion of partners and other family members in breastfeeding support		✔			✔	
Building regular physical activity into everyday life		✔			✔	
Support of relevant civil society organisations		✔			✔	

6.2 Knowledge, attitudes, and beliefs

Personal knowledge, attitudes, and beliefs are shaped at school and other places of study, by religious teachings, by health professionals (such as nurses, doctors, dietitians) and other practitioners, and by the media, as well as by family and the wider community. Many interventions are designed to reinforce or to alter knowledge, attitudes, and beliefs, and are sometimes assessed for efficacy. Interventions designed to improve diets often also involve attempts to increase physical activity. These include mass media population-wide campaigns as well as smaller-scale community interventions.

6.2.1 Summary of evidence

6.2.1.1 Patterns of diet

People often have contrasting beliefs about what is 'healthy eating', which may be deep-seated (also see the previous chapter). In some traditions, healthy foods are those that make people 'big and strong'. For other people, food quality is mainly an issue of food safety, also the subject of media and other campaigns. For others, the way that foods are produced, for instance the degree of processing, is the key factor.[65] People who avoid meat or animal food for ethical or other reasons may regard such foods as unhealthy. Peoples' perceptions of the healthiness of individual foods and drinks are also affected by media coverage, which may be distorted for commercial reasons or to sell a story, and thereby contribute to apparent conflict in healthy eating messages.

Some of the studies in the SLR adjust for nutritional knowledge.[66 67] Some interventions are designed to increase knowledge and also measures of healthy eating.[68–70] On its own, increased knowledge may not have much effect on dietary behaviour, although any effect tends to be greater in more educated and affluent groups.[71–76] Nutrition knowledge and education programmes can enable people to make better use of food labelling. The SLR shows that interventions to change dietary habits are more effective when these include nutrition education components.[77–79] A review not in the SLR found that promotional campaigns can increase awareness of what foods make up healthy diets, and may prompt people to improve their diets.[26] One review found that people who know that vegetables and fruits are healthy are more likely to consume relatively high amounts.[80]

6.2.1.2 Breastfeeding

A woman's knowledge, attitude, and beliefs, as well as those of her partner and close family members (see chapter 6.1), influence her decision whether or not to breastfeed, and if so for how long. Intention to breastfeed, and in particular early timing of this intention, increases duration of breastfeeding.[81] Raised awareness of the benefits of breastfeeding can reinforce intention and increase initiation and duration of breastfeeding.[82–84]

Alternatively, mothers' beliefs that they have insufficient milk, that their babies are going hungry, or that breastfeeding could be harmful all discourage breastfeeding.[85] In many countries, mothers believe that infant formula, or evaporated or condensed cow's milk, have special health benefits.[86] Mothers in Africa who are HIV-positive are often told that the risks of formula feeding are outweighed by the risk of transmission of AIDS through breastmilk to their children.[87]

Initiation and duration of breastfeeding are most likely to be increased when interventions are integrated, involving local media campaigns, educational material, and professional and peer group support. All together, these are most likely to reinforce or change attitudes and beliefs as well as knowledge, and thus breastfeeding practice. The most effective interventions begin early in pregnancy.[88 89]

6.2.1.3 Overweight and obesity

The 2007 WCRF/AICR Diet and Cancer Report identified obesity as a cause of a number of common cancers, as well as of other diseases. Overweight short of obesity is also identified as increasing the risk of some diseases, including some cancers. People who are attentive to media coverage are likely to be aware of these conclusions, without necessarily agreeing with them or acting on them.

Some studies published after the completion of the SLR found no correlation between knowledge about nutrition and body fatness as measured by body mass index (BMI).[30 90] One review (also see chapter 5) found that reinforcing interventions by media campaigns and also sustained health professional and community support increases their effectiveness.[26] A study in African Americans found that frequent eating at 'fast food' restaurants predicted lack of belief in any relationship between diet and cancer, low rating of personal health, and belief that it is difficult to prepare healthy meals or order healthy foods in restaurants.[74]

6.2.1.4 Physical activity

Until recently, regular sustained physical activity was seen as the way to increase physical fitness, but often as not important in other ways. Knowledge that active ways of life protect against many diseases, including colon cancer and (probably) postmenopausal breast and endometrial cancer, summarised in the 2007 WCRF/AICR Diet and Cancer Report, is recent.

The SLR found that knowledge, attitudes, and beliefs are only inconsistently associated with degrees of physical activity.[40 91 92] Other reviews have found associations. Attitudes to physical activity are affected by degree of self-belief, perception of time available, sense of other priorities, feeling old, disability, and whether exercise is seen as enjoyable, boring, or painful.[38 91–95] One study found that a 2-year social marketing campaign changed attitudes to and increased physical activity among 9–13 year olds.[41 96 97]

A review of randomised controlled trials of interventions to encourage sedentary adults to become physically active found that professional advice and guidance with ongoing

Box 6.5 Information and education: necessary support

The SLR carried out for this Report summarises evidence from studies carried out in higher- and also lower-income countries, consistently showing that education and information programmes are effective when they are part of concerted action.[79 99–113] Such programmes take many forms, such as media campaigns, internet information, printed literature, point-of-sale displays, signs, cookery skills courses, and 'health fairs'.

The evidence also shows that in isolation, information and education may not be effective or translate into action. Effective programmes include information and education as but one essential component of concerted approaches, which may involve community action, encouragement of clubs and other mutual support groups, and support from influential actors such as health professional organisations and other public opinion-formers.[114]

support can encourage people to be more active in the short- to mid-term.[98] Another review found that promotional campaigns including media interventions can improve knowledge and awareness of and attitudes to physical activity, and that people who are already motivated are more likely to translate this into action.[26]

6.2.2 Evaluation of evidence

The impact of personal knowledge, attitudes, and beliefs on diet and physical activity is unclear. Information comes from different sources, including food and drink manufacturers, who may not be impartial. Big stories on 'food scares' or scientific disputes can drown out more measured information. Attitudes and beliefs may have been formed early in life when public health messages were different and, as summarised in the previous chapters, may have deep social and cultural roots. Interventions designed to measure the impact of information and education in isolation generally produce poor results, although they can improve the efficacy of other initiatives to alter diet and physical activity behaviour.

What the evidence does show is that attempts to reinforce or change behaviour are more likely to be effective and sustained when they are concerted and consistent, and supported in the family and community and by health professionals — and also other actors such as government, civil society organisations, industry, employers, and the media. (See box 6.5)

As with the previous section, more research needs to be undertaken to examine the effect of people's knowledge, attitudes, and beliefs on their ways of life. Taking the evidence all together, *the Panel has chosen* to consider evaluation of two options for possible action. These are promotion of interventions that include support from knowledgeable family members; and promotion of the value of breastfeeding, particularly to women early in pregnancy.

6.2.2.1 Promotion of interventions that include support from knowledgeable family members

Political feasibility and acceptability
Support and reinforcement of family and community values is likely to be welcomed politically.

Potential impact
BENEFITS: Giving priority to concerted and consistent initiatives and actions involving support from respected knowledgeable people is likely to have considerable impact on public health.
HARMS: Solitary people will not benefit from this approach.

General acceptability
Any initiative or action that combines knowledge with action is likely to be generally popular.

Cost
Working with family members with special knowledge is likely to be more economical as well as more effective.

Timeframe
Many initiatives, including formal studies, already involve experts. At a national level, recognition that this approach is more effective, and is more appropriate in a public health context, may take some time in countries whose culture is individualistic.

Transferability
By its nature, a family and community approach, while conceptually universal, needs to harmonise with local culture and custom. It follows that those responsible for initiating and carrying out initiatives need to have a good understanding of the personal and social nature of the people they are working with.

6.2.2.2 Promotion of the value of breastfeeding, particularly early in pregnancy

Political feasibility and acceptability
The success of the UN Baby-Friendly Hospital Initiative indicates that extension of breastfeeding advice prenatally, including to women and their partners planning to have children, is already generally accepted. All breastfeeding promotion programmes need to be developed in partnership with the leading global civil society networks.

Potential impact
BENEFITS: Most women have decided how they will feed their child by the start of the final 3 months of their pregnancy.[117] Educating parents at earlier stages of pregnancy will inform and strengthen that decision in favour of breastfeeding. Knowledge that extended exclusive breastfeeding is an important protection against breast cancer and probably protects the child against overweight and obesity is a further reason to breastfeed. (See box 6.6)
HARMS: Delivering prenatal education in a hospital or other healthcare setting may exclude groups of mothers who have

Box 6.6 The UN Baby-Friendly Hospital Initiative

The UN Baby-Friendly Hospital Initiative supports prenatal as well as postnatal promotion of breastfeeding.[56] By 2008, more than 15 000 facilities in 134 countries had Baby-Friendly status.[115] The English National Institute for Health and Clinical Excellence (NICE) recommends the Initiative to improve rates of breast-feeding and provide cost savings to the National Health Service. The UN Global Strategy for Infant and Young Child Feeding, published in 2003, builds on the Initiative and calls for all national governments to put in place national policy on infant and young child feeding and an action plan to implement the policy.[57] As a result, many countries have developed national policies on breastfeeding.[116]

poor access to these services. Ideally, interventions should target these groups, finding innovative ways to reach and engage them.[84]

General acceptability
Promoting breastfeeding pre- and postnatally is likely to be acceptable to most people.

Cost
The long-term savings from national and local promotion of breastfeeding are likely to be higher than the costs. Cost analyses need to take all factors into account.

Timeframe
Steady development of breastfeeding promotion is an indefinite strategy. Extension of current programmes into the prenatal and preconceptual periods might take a year or so, depending on how advanced such programmes already are.

Transferability
Breastfeeding promotion is already a global strategy.

Knowledge, attitudes, and beliefs.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Promotion of interventions that include support from knowledgeable family members		✔		✔		
Promotion of value of breastfeeding particularly early in pregnancy		✔			✔	

6.3 Physical and psychological states

People's physical and psychological states affect their ways of life. Physical states include degrees of positive health and well-being as well as presence or absence of debility or disease or risk factors for disease — including cancer. How much and what people eat and drink, how active they are, and how likely they are to become overweight or obese, are all affected by and may be constrained by the presence or absence of health or fitness. Psychological states include degrees of presence or absence of self-respect, self-determination, self-confidence, and self-sufficiency, as well as degrees of depression or euphoria. Habits are also included here. These have both physical and psychological aspects, as do hunger and appetite.

6.3.1 Summary of evidence

6.3.1.1 Patterns of diet

Peoples' patterns of eating and activity have obvious links to their state of health. Illness may reduce appetite. Cancer may affect both appetite and metabolism (see boxes 6.7 and 6.8).[118] People with musculoskeletal diseases such as arthritis are less mobile and find it more difficult to shop and to prepare food. Treatments for cancer commonly affect appetite and may make the mouth and throat sore and swallowing difficult.[119]

The SLR found that interventions including motivational materials or incentives can improve the quality of diets,[104 120–122] and that school-based cooking clubs can make children more confident to develop cooking skills.[123 124] Another literature review[80] shows that people with a developed sense of confidence in being able to carry out tasks are more likely to improve their diets and in particular to eat more vegetables and fruits.[74 80 125 126]

Emotional states influence food choice, and in turn eating and food choice can affect emotional states.[127 128] Some people eat or drink excessively when bored or lonely. Illness, pain, fear, and tension can reduce food consumption.[129] Dieters and people identified as depressed or neurotic may prefer sweet, fatty, and snack foods.[127]

Box 6.7 Cancer survivors

Cancer survivors are people living with a diagnosis of cancer, at any stage from first diagnosis. The 2007 WCRF/AICR Diet and Cancer Report recommendations for cancer survivors are, for those able to do so and unless otherwise advised, the same as those for people without cancer.

There are many circumstances in which having cancer affects patterns of diet and physical activity. For example, the cancer itself, medication, or the results of surgery may impair appetite, the ability to eat, or the absorption of nutrients or increase nutrient losses, and may also affect physical activity. Mothers with cancer may find breastfeeding difficult, or when taking drugs may be advised against it.

Box 6.8 Cancer survivors and their organisations

Since the 1990s, cancer survivors and their representative organisations have become a significant social force in the USA and are likely to become so in other countries. This development follows the establishment of energetic and effective lay organisations representing the interests of people with HIV/AIDS.

Over the whole course of life, most people in many countries are affected by cancer, themselves or within their family.

Understanding and taking into account the impact of cancer on patterns of diet, physical activity, and body composition, and the risk of spread or recurrence of cancer, is a major challenge to relevant public health professionals. Equally, the impact of dietary patterns, body composition, and physical activity on outcome in cancer survivors is under-investigated. Research in this area is becoming a high priority and is in part being driven by civil society organisations created by cancer survivors, as well as by established bodies such as the US National Cancer Institute, the American Cancer Society, and the American Institute for Cancer Research. Success in understanding the relationship between food, nutrition, and physical activity and the progression of cancer (either as the risk of progression or new cancer, as quality of life, or as length of survival), and in taking action, is likely to come from alliances between cancer survivor organisations, other relevant civil society organisations, research institutes, government, appropriate health professional organisations, and other actors including industry.

6.3.1.2 Breastfeeding

Physical, mental, and emotional states all influence the length and duration of breastfeeding.

Illness may reduce breastfeeding, particularly when infection may transmit to the unborn child. Specific health problems associated with the early stages of breastfeeding, such as sore or cracked nipples, reduce levels of breastfeeding.[130] Mothers taking medication may have to stop breastfeeding because the drugs or their metabolites can transmit to the child.[119]

Mental and emotional states can affect a mother's decision to breastfeed. Previous good experience of breastfeeding increases duration, whereas embarrassment decreases duration.[81 131] Postpartum depression decreases breastfeeding, though it is not clear whether depression causes cessation of breastfeeding or the other way round.[132] Emotional support programmes increase initiation and duration of breastfeeding.[84]

6.3.1.3 Overweight and obesity

People with low self-esteem may be less likely to decrease weight in response to encouragement to do so.[133] Interventions designed to improve sense of self-worth may be effective,[134] but there is some evidence that children with higher BMI may have greater dietary self-efficacy.[30] A review of cohort studies found that weight usually increases as a result of stopping smoking.[26]

6.3.1.4 Physical activity

Fit people, being physically active, are better able to maintain a healthy weight. Sedentary people are more likely to be

or become overweight or obese. Illness may reduce the desire or ability to be physically active, because of the illness itself or because of adverse effects of treatment. Hospital stays may also have an impact on food consumption and activity.

Poor health or being unfit can be barriers to physical activity.[92 93 95] Smokers are less likely to be physically active.[91 92 95 135] The SLR shows that, in adults, confidence in ability to be physically active, self-motivation and enjoyment of physical activity are associated with higher levels of physical activity.[37 91–93 95 135 136] In adolescents, depression is a barrier to activity.[40 137] One review showed that active children are more likely to have positive motivation and good self-image.[138] Older people are more likely to feel unable to be physically active.[139–142] Emotional states affect levels of physical activity, which in turn influence emotional states.[142] Life transitions such as getting married, starting a job, and having children may lead to lower levels of physical activity in women.[143 144] Adults can be motivated to increase physical activity by making schedules, setting goals, and arranging to be active in company.[145] Older adults may be motivated by the social benefits and by feeling that activity will slow down the ageing process, and discouraged by lack of self-confidence and not wanting to expose their bodies.

Children up to 8 years of age are more likely to be physically active if they feel supported by parents and other children, and when they enjoy the activity. Active travel is encouraged when both the children and their parents feel this is safe and fun. Adolescent girls are more likely to be active for the same reasons and also when they feel this is a good way to be or stay slim or when the activity is socially rewarding, and less likely to be active if they feel pressured to conform or compete, or fear harassment.[146]

6.3.2 Evaluation of evidence

Physical and psychological states shape patterns of diet, physical activity, and body composition, and also patterns of breastfeeding. These states, like other personal factors examined in this chapter, tend to be overlooked by researchers and need more attention. Policies and practices applied without consideration of the differences between populations or people are less likely to be effective. Programmes initiated by people themselves or by professionals may need first to address states such as lack of self-efficacy or poor self-image that impede healthy behaviour.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of one general option for possible action. This is consideration of physical, mental, and emotional states and their relationship with patterns of diet and physical activity.

6.3.2.1 Consideration of physical, mental, and emotional states and their relationship with patterns of diet and physical activity

Political feasibility and acceptability

Policy-makers may resist approaches that take people's personal natures into account, as being inherently more complicated and expensive. Good evidence that this is a more effective approach may be needed before it is accepted by those responsible for administering public money.

Potential impact

BENEFITS: Approaches that take people's personal characteristics and situations into account may be more effective.
HARMS: None except as mentioned below. (See Cost)

General acceptability

An implication is that those responsible for policies and programmes will be especially attentive to the nature of the people they work with. This may be more demanding for professionals, but is likely to be very acceptable to the people themselves.

Cost

If specially trained professionals are needed costs may be higher. This has to be balanced against the potential benefits.

Timeframe

Like other initiatives proposed in this Report, this is an indefinite strategy.

Transferability

Between countries and settings with comparatively good resources, this approach is transferable; less so, where financial, other material, and professional resources are scarce.

Physical and psychological states.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Consideration of physical, mental, and emotional states and their relationship with patterns of diet and physical activity		✔			✔	

6.4 Personal characteristics

Personal characteristics such as age, sex, height, and weight influence patterns of diet, physical activity, and body composition. A life course approach to health and well-being and to the control and prevention of disease, including cancer, takes into account the importance of the accumulated experience of life, as well as of factors that operate at key periods throughout the life course.

6.4.2 Summary of evidence

6.4.1.1 Patterns of diet

Age, sex, height, and weight all affect the amount of energy from food and drink that can be consumed while remaining in energy balance. Tall heavy young men who are active have much higher energy requirements than short light older women who are sedentary.[147]

Major life events such as leaving home, getting married, starting work, getting divorced, and bereavement all tend to alter patterns of diet. Older people are likely to find shopping and preparing and cooking meals more difficult, and they may be affected by illness or medication, or by social influences such as bereavement or isolation. In general, decreased function, such as that relating to taste, may reduce food intake.

6.4.1.2 Breastfeeding

In high-income countries, older mothers are more likely to breastfeed for longer periods of time.[81]

6.4.1.3 Overweight and obesity

Women on average have a greater proportion of body fat than men. In sedentary societies, overweight and obesity tend to increase until old age. Obesity tends to impede physical activity.

A review of cohort studies found that weight tends to increase as a result of pregnancy and menopause.[26] Evidence for life events such as marriage, divorce, and changes of work patterns is not clear.

6.4.1.4 Physical activity

Age, sex, and weight all influence levels of physical activity. Among populations whose occupations are typically sedentary, younger people and males are more likely to take part in recreational physical activity. Among populations whose occupations are usually or often physically demanding, women may be as active as men, in the fields or house. Obese people are less likely to be physically active. People tend to become less physically active as they become older or retired.

The SLR shows that young people, and boys and men, are more likely to take part in recreational physical activity than older people, or girls and women.[37 39 40 91–93 95] Among children and adolescents, engagement in physical activity declines through adolescence.[40] Another review found that young males are more active than young females, and that during adolescence, physical activity tends to decline with age.[138] (See box 6.9)

Box 6.9 The life course

A life course approach to promotion of health and well-being and control and prevention of disease including cancer is likely to prove effective. It can be applied by policy-makers at population level, by investigators concerned with, and health professionals who aim to improve, the health of groups of people, and by people themselves. (Also see chapter 2.8)

A life course approach takes into account the whole period of life, from conception (and preconception) to death (and on to the next generations). It pays special attention to times in life when particular actions may have lasting effects, and so when protection of health and prevention of disease is likely to be most effective.

With chronic diseases, and also nutritional deficiency and related infections, the very earliest period of life, from preconception to the age of 2 years, is particularly important. Being tall as an adult increases or probably increases the risk of some common cancers (but decreases risk of cardiovascular disease). Tallness is determined by various factors, some inherited and some affected by early life events that alter the rate and extent of growth. This does not mean that other times in life are not important. Prevention of disease and promotion of health is a lifelong process. This said, the seeds of many diseases including many common cancers are often sown very early in life.

Being physically active at a younger age does not appear to be a strong predictor of higher activity levels later in life. However, participating in sport increases other activity (especially in adolescent girls) and adolescents who are sedentary out of school are more likely to be inactive when at school. The WHO recommends that school-aged children should be moderately to vigorously physically active for at least 60 minutes per day.[148] Few achieve this target. Children who lead relatively inactive lives are likely to sustain these habits into adulthood.[149] (See box 6.10)

6.4.2 Evaluation of evidence

Personal characteristics are important determinants of diet and physical activity, and thus of the risk of overweight and obesity. This is notably so at key points in the life course, and in particular through childhood. The evidence shows that protection against chronic diseases including cancer, and promotion of well-being, best begins at the start of life. Policy-makers, investigators, health professionals, and people themselves will be more likely to succeed in maintaining healthy habits and changing unhealthy habits when they take these factors into account within a life course approach.

Taking the evidence all together, *the Panel has chosen* to consider evaluation of two options for possible action. The first, similar to the option chosen in the previous section, is consideration of the effects of age, sex, and size on patterns of diet and physical activity. The second is promotion of physical activity especially for children and young people.

Box 6.10 Getting fit in Mongolia

The Mongolian National Fitness Programme is designed to create a national physically active culture.[150] Initiatives at national, state, and local levels mostly target children and young people. A government-sponsored media campaign includes a weekly 20-minute exercise programme, local exercise programmes, and sports competitions.

The initiatives are delivered by the Ministry of Health in partnership with industry and civil society organisations. The government has developed a national strategic plan in line with the WHO Global Strategy on Diet, Physical Activity and Health.

6.4.2.1 Consideration of the effects of age, sex, and size on patterns of diet and physical activity

Political feasibility and acceptability
Public health analyses made by UN agencies and national governments in the past have tended to take a 'standard' approach, which has somewhat underplayed the significance of age, sex, and other personal differences within any population. More recent publications, including those concerned with recommendations on food and nutrition, physical activity, the control and prevention of obesity, and the control and prevention of chronic diseases including cancer, have paid more attention to their significance.

Potential impact
BENEFITS: Policies and programmes tailored to fit people at different stages of life and to take full account of sex, size, and other personal characteristics will be expected to have a greater impact.
HARMS: Policies and programmes need to maintain common themes in order not to become over-complicated. For example, nutrition labels that specified energy and nutrient requirements for males and females at different ages would be impossibly detailed.

General acceptability
Policies and programmes that allow for age, sex, and other personal characteristics will be more attractive. The life course approach to public health needs to be fully explained and communicated.

Cost
More detailed approaches may involve more resources.

Timeframe
This is an indefinite strategy. Adjusting current documents to take into account age and sex (and also physical and psychological states) will take some time.

Transferability
The strategy can be applied universally.

6.4.2.2 Promotion of physical activity especially for children and young people

Political feasibility and acceptability
The importance of physical activity for health especially for children is now generally accepted. Governments need to put classic public health programmes in place that will make it safe, easy, and enjoyable for children — and adults — to be physically active.

Potential impact
BENEFITS: Regular sustained moderate and vigorous physical activity protects against colon cancer and probably against postmenopausal breast and endometrial cancer. It also protects against overweight and obesity and thus the cancers of which these are causes. Overweight and obesity tend to track into adult life, which highlights the importance of concentrating on raising activity among children. Physically active children will have the best chance of becoming fit and active adults, with weights within the healthy range and better protected against cancer and other diseases.
HARMS: Children who lack access to physical activity facilities will lose out relative to others. Otherwise none, except cost.

Personal characteristics.
Level of confidence in evidence and potential impact of actions

	LEVEL OF CONFIDENCE IN EVIDENCE			POTENTIAL IMPACT OF ACTIONS		
	High	Medium	Low	High	Medium	Low
Consideration of the effects of age, sex and size on patterns of diet and physical activity		✔			✔	
Promotion of physical activity especially for children and young people		✔			✔	

General acceptability

In the school setting, taking into account the views of children and parents may increase the acceptability and hence the effectiveness of such interventions.[142 151] But to be fully effective, physical activity at school in the form of fitness training, recreation, and sport needs to be compulsory, as does learning about physical activity and its benefits. (See chapter 5.2)

Cost

A classic public health approach to increasing physical activity, with priority given to children, involves equipping all schools appropriately and reshaping built environments to make physical activity out of school safe, accessible, and enjoyable. The overall costs are likely to be high. Some costs may be shared with industry.

Timeframe

There are already many smaller and opportunistic initiatives in place. Others can readily be started. Major government-backed strategies involving substantial changes in schools will take a period of years to be fully operational.

Transferability

Any national programme of this type is transferable, with allowance for different circumstances such as climate and variation in nationally favoured sports.

6.5 Conclusions

People's ways of life are shaped by experience from early childhood in their families and by other close associations. It is consistently apparent from the evidence that people are more likely to eat and drink healthily, sustain physical activity, and control their weight, and that mothers are more likely to continue to breastfeed their children, when they act as family and group members, together or in support of one another.

Interventions are therefore more likely to be effective and sustained when they involve people as members of families, or involve friends, close-knit communities, and other groups such as clubs. Addressing people as individuals is less likely to be effective and less likely to have a sustained effect.

Knowledge of what constitutes healthy patterns of diet and physical activity, and of healthy body weight, can improve the efficacy of food labelling and other initiatives to alter diet and physical activity behaviour. Adequate knowledge, and information to provide it, are essential but, alone, may not lead to changes in behaviour. Attempts to reinforce or change behaviour are most likely to be effective and sustained when these are concerted and supported in the family and community, by health professionals, and by other actors including governments. Breastfeeding is most likely to be sustained when advice on its benefits begins to be given as early in pregnancy as possible.

Physical and psychological states shape patterns of diet, physical activity, and body composition, and also patterns of breastfeeding. Policies and practices applied without consideration of the differences between populations or people are less likely to be effective. Programmes initiated by people themselves or by professionals may need first to address states that impede healthy behaviour, such as lack of self-efficacy or poor self-image.

Policy-makers, investigators, and people themselves will also be more likely to succeed in maintaining healthy habits and changing unhealthy habits when they take into account the impact of characteristics such as age and sex, as well as relevant physical states. This is notably so at key points in the life course such as adolescence. Effective protection against chronic diseases including cancer, and promotion of well-being, begins at the start of life.

Comprehensive programmes designed to ensure that the rising generation enjoys healthy diets and becomes and remains physically active need to be given priority within public health programmes, on a level with those designed to ensure safe water and to reduce urban pollution.

Part 3

Recommendations

Introduction to Part 3

The prevention of cancer, at all levels from global to local, is one of the great public health challenges of the 21st century. The task is urgent, important, and achievable. It is part of the even greater task to prevent and control both communicable and noncommunicable disease, sustainably and equitably.

This Report is the culmination of six years of work involving hundreds of scientists and public health leaders. Responsibility for the Report and its judgements and recommendations rests with the panel of 23 scientists from all over the world, supported by observers from United Nations and other international agencies, listed at the front of the Report.

The recommendations in chapter 8 are guided by the principles in chapter 7. They derive from the evidence systematically collected first for the 2007 World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR) Diet and Cancer Report and then specifically for this Report, supplemented by additional evidence, as summarised and evaluated in Part 2. Allowance has also been made for gaps in the evidence. The evidence concerns the physical environmental, economic, social and personal determinants of patterns of diet, physical activity, body composition, and associated factors, and thus of cancer, within the terms of reference of this Report. These determinants will be expected also to affect risk of other chronic disease including diabetes and cardiovascular disease.

The recommendations are addressed to actors — those people who make decisions or policy in relevant areas, at all levels from United Nations agencies to families. The nine actors are not in an order of priority. They are all vital, and vary in relative importance depending on the issue. They are multinational bodies; civil society organisations; government; industry; the media; workplaces and institutions; schools; health and other professionals; and people – as members of communities and families as well as individuals.

Three points need emphasis. First, strategies to prevent cancer by means of food, nutrition, physical activity and associated factors, must be part of an overall strategy of prevention, treatment and control. This includes screening for and early detection of cancer, and also treatment and palliation. It also includes control and prevention of smoking and other exposure to tobacco, and of other carcinogenic agents such as infections, industrial pollution, and other factors. An overall strategy will also integrate control and prevention of cancer with that of obesity and of other major diseases, in ways that work globally, in high-income countries and also in parts of the world where there are no or limited resources for comprehensive treatment of chronic diseases including cancer.

Second, while it is essential to identify the opportunities and responsibilities of specific actors, effective policies and actions depend on all relevant actors working together. Isolated interventions rarely remain effective.

Third, public health policies and actions, like those recommended here, characteristically go beyond what health ministries and health professionals can do, and cannot be achieved simply by relying on people making wise personal choices. Ensuring healthy patterns of diet involves changes in agriculture and trade policies that determine food systems and supplies. Enabling safe and enjoyable day to day physical activity requires civil engineers and employers to construct and adapt cities, transportation systems, buildings

and offices, in ways that will improve public health. Family policies to prefer healthy food and drink are impeded by economic and commercial practices that have the effect of making processed food high in refined starches, sugar, fat or salt, and sugary drinks cheap, and sometimes artificially so.

The Panel's judgements recognise the urgent need for cancer prevention. The Panel has taken into account the impact of factors such as global population increase and ageing, economic globalisation, changes in the physical environment including climate change, and the rapid growth of cities on the overall context in which the recommended cancer prevention initiatives will be undertaken. The Panel has also taken into account the sharp increases in the cost and price of some staple food commodities, and the global economic downturn that began during 2008.

There is good reason for optimism. Cancer is mostly preventable as explained in the 2007 WCRF/AICR Diet and Cancer Report. The recommendations in chapter 8 are derived from the most methodical and comprehensive process yet attempted in this field. The Panel judges that they are those most likely, when made into policies and then enacted as programmes, to be most effective in the prevention of cancer.

They are also consistent with recommendations to prevent other chronic diseases. Many can begin to be enacted immediately. Privileged and well-informed people can to a large extent protect themselves by wise personal policies and choices. But almost all people require and deserve further protection from factors that are outside the control of individual choices. One of the prime responsibilities of governments is to promote public health as a public good, supported by civil society, industry, the media, those responsible for schools and workplaces, health and other professionals, and people as citizens. This Report is a call for them to act.

CHAPTER 7

Principles

The policy and action recommendations in the next chapter are governed and guided by the seven principles specified in this chapter. Like the recommendations themselves, the principles are all interdependent and mutually reinforcing and should be taken as a whole.

This report, the principles below, and the recommendations are concerned with food, nutrition, physical activity, body composition, associated factors, and the prevention of cancer.

The recommendations complement initiatives to reduce smoking which, with other uses of and exposure to tobacco, is the leading single avoidable cause of cancer.

Reliable conclusions derive from careful scrutiny of sound evidence. Evidence is a basis for judgements. These are a basis for recommendations, and are best guided by principles. The purpose of principles is to ensure that recommendations will, when enacted, be most appropriate, purposeful, and effective. Explicitly stated principles are part of a sound, transparent process.

7.1 Action is needed

Incidence and trends of cancer, and of obesity — a cause of a number of cancers — now amount to a global public health crisis. While there is more to be learned about the causes of cancer and of obesity, enough is known to justify policies and actions at all levels from international to personal.

In the high-income countries of Europe, North America, and elsewhere, chronic diseases have been the dominant causes of mortality for over half a century. Now incidence of and mortality from chronic diseases are dominant throughout the world, including Asia, Latin America, and much of Africa. Cardiovascular diseases are generally most common, followed by cancer. The greatly increased rates of serious chronic diseases needs increased recognition and action.

Prevention of cancer needs to be given high priority. One reason is that most countries do not and will not have the financial, professional, and other resources for population-wide screening, medical and surgical treatment, and palliative care.

The burden of cancer is increasing throughout the world. The main reasons are an increasing and ageing population. In some countries another reason is an increase in smoking. Also, current trends in patterns of diet, physical activity, and body composition, as shown in chapter 2 of this Report, are leading to shifts in the patterns of cancer. Populations have become increasingly sedentary and increasingly fat. With some exceptions, there is little sign that these trends are slowing, let alone reversing. Indeed, overweight and obesity have now become the norm in many countries, and the increase of overweight in childhood and early life, now apparently relentless, is likely to increase the incidence of some cancers later in life.

Since the 1980s, production and consumption of 'fast' and other processed foods, convenience foods, and sugared

drinks have increased phenomenally in most countries, as have physically inactive ways of life and rates of overweight and obesity. These factors, separately and collectively, increase the risk of a number of cancers and of other serious chronic diseases.

This Report confirms the view of many health professionals, and of many policy-makers and decision-takers in government, industry, civil society organisations, and the media, which is that the linked global changes in food systems and dietary patterns, and increases in sedentary ways of life, and in overweight and obesity amount to a global public health crisis. One contribution of this Report is to place the global increases in incidence of common cancers within this big picture.

Several nutritional and other biological factors are convincing or probable causes of cancer. These justify public health goals and personal recommendations, as shown in the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report. The chapters in Part 2 of this Report address the evidence that economic, social, and environmental factors are determinants of patterns of diet, physical activity, body composition, and associated factors that affect the risk of cancer. The evidence summarised in Part 2 is drawn from a great range of sources and though inevitably incomplete, is a sufficient and reliable basis for the policies and actions set out in the recommendations made in the next chapter.

7.2 The public health approach

Public health is a public good, requiring protection that needs leadership and concerted and determined action across many sectors taken at all levels. Citizens have a right to expect that decisions determining availability of foods and drinks and opportunities for physical activity in any societal sector are taken with public health as a top priority.

Patterns of diet and physical activity, and general ways of life, are shaped by physical environmental, economic, and social as well as personal factors. Enabling environments increase the likelihood of positive health, and also protect against disease.

Maintenance and improvement of public health is the responsibility of all sectors of society. Governments, one of whose tasks is to act in the public interest, have a responsibility to protect and promote public health, for instance by legal, fiscal, or regulatory measures. This is well recognised in many areas involving public protection, such as food contamination and adulteration, controls on the use of guns, drugs, and tobacco, and the availability and pricing of alcoholic drinks. The obligation to use seatbelts and the prohibition of smoking in public places, initially thought by some to be intolerable interferences with personal liberty, are now generally respected and appreciated.

All this is part of what is meant by public health being a public good. Policies and actions designed to improve and protect public health also need to be equitable, and to make careful use of financial, human, living, and physical resources.

Freedom of personal choice is important as a reality and as an aspiration. Advice offered to people as individuals is important and valuable, but to be fully effective needs to be part of a wider set of actions. People of higher income and education status are generally more inclined and able to respond to personal advice, so national plans that rely only on information and education programmes may widen social inequities. Effective programmes provide people with the information they need, the education, resources, and opportunities to use it, and a sense of empowerment to be able to implement the advice.

In recent decades an ideology based on the concept of the supremacy of the individual and of individual choice has become dominant in high-income and also most other countries. According to this theory, market operations offer people options — some healthy, some unhealthy — which they are free to select, and the responsibility of the state should usually be confined to offering sound advice on healthy choices. Failing any demonstration of imperative need, this is generally the public policy option preferred in recent years by governments and supported by industry and much of the media. However, the perception that people's choices are free is often mistaken. People's choices are usually constrained, limited, or heavily influenced by external factors including historical and cultural background.

There is a clear imperative to apply the classic public health approach to the prevention of cancer in relation to foods and drinks, physical activity, and body composition. As happened for smoking, the time has come for all sectors of society to work together to prevent cancer. People are best seen not just as individual consumers of foods and drinks,

goods and services, but also as actors themselves — citizens who can influence the practices in their own families and communities, and who can also affect the policies of governments, industry, employers, and other actors.

7.3 All actors to work in concert

To be effective, policies, programmes, and actions designed to prevent cancer among populations, by whatever means and whether at international or local level, need to ensure that all relevant actors are partners in the planning and enactment of policies.

The recommendations target all relevant actors:

Multinational bodies
Civil society organisations
Government
Industry
Media
Schools
Workplaces and other institutions
Health and other professionals
People

The actors are the policy-makers and decision-takers working within these groups, and people, acting as members of communities and families as well as individuals. The range of these groups reflects the scope of public health policy.

Of these, the international public and private sectors, including institutions and industries now operating globally, have since the 1980s become increasingly powerful. Their challenge is to give the necessary priority to the promotion of health and protection against disease, including prevention of cancer.

Policies and actions designed to improve public health are sometimes thought to be uniformly against commercial interests. Sometimes this may be so, but there is no reason to accept this as a general rule. Indeed, enhanced awareness of the value of healthy diets is likely to encourage people with adequate resources to spend more time and money on foods and drinks. Programmes and practices designed to improve public health are also liable to be electorally popular, especially now that overweight, obesity, and related disorders and diseases have become so common among young people, including children.

The nine actors have different natures and responsibilities, and one actor may take the lead in any initiative. For example, government needs to take the lead in any initiative involving legislation, and manufacturers, retailers, and caterers have the most direct responsibility for the formulation and reformulation of processed meals, snacks, foods, and drinks. Above all, what is now needed is action integrated across all sectors. The success of substantial public health initiatives depends on actors working together as partners.

7.4 Prevention over the life course

The recommendations are designed as the basis of programmes and practices throughout the course of life, with special emphasis given to actions that protect the short- and long-term health of children, young women, and mothers, as well as adults generally.

Until recently, most expert reports concerned with the prevention of chronic diseases have tended to give most attention to the times in life when disease is mostly likely to be diagnosed. From the point of view of prevention, this time is late.

Cancer can be prevented at all stages of life, sometimes even after the processes that lead to cancer have begun. There is impressive evidence concerning the natural history of the cancer process, from animal experiments and other mechanistic studies and from epidemiology, showing that fetal, infant, and young child nutrition, and also body fatness and physical inactivity from infancy onwards, are important determinants of susceptibility to cancer in later life. This points to the need for interventions and actions not only in adult life but as early in life as possible including before birth and in childhood, as well as throughout life.

Taking action to prevent cancer, and also to reduce the risk of recurrence of cancer, is always worthwhile, personally and as an example to family, friends, and colleagues. Effective programmes to prevent cancer are likely to be addressed to children, young women, and mothers, as well as the more traditionally recognised at-risk groups and adults in general.

7.5 Cancer in context

Recommendations of all types designed to prevent cancer will be most effective when they are integrated with those designed to prevent obesity, other chronic diseases, and other diseases with broadly similar causes.

The Panel's responsibility has been to agree recommendations for public policies and actions most likely to help fulfil the public health goals specified in the 2007 WCRF/AICR Diet and Cancer Report, which when followed will help to prevent cancer.

The recommendations in both Reports have been developed to harmonise with recommendations for the prevention of other diseases, the risks of which are modified by factors similar to those that affect the risk of cancer. These include other chronic diseases. It is good public health policy to aim to prevent diseases with causes in common all together.

Such integrated approaches imply alliances of actors, which should avoid wasteful and frustrating rivalry and competition for resources and media coverage, and instead pool resources and establish common programmes.

7.6 Aspiration and achievement

Effective recommendations combine a number of qualities. Those specified in this Report are designed to be positive, challenging but feasible, and sustainable and equitable.

Wherever possible, the recommendations are framed positively. This approach has special importance for cancer. It is commonly supposed that environmental and other external factors that modify the risk of cancer only *increase* this risk. This perception, formed from knowledge of the effects of radiation, smoking, and other carcinogens, is understandable. However, the science shows that cancer cannot simply be ascribed to exposure to carcinogens, but is also affected by the interplay of various protective and adverse exposures operating at different times of life.

The most appropriate and effective approach to the prevention of cancer by food and nutrition, physical activity, and associated factors is positive. This implies stressing the protective effect of the dietary and physical activity patterns and ranges of body weight recommended in the 2007 WCRF/AICR Diet and Cancer Report.

Some of the recommendations are challenging. Given collaboration between all actors, they are feasible. The recommendations recognise major economic, social, and environmental changes increasingly affecting the health and well-being of the human species and the living and physical world. These include population growth, climate change, environmental degradation, and shifts in food systems and prices, and increasing scarcity of energy and water, and foods such as fish. More recent challenges include the global rise in the prices of staple food commodities, and the global economic recession that began in 2008. The recommendations are designed to be the basis for interventions and actions that are sustainable economically, socially, environmentally, and in other ways and that will promote more equitable societies.

7.7 Strategic action

Cancers often take a long time to become apparent. The processes by which public policies are agreed, enacted, and take effect also take a long time. Policymakers and opinion-formers need to set goals and specify expectations that are long term and realistic.

Experience with the control of tobacco and other major public policy initiatives has shown that the development of interventions and other policies and actions, and their implementation, often take full effect only over an extended period of time. Some of the recommendations made in this Report can immediately become the basis of programmes and actions. Most of them will take a number of years and even decades to have their full effect. This strategic approach recognises that agreement on the need to protect and promote public health, and on the most appropriate approaches and the reallocation of human and material resources to implement them, will often take time.

Likewise, most adult cancers typically take many years, even decades, to develop from initial mutation to clinical diagnosis. While interventions designed to prevent cancer may sometimes show effects relatively quickly, it is prudent to expect that the implementation of policies that engender societal change and then reduce cancer risk might take several years or even decades.

A strategic approach is also needed to monitoring and evaluating programmes and actions. Policy planners need to work in the medium and long term and not raise unrealistic expectations of quick successes. With cancer, as with some other diseases, early life experience is an important factor determining lifetime susceptibility. Changes in policy that affect the health of mothers and children may not show their full effects for decades, or even two or three generations.

CHAPTER 8

Policies and actions

The prevention of cancer worldwide is an urgent and feasible task of great importance. It requires concerted and integrated international, national, and local action. As shown in the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report, food, nutrition, and physical activity are major determinants of cancer risk.

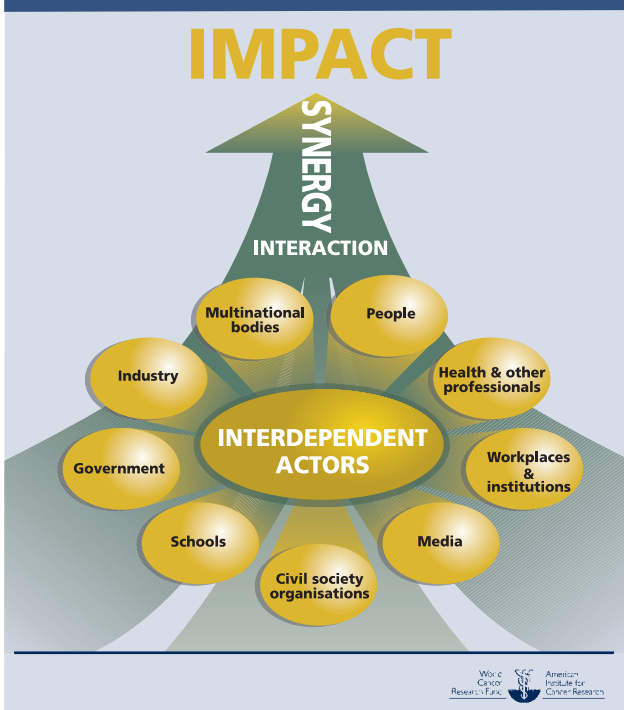
This final chapter specifies recommendations for policies and actions that will reduce the burden of cancer and also other chronic diseases. The recommendations are arranged in a common format. Individually and collectively they are designed to prevent cancer at all levels from personal to global. They are directed at policy-makers and decision-takers in nine fields here identified as 'actors'. These are multinational bodies, civil society organisations, government, industry, media, schools, workplaces and institutions, health and other professionals, and people as members of communities and families and as individuals. All these actors have the responsibility to make decisions with a view to their impact on public health, including cancer prevention. Public health is everybody's business.

Each recommendation does not stand alone; all depend to some extent on action being taken elsewhere. In some cases one action depends on another; in others the benefit from two or more actions will be greater than the sum of them separately — this is to say 'synergistic'. The greatest benefit will come from coordinated action by all actors.

The recommendations are realistic. While some are challenging, all are important. They all have a global perspective, and many can be made more pointed when adapted to national and local needs and circumstances.

Several of the recommendations have common themes. One is the need for governments and through them multinational bodies to take the lead in improvement of public health, including the prevention of cancer, obesity, and other diseases. Conversely, there is a need for all actors to accept responsibility to act in ways that protect and promote public health.

Figure 8.1
The nine actors: impact of concerted action



Achieving healthy patterns of diet and sustained physical activity requires concerted and integrated action from all sectors of society. The recommendations in this chapter are directed at nine actors. The impact of policies and actions depends on successful interactions between all the actors. Each recommendation does not stand alone; all depend to some extent on action being taken elsewhere. In some cases one action depends on another; in others the benefit from two or more actions will be greater than the sum of them separately – this is to say 'synergistic'.

Major successful national and international public health initiatives, including in areas other than those covered in this report, are guides to policies and actions that will prevent cancer. There is a common feature of initiatives that have improved air and water quality and traffic safety, that have reduced smoking, and — within the scope of this Report — that have reduced alcohol consumption and increased rates of breastfeeding. As figure 8.1 shows, this common feature is concerted action, often initiated by civil society and professional organisations working in the public interest, led by governments and through them multinational bodies, with the support of the actors specified in this chapter.

The recommendations themselves generally derive from the evidence summarised and evaluated in chapters 3 to 6, corresponding to the physical environmental, economic, social, and personal dimensions that determine patterns of diet, physical activity, and body composition (see figure 1.1).

Table 8.1, on the following two pages, is designed to show how the evidence summarised and evaluated in chapters 3 to 6 — the basis for the policy and action options in those chapters — in turn lead to the recommendations made in this chapter, and how these recommendations in their turn contribute to the achievement of the recommendations in the 2007 WCRF/AICR Diet and Cancer Report. Those recommendations are one example of guides to healthy patterns of diet and physical activity issued by authoritative national and international bodies. (See box 8.1)

Box 8.1 Authoritative guidance on public health and on healthy patterns of food, nutrition, and physical activity

Recommended guides to protection of public health and well-being, to healthy diets and meals and physical activity, and for prevention of chronic diseases are issued by relevant United Nations (UN) specialist agencies, national governments, and other authorities. In the context of this Report, the recommended guide for the prevention of cancer by healthy diets, sustained physical activity, weight control, and associated factors is the 2007 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report.

Table 8.1 (overleaf) Policy and action: from evidence to options to recommendations

The double-page table overleaf shows the progression from the evidence gathered and evaluated in chapters 3 to 6, to the evaluation of the evidence and the policy and action options listed in those chapters, to the recommendations specified and explained in this chapter.

The broad left hand column lists all the recommendations that follow in this chapter. The next seven columns are headed by recommendations from the 2007 WCRF/AICR Diet and Cancer Report (also see chapter 2.7).

Where the intersecting cells show a colour coded number, this indicates a policy recommendation in the left hand column that will contribute to the achievement of a specific recommendation from the 2007 WCRF/AICR Diet and Cancer Report. The numbers in these cells correspond to the sections of chapters 3 to 6 of this Report in which the relevant evidence is evaluated. The key is a colour coded list of the policy and action options in:

Chapter 3 The physical environmental dimension
Chapter 4 The economic dimension
Chapter 5 The social dimension
Chapter 6 The personal dimension.

In this way the progression from evidence to policy action options in chapters 3 to 6 and to the recommendations in this chapter can be tracked, as well as how they can contribute to the prevention of cancer.

Table 8.1 Policy and action. From evidence to options to recommendations

(See previous page for legend)

	2007 WCRF/AICR DIET AND CANCER REPORT RECOMMENDATIONS						
	Body fatness, physical activity, foods and drinks that promote weight gain	Plant foods	Animal foods	Alcoholic drinks	Salt	Aflatoxin, arsenic	Breast-feeding
MULTINATIONAL BODIES							
All multinational bodies: Build the protection and maintenance of public health into all relevant agriculture, food, health, economic, trade, environmental and other agreements	1.2.1, 1.2.2, 4.2.1	1.2.1 1.2.1, 1.2.2, 2.2.1, 4.2.1	1.2.1 1.2.1, 1.2.2, 2.2.1, 4.2.1	1.2.1, 1.2.2, 4.2.1	1.2.1, 1.2.2, 4.2.1	1.2.1 1.2.2, 2.2.3, 1.2.1, 4.2.1	4.2.1
UN bodies: Work together to ensure integrated policies among all relevant agencies	1.2.1, 1.2.2, 4.2.1	1.2.1 1.2.1, 1.2.2, 2.2.1, 4.2.1	1.2.1 1.2.1, 1.2.2, 2.2.1, 4.2.1	1.2.1, 1.2.2, 4.2.1	1.2.1, 1.2.2, 4.2.1	1.2.1 1.2.2, 2.2.3, 1.2.1, 4.2.1	4.2.1, 4.2.2
CIVIL SOCIETY ORGANISATIONS							
All civil society organisations: Create, develop, and press governments and other actors to implement effective policies and programmes for nutrition and physical activity	5.2.1	5.2.1	5.2.1	5.2.1	5.2.1	5.2.1	5.2.1
Civil society organisations concerned with public health: Hold other actors to account regarding their policies and actions on food, nutrition, and physical activity, including the prevention of cancer	5.2.1	5.2.1	5.2.1	5.2.1	5.2.1	5.2.1	5.2.1
Civil society organisations concerned with public health: Mobilise the media and public opinion in support of improved public health, including healthy nutrition, sustained physical activity, and the prevention of cancer	5.2.1, 5.2.2, 1.2.4	5.2.1, 5.2.2, 1.2.4	5.2.1, 5.2.2, 1.2.4	5.2.1, 5.2.2, 1.2.4	5.2.1, 5.2.2, 1.2.4	5.2.1, 5.2.2, 1.2.4	5.2.1, 5.2.2, 1.2.4
Civil society organisations concerned with public health: Form alliances with associated civil society organisations including those concerned with public policy, justice, equity, and environmental protection	1.2.1, 5.2.1	1.2.1, 5.2.1	1.2.1, 5.2.1	1.2.1, 5.2.1	1.2.1, 5.2.1		1.2.1, 5.2.1
Civil society organisations concerned with public health: Advocate traditional cultures and ways of life when these generate healthy, diverse, and sustainable dietary patterns and regular physical activity	1.2.2	1.2.2	1.2.2	1.2.2	1.2.2	1.2.2	1.2.2
GOVERNMENT							
Examine, audit, and revise legislation and regulations so that they protect public health and prevent disease, including cancer	4.2.2, 4.2.3, 1.2.2, 4.2.1, 4.2.2, 4.2.3	1.2.2, 4.2.1 4.2.2, 4.2.3 2.2.1	1.2.2, 4.2.1 4.2.2, 4.2.3	1.2.2, 4.2.1 4.2.2, 4.2.3 2.2.3	1.2.2, 4.2.1 4.2.2, 4.2.3	1.2.2, 4.2.1 4.2.2, 4.2.3	1.2.2, 1.2.3, 4.2.1, 4.2.2, 4.2.3
Ensure that built and external environments are designed and maintained in ways that facilitate physical activity and other healthy behaviour	4.2.2, 4.2.3	3.2.2				1.2.2	4.2.1
Encourage safe, nutrient-dense, and relatively unprocessed foods and drinks, and discourage sugary and alcoholic drinks and 'fast' and other processed foods	2.2.1, 2.2.2, 3.2.3	2.2.1, 2.2.1	2.2.2, 2.2.1, 2.2.2	2.2.2, 2.2.3	2.2.2	1.2.2, 2.2.3	
Require schools to provide meals to high nutritional standards, and facilities for recreation and sport, and to include nutrition and physical activity in core curricula	3.2.3, 2.2.1, 2.2.2, 2.2.3, 4.2.2	2.2.1, 2.2.2, 2.2.3, 4.2.2	2.2.1, 2.2.2, 2.2.3, 4.2.2	2.2.1, 2.2.2, 2.2.3, 4.2.2	2.2.1, 2.2.2, 2.2.3, 4.2.2	2.2.1, 2.2.2, 2.2.3, 4.2.2	2.2.1
Require all government and publicly funded facilities that provide catering to ensure that their meals, foods, and drinks are of high nutritional quality	3.2.3, 2.2.4	2.2.4	2.2.4	2.2.4	2.2.4	2.2.4	2.2.4
Require increased and widespread dedicated walking and cycling facilities throughout the built and external environment	4.2.2, 4.2.3						
Restrict advertising and marketing of 'fast' and other processed foods and of sugary drinks to children, on television and in other media and in supermarkets	3.2.2, 4.2.1						
Incorporate United Nations recommendations on breastfeeding into law or appropriate public health and consumer protection rules							4.2.2, 1.2.3, 2.2.2
Give greater priority to research on, and programmes to improve, public health, including the prevention of cancer and other diseases	2.2.4, 4.2.3	2.2.4, 4.2.3	2.2.4, 4.2.3	2.2.4, 4.2.3	2.2.4, 4.2.3	2.2.4, 4.2.3	2.2.4, 4.2.3
Establish and maintain publicly funded information and education on, and surveillance of, food, nutrition, and physical activity status	4.2.3	4.2.3	4.2.3	4.2.3	4.2.3	4.2.3	4.2.3
Ensure that international food trade and aid sustains future health as well as the immediate relief of populations in recipient countries	1.2.1	1.2.1	1.2.1	1.2.1	1.2.1	1.2.1	
INDUSTRY							
Built environment industries: Plan, commission, construct, and operate all built environments so as to protect public health and facilitate physical activity	3.2.1, 4.2.2, 4.2.3	3.2.1				1.2.2	4.2.1
Food and drink industries: Make public health an explicit priority in all stages of food systems including product research, development, formulation and reformulation, and promotion	2.2.2, 3.2.1, 3.2.2, 3.2.3, 4.2.1,		2.2.2, 3.2.1, 3.2.2, 4.2.1	3.2.3	3.2.1, 3.2.2, 3.2.3, 4.2.1		4.2.2
Food and drink industries: Ensure that healthy meals, snacks, foods, and drinks are competitively priced compared with other products	2.2.1, 2.2.2	2.2.1, 2.2.2	2.2.1, 2.2.2	2.2.3	2.2.1, 2.2.2		
Food and drink industries: Collaborate in order to stop advertising, promotion, and easy availability of sugary drinks and unhealthy foods to children	4.2.1	3.2.2	4.2.1		4.2.1		
Food and drink industries: Ensure that marketing and promotion of breastmilk substitutes and complementary foods follow the terms of UN codes and strategies on infant and young child feeding							4.2.2

Key: entries are references to the policy and action options in Part 2.

CHAPTER 3. THE PHYSICAL ENVIRONMENTAL DIMENSION

Climate and terrain
- 1.2.1 Modelling and monitoring impact of climate change on food systems
- 1.2.2 Prevention of arsenic contamination

Food production
- 2.2.1 Encouragement of smallholdings and home farms and gardens
- 2.2.2 Improvement in methods of animal production
- 2.2.3 Prevention of aflatoxin contamination

Retail and catering environments
- 3.2.1 Increased access to supermarkets
- 3.2.2 Priority given to the display of healthy foods and drinks in retail and catering outlets

Planning and transport
- 4.2.1 Making breastfeeding accepted and pleasant for the mother within built environments
- 4.2.2 Increase in freely accessible parks and leisure, play, and sports areas
- 4.2.3 Creation and revival of active transportation systems

CHAPTER 4. THE ECONOMIC DIMENSION

Economic globalisation
- 1.2.1 Use of global food trade rules to improve public health
- 1.2.2 Monitoring the impact of economic globalisation on food systems and chronic diseases including cancer

Availability and price
- 2.2.1 Removal of agricultural and other subsidies that damage public health
- 2.2.2 Imposition or increase of taxes and other disincentives on unhealthy foods and drinks, and on private vehicles
- 2.2.3 Increase in cost and restriction of availablilty of alcoholic drinks
- 2.2.4 Financial and other support for local authorities, employers, and health professionals who promote or prescribe healthy diets and physical activity

Food and drink processing
- 3.2.1 Reformulation of processed meals, dishes, snacks, and foods and drinks to contain less sugar, refined starches, fat, and salt
- 3.2.2 Introduction or strengthening of standard uniform explicit systems of nutrition labelling
- 3.2.3 Reduction of portion sizes of processed meals, dishes and snacks, and foods and drinks

Product advertising and marketing
- 4.2.1 Restriction or prohibition of advertising and marketing of unhealthy processed foods to children
- 4.2.2 Stricter controls on advertising and marketing of infant formula and weaning foods
- 4.2.3 Promotion and marketing of healthy ways of life

Income status, equity
- 5.2.1 Reduction of absolute poverty and of income inequities, in all societies

	2007 WCRF/AICR DIET AND CANCER REPORT RECOMMENDATIONS						
	Body fatness, physical activity, foods and drinks that promote weight gain	**Plant foods**	**Animal foods**	**Alcoholic drinks**	**Salt**	**Aflatoxin, arsenic**	**Breast-feeding**
Food and drink industries: Ensure accuracy, uniformity, and availability of product information in all advertising and promotion and on food labels	3.2.2	3.2.2, 3.2.2	3.2.2	3.2.2	3.2.2	3.2.2	3.2.2
Physical activity industry: Promote goods and services that encourage participation in physical activity by people of all ages, rather than in competitive or elite sporting performance	4.2.3, 4.2.2						
Entertainment and leisure industry: Give higher priority to entertainment products and services that enable everybody, especially children and young people, to be physically active	4.2.3, 4.2.2						
MEDIA							
All media: Emphasise news, features, and campaigns designed to promote public health and to prevent cancer, and put health coverage in context	4.2.3, 4.2.2	4.2.3	4.2.3	4.2.3	4.2.3	4.2.3	4.2.3, 1.2.3
All media: Give executives resources and authority to ensure that their writers and editors have, or know how to access, expertise in public health	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1		2.2.1, 2.2.2
All media: Distinguish between news and editorial coverage, and advertisements and other commercially sponsored material	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1		2.2.1, 2.2.2
Advertising and publicity media: Advise clients against campaigns that make misleading or unsubstantiated claims, or that promote unhealthy diets, physical inactivity, or overweight and obesity	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1		2.2.1, 2.2.2
SCHOOLS							
Provide healthy daily meals for all staff and pupils, together with facilities for active recreation, activity and sports	3.2.3, 2.2.2, 2.2.3 4.2.2	2.2.2, 2.2.3	2.2.2		2.2.2, 2.2.3	2.2.2, 2.2.3	
Incorporate food and nutrition (including food preparation and cooking skills) and physical education into the mandatory core curriculum	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1
Ensure that teaching materials are independently originated and free from commercial bias	2.2.1	2.2.1	2.2.1	2.2.1	2.2.1		2.2.1, 2.2.2
Do not allow vending machines that offer snacks high in sugar, fat or salt, or sugary drinks and withdraw such 'fast' foods and drinks from school canteens	2.2.2, 2.2.3	2.2.2, 2.2.3	2.2.2, 2.2.3		2.2.2, 2.2.3		
WORKPLACES AND INSTITUTIONS							
Workplaces and institutions: Use price and other incentives to encourage healthy eating and active commuting, and to discourage motorised transport	2.2.3, 2.2.4	2.2.3, 2.2.4	2.2.3, 2.2.4		2.2.3, 2.2.4		2.2.4
Workplaces and institutions: Ensure that physical environments are designed or adapted and maintained to facilitate physical activity and weight control	3.2.2, 2.2.4	3.2.2, 2.2.4	3.2.2, 2.2.4		3.2.2, 2.2.4		
Workplaces and institutions: Encourage sustained breastfeeding with supportive environments and employment contracts, and access to childcare							4.2.1, 2.2.4
Workplaces and institutions: Do not allow vending machines that offer snacks high in sugar, fat or salt, or sugary drinks, and withdraw such 'fast' foods and drinks from canteens	2.2.3		2.2.3		2.2.3		
Institutions: Provide healthy meals, facilities for physical activity, and access to advice on nutrition, fitness, weight control, and disease prevention	3.2.3, 2.2.3, 2.2.4	2.2.4	2.2.3, 2.2.4		2.2.3, 2.2.4		2.2.4
HEALTH AND OTHER PROFESSIONALS							
All professionals: Include food, nutrition, physical activity, and cancer prevention in core professional training and continuing development	4.2.2, 4.2.3, 2.2.4, 2.2.3, 2.2.4, 2.2.1	2.2.4, 2.2.3, 2.2.4, 2.2.1	2.2.4, 2.2.3, 2.2.4, 2.2.1	2.2.4, 2.2.3, 2.2.4, 2.2.1	2.2.4, 2.2.3, 2.2.4, 2.2.1		4.2.1, 2.2.4, 2.2.1, 2.2.2
All professionals: Work with other disciplines to help understand how to improve public health, including cancer prevention, through food, nutrition, and physical activity	4.2.2, 4.2.3						4.2.1, 2.2.2
Health professionals: Prioritise public health including cancer prevention, and food, nutrition, and physical activity, in core training, practice, and professional development	2.2.1, 3.2.1, 4.2.1, 4.2.2	2.2.1, 3.2.1, 4.2.1	2.2.1, 3.2.1, 4.2.1	2.2.1, 3.2.1, 4.2.1	2.2.1, 3.2.1, 4.2.1	2.2.1,	2.2.1, 2.2.2, 3.2.1, 4.2.1
Health professionals: Take a lead in educating and working with colleagues, other professionals, and other actors to improve public health including cancer prevention	4.2.3, 2.2.1, 4.2.2	4.2.3, 2.2.1	4.2.3, 2.2.1	4.2.3, 2.2.1	4.2.3, 2.2.1	4.2.3, 2.2.1	1.2.3, 4.2.3, 2.2.1
Health professionals: Involve people as family and community members, and take account of their personal characteristics in all types of professional practice	5.2.2, 2.2.1, 3.2.1, 4.2.1	5.2.2, 2.2.1, 3.2.1, 4.2.1	5.2.2, 2.2.1 3.2.1, 4.2.1	5.2.2, 2.2.1 3.2.1, 4.2.1	5.2.2, 2.2.1 3.2.1, 4.2.1	5.2.2, 2.2.1 3.2.1, 4.2.1	5.2.2, 1.2.2, 2.2.1 3.2.1, 4.2.1
PEOPLE							
Support organisations and initiatives whose purpose is to improve public and personal health and to prevent chronic diseases including cancer	5.2.1, 1.2.4	5.2.1, 1.2.4	5.2.1, 1.2.4	5.2.1, 1.2.4	5.2.1, 1.2.4	5.2.1, 1.2.4	5.2.1, 1.2.4
Develop policies and set examples within the household and community to enable healthy eating, sustained physical activity, and weight control	1.2.1, 1.2.3, 4.2.2	1.2.1, 1.2.3	1.2.1, 1.2.3	1.2.1, 1.2.3	1.2.1, 1.2.3	1.2.1, 1.2.3	1.2.2
Ensure that personal, household, family, and community good health and protection against disease are priorities when making major decisions	1.2.3, 1.2.4, 2.2.1, 3.2.1, 4.2.1, 4.2.2	1.2.1, 1.2.4, 2.2.1, 3.2.1, 4.2.1,	1.2.1, 1.2.4, 2.2.1, 3.2.1, 4.2.1,	1.2.1, 1.2.4, 2.2.1, 3.2.1, 4.2.1,	1.2.1, 1.2.4, 2.2.1, 3.2.1, 4.2.1,		1.2.2, 1.2.4, 2.2.1 2.2.2, 3.2.1, 4.2.1
Use independent nutrition guides, food labels and other reliable information when planning household supplies and purchasing food and drink	3.2.2	3.2.2	3.2.2	3.2.2	3.2.2		

CHAPTER 5. THE SOCIAL DIMENSION

Ethnicity and culture
- 1.2.1 Examination of the impact of ethnic, cultural, and other values on patterns of diet, body fatness, and physical activity
- 1.2.2 Maintenance of the healthy aspects of traditional ways of life
- 1.2.3 Promotion of the culture of breastfeeding

School and work
- 2.2.1 Introduction or strengthening of academic and practical nutrition and physical activity in school curricula
- 2.2.2 Introduction or maintenance of nutrition standards for school meals
- 2.2.3 Restriction of access to unhealthy foods, drinks, and snacks in schools, other institutions, and workplaces
- 2.2.4 Encouragement of healthy eating and regular physical activity and facilities for breastfeeding in workplaces

Social status and equity
- 3.2.1 Reduction of social inequities

Multinational bodies and governments
- 4.2.1 Legislation to protect and improve population nutrition and physical activity, control obesity, and thus prevent cancer
- 4.2.2 Regulations of policies on food, nutrition, and physical activity in school and other institutions
- 4.2.3 Information and education campaigns backed by legislation and voluntary codes

Civil society
- 5.2.1 Advocacy and pressure to encourage governments, industry, employers, and other actors to improve public health
- 5.2.2 Interventions in the community, schools, and workplaces

CHAPTER 6. THE PERSONAL DIMENSION

Individuals, families, and communities
- 1.2.1 Encouragement of regular preparation and cooking of meals
- 1.2.2 Inclusion of partners and other family members in breastfeeding support
- 1.2.3 Building regular physical activity into everyday life
- 1.2.4 Support of relevant civil society organisations

Knowledge, attitudes, and beliefs
- 2.2.1 Promotion of interventions that include support from knowledgeable family members
- 2.2.2 Promotion of the value of breastfeeding, particularly early in pregnancy

Physical and psychological states
- 3.2.1 Consideration of physical, mental, and emotional states and their relationship with patterns of diet and physical activity

Personal characteristics
- 4.2.1 Consideration of the effects of age, sex, and size on patterns of diet and physical activity
- 4.2.2 Promotion of physical activity especially for children and young people

When a large amount of consistent evidence clearly leads to a policy and action option, which in turn generates a recommendation, the progression to policy and action options and then to recommendations is clear. As one example, the recommendation that governments encourage safe, nutrient-dense, and relatively unprocessed foods and drinks and discourage sugary and alcoholic drinks, 'fast food', and other processed foods is supported by a wealth of evidence.

However, there are several areas where direct evidence in the conventional sense is lacking. On such occasions the Panel has made recommendations supported by its collective experience and judgement as well as the evidence. An example is the recommendation that all relevant professionals, with their representative bodies, include food, nutrition, physical activity, and cancer prevention in core professional training and continuing development. When city and transport designers, engineers, and architects, as well as health professionals, have the protection of public health built into their training and practice, great benefits will follow over time.

Many of the recommendations address public health in general. This is because prevention of cancer, and specifically the fulfilment of the recommendations made in the 2007 WCRF/AICR Diet and Cancer Report, will have the effect of reducing not only cancer, but also other chronic diseases. Their implementation needs to be an integral part of a broad public health strategy.

Worldwide prevention of cancer depends on knowledge of its causes. Prevention also requires actions that address all the main factors that modify the risk of cancer. These need to be integrated with policies and actions designed to control and reduce smoking and other use of and exposure to tobacco. Infection and infestation are also important causes of some cancers, often in association with dietary and associated factors, just as cigarette smoking has a synergistic effect on the risk of cancers of the oral cavity and upper digestive tract among consumers of alcoholic drinks. The most effective and valuable prevention programmes are those that are fully integrated.

Similar to cessation of smoking and other use of and exposure to tobacco, around one third of the commonest cancers are preventable by following the recommendations of the 2007 WCRF/AICR Diet and Cancer Report. The new estimates of the preventability of colorectal, breast, and other common cancers, specially commissioned and summarised in chapter 2, are a further spur to action.

Cancer cannot be prevented merely by a series of personal decisions. The environmental, social, and economic pressures summarised in Part 2 that impede healthy choices, that make food supplies more processed and high in sugar and fat, that lead to increases in portion and serving sizes, and that make people more sedentary, and therefore increase overweight and obesity throughout the world, need to be recognised and countered in the public interest. This implies policies and actions at all levels, on the scale of those that improved public health in Europe beginning in the mid-19th century.

Information and education designed to encourage wise personal choices are essential. Although by themselves they are often insufficient to change behaviour, they are vital as part of a greater whole. As one example, knowledge that increasing physical activity can enhance enjoyment of life and protect against various diseases including colon cancer and (probably) postmenopausal breast cancer and endometrial cancer, as well as obesity and other related cancers, may not lead to any change. Physical activity needs to be built into everyday life, but the opportunities are not always present and the built environment often creates obstacles. Legislation and regulation are needed to renew and revive physical education, recreation, and sport in schools, to redesign buildings, cities, and transportation systems, and to encourage active transport such as walking and cycling. Such initiatives are more successful when people are aware of their health benefits.

Another example is the need for regulations designed to enable parents and other carers and encourage children to enjoy healthy diets as well as to be physically active, and thus to remain within the healthy range of body weight. The evidence shows that the advertising and marketing of processed energy-dense foods and sugary drinks directed at children and young people increases consumption of these products. Likewise, the quality of the foods and drinks available to children in schools forms a crucial part of their diets and also influences their choices outside school.

The aim of prevention is to promote health and well-being throughout life, as well as to reduce ill-health especially in vulnerable times and in later life. Achieving the 2007 WCRF/AICR Diet and Cancer Report recommendations will also be helpful to many people who have already had a diagnosis of cancer. Prevention of cancer does not mean its total elimination, but reduction in its occurrence and delay in its onset (see box 1.2). Many types and cases of cancer are largely preventable by known means. This good news creates a great opportunity for all actors — policy-makers and decision-takers in all relevant areas — to help to stop cancer before it appears.

8.1 Recommendations

MULTINATIONAL BODIES[1]

AIM

Originate and promote coordinated strategies that protect public health through food, nutrition, and physical activity

RECOMMENDATIONS

All multinational bodies

Build the protection and maintenance of public health[2] into all relevant agriculture, food, health, economic, trade, environmental, and other agreements

United Nations bodies

Work together to ensure integrated policies among all relevant agencies

1. Includes policy-makers and decision-takers in international political, economic, and trade bodies such as the International Monetary Fund, the World Bank, the World Trade Organization, the European Union, the North American Free Trade Association, the southern Latin American trade association (Mercosul) and others, as well as the United Nations (UN) and its constituent bodies. Key UN organisations include the Food and Agriculture Organization, the World Health Organization, the Pan American Health Organization, the International Agency for Research on Cancer, the United Nations Children's Fund, the United Nations Development Programme, the UN Educational, Scientific and Cultural Organization, the World Food Programme, the International Labour Office, and many others. Also includes inter-UN bodies concerned with food and nutrition, notably the UN System Standing Committee on Nutrition and the Codex Alimentarius Commission. (For international civil society organisations and transnational industries, see Civil society organisations and Industry.)
2. Includes the prevention of cancer and other chronic diseases. Thus, the European Union, the World Bank, the International Monetary Fund, the World Trade Organization, the Codex Alimentarius Commission, and other multinational bodies, especially those whose decisions have the force of law or that are otherwise binding, need to incorporate protection and maintenance of public health as an invariable part of their work.

Nature of this actor

The work of multinational political, economic, trade, and other bodies, as well as bodies directly concerned with food and health, has an impact on public health. These include the European Union (EU), the World Bank, the International Monetary Fund (IMF), and the World Trade Organization (WTO) as well as formal groupings of nation states such as the G8, and the G77, which represent the interests of high-income governments and lower-income governments, respectively. They also include regional economic and trade bodies such as those working at European, North American, and southern Latin American level. (See box 8.2)

The UN is a system of multinational bodies set up to develop, record, and carry out agreements as accepted by national governments. Relevant UN bodies include the Food and Agriculture Organization (FAO), the World Health Organization (WHO), the Pan American Health Organization, the International Agency for Research on Cancer, the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the UN Educational, Scientific and Cultural Organization UNESCO), the International Labour Office, and the World Food Programme (WFP). They also include inter-UN bodies such as the UN System Standing Committee on Nutrition (UN SCN) and the Codex Alimentarius Commission (Codex).

(For international civil society organisations, see page 121. For arms of national governments that act internationally, such as development agencies, see Government, page 124. For transnational and other international industry, see page 128).

Why this actor

Potent decisions that determine the nature of food systems, promote international trade, and thus affect public health are taken by multinational bodies. Decisions made and actions taken by such bodies often do not have public health in mind. These may nevertheless profoundly affect patterns of diet and levels of physical activity — and so body composition — initiation and duration of breastfeeding, and other factors that directly or indirectly affect cancer risk. The policies and actions of multinational political, economic and trade bodies may have a greater effect on patterns of disease than those of organisations directly concerned with the control and prevention of disease. The authority of national governments (see page 124) is now increasingly circumscribed by international agreements.

Multinational bodies represent the collective interests of national governments. They typically come to agreements after consultation with international civil society organisations (see page 121) and international industry (see page 128). This process is usual in areas such as trade and energy policy and agreement on and response to climate change and other environmental issues. It also needs to be usual for prevention of disease and protection of health.

Reasons for aim

Originate and promote coordinated strategies that protect public health through food, nutrition, and physical activity

The prevention and control of cancer and other chronic diseases is a challenge affecting the whole world, and so needs to be addressed at the international level. Health and well-being need to be central considerations when international political, economic, trade, and other relevant policies are determined. Health is a human right and a public good in itself. Also, the state of health and well-being of any population has an impact on its prosperity, social integration, and ability to manage its physical environment. Prevention of cancer and fulfilment of the recommendations of the 2007 WCRF/AICR Diet and Cancer Report need to be an integral part of broad public health strategies.

Box 8.2 Multinational bodies, public health, and the prevention of cancer

The responsibilities of national governments include acting in the public and general interest. The policies and actions of multinational bodies, which represent the collective interests of national governments who make up their membership, can influence patterns of diet and physical activity, and so also body composition, whether specifically designed to do so or not.

Multinational political, economic, and trade bodies have in recent decades become more powerful relative to multinational bodies within the UN system concerned with agriculture, food systems, biodiversity, food, and health, and their decisions are often seen to favour the interests of high-income countries at the expense of lower-income countries.

Multinational political, economic, trade, and other bodies

Multinational political bodies include the EU and groupings of nation states such as the G8 and the G77. Multinational economic and trade bodies include the World Bank and the IMF, both established after the Second World War and headquartered in Washington, and the WTO, established in 1995 with its headquarters in Geneva.

In recent decades, multinational bodies whose decisions have the force of law or that are otherwise binding have become increasingly powerful. Their general policies have also increasingly been designed to promote the free international flow of money and goods. They are therefore prime movers of economic and other forms of globalisation. Their decisions are profoundly relevant to the purposes of this Report. With the partial exception of the World Bank, whose work does include support of countries suffering food and other insecurity, these multinational bodies do not have an explicit remit to consider the impact of their policies and actions on public health. The recommendations made here propose that all relevant multinational bodies be charged with the protection of public health, including the prevention of cancer, as a responsibility equal with their current charge.

Multinational agriculture, food, and health bodies

Multinational bodies concerned specifically with food and health are mostly within the UN system. These include the FAO, WHO, UNICEF, WFP, and two bodies formally under WHO, the Pan American Health Organization and the International Agency for Research on Cancer. Observers from WHO, FAO, and UNICEF were formal observers on the Panels responsible for the 2007 WCRF/AICR Diet and Cancer Report and for this Report.

Like the UN itself, specialist UN agencies were established after the Second World War. They are funded by national governments. Much of the work of FAO is concerned with the monitoring of food systems and supplies, promoting agricultural development and food security, and ensuring good nutrition. Much of the work of WHO is concerned with the surveillance, control, and prevention of infectious diseases, as well as with the promotion of health and well-being. As its name implies, UNICEF is concerned with the health of children, and also mothers, and has a special interest in breastfeeding. The WFP is concerned with food security, including famine relief, and works closely with national aid agencies such as the US Agency for International Development. From time to time UN agencies, singly or in collaboration, issue strategies, standards, codes, and other agreements made by member states. Some relevant to this Report are the WHO Global Strategy on Diet, Physical Activity and Health[1] and the WHO/UNICEF Global Strategy on Infant and Young Child Feeding.[2] Such agreements are not binding in international law, but are highly influential.

Two UN bodies concerned with food and health are the FAO/WHO Codex and the UN SCN. Codex is mainly concerned with food quality and food safety.[3] The UN SCN is a body whose mandate is to promote cooperation among UN agencies and partner organisations in support of national and international efforts to end malnutrition in all its forms.[4]

Individually and especially collectively, UN and other multinational bodies concerned with agriculture, food, and health have considerable influence on public health. The two opportunities indicated in the recommendations here are for UN bodies to give a higher priority to the promotion of public health, including the prevention of cancer, and to work together more effectively to ensure integrated policies and actions.

Table 8.2 Multinational bodies: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with multinational bodies in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
All multinational bodies: Build the protection and maintenance of public health into all relevant agriculture, food, health, economic, trade, environmental, and other agreements	✔	✔	✔	✔				✔	
UN bodies: Work together to ensure integrated policies among all relevant agencies	✔	✔	✔	✔				✔	

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

Reasons for recommendations

All multinational bodies

Build the protection and maintenance of public health into all relevant agriculture, food, health, economic, trade, environmental, and other agreements

International political, economic, trade, environmental, agriculture, and other policies typically do not take the promotion of public health into consideration. Nevertheless, they may have profound unintended effects on food systems and dietary patterns, levels of physical activity, and degree of body fatness in populations. International agreements specifically relating to food and health are usually concerned more with food safety and standards and with surveillance and control of infectious and deficiency diseases. Less attention is currently given to the prevention of chronic diseases, including cancer, or to the promotion of positive states of public health and well-being. Responsible UN bodies such as WHO and FAO, either jointly or through Codex, could develop criteria for specifying the nutritional profile of high-quality foods in order to influence policies throughout the food chain.

(See chapters 3.1.2.1, 3.1.2.2, 3.2.2.3, 4.1.2.1, 4.1.2.2, 4.2.2.1 and 5.4.2.1)

United Nations bodies

Work together to ensure integrated policies among all relevant agencies

Global initiatives such as WHO strategy on diet, physical activity, and health and the UN strategy on infant and young child feeding are vital. These, and strategies specifically for the prevention of cancer, will be fully effective only as an integral part of coordinated and coherent public health strategies designed to prevent and control other diseases and to promote health. This approach is rational, because many of the factors that affect the risk of cancer also affect the risk of other diseases.

The UN system's approach to food and nutrition policy and action has been criticised as fragmented. Only intervention at the highest level within the UN system can resolve this. The UN Secretary-General needs to require and maintain integrated policies among all relevant UN agencies.

The evidence that overnutrition and undernutrition co-exist in the same countries and even the same communities and families, and the relatively recent understanding that malnutrition includes both over- and undernutrition, creates a need for all international organisations to collaborate and integrate their policies. This is crucial with lower-income countries where nutritional deficiencies and infectious diseases remain endemic, and the importance of the prevention of cancer and other chronic diseases is liable not to be seen as a priority.

(See chapters 3.1.2.1, 3.1.2.2, 3.2.2.3, 4.1.2.1, 4.1.2.2, 4.2.2.1, 4.4.2.2 and 5.4.2.1)

CIVIL SOCIETY ORGANISATIONS[1]

AIM

Create, advocate, and develop sustainable policies and actions that ensure healthy food, nutrition, and physical activity for all

RECOMMENDATIONS

All civil society organisations

Create, develop, and press governments and other actors[2] to implement effective policies and programmes for nutrition and physical activity

Civil society organisations concerned with public health

Hold other actors to account regarding their policies and actions on food, nutrition, and physical activity, including the prevention of cancer

Mobilise the media and public opinion in support of improved public health, including healthy nutrition, sustained physical activity, and the prevention of cancer

Form alliances with associated civil society organisations including those concerned with public policy, justice, equity, and environmental protection

Advocate traditional cultures and ways of life when these generate healthy, diverse, and sustainable dietary patterns and regular physical activity

1. International, national, and local civil society organisations. Includes public interest and consumer organisations, professional and scientific bodies, political parties, trades unions, religious groups, women's groups, and small farming and fishing cooperatives. Excludes industry and business interest organisations, and the media. (See Industry and Media)
2. All other actors are multinational bodies, industry, media, schools, workplaces and other institutions, health and other professionals, and people, and also other civil society organisations.

Nature of this actor

This group includes international and national civil society organisations (CSOs) and in particular those that have formal relationships or dealings with multinational bodies, national governments, or industry. CSOs may have the declared purpose to work in the public interest, or they may mainly be concerned to protect the interests of their members and supporters. Many CSOs are only concerned with some of the issues covered in this Report. Success will come from many complementary CSOs working together. (See box 8.3)

As well as public interest and consumer representative organisations, included here are charitable foundations, scientific and professional associations, political parties, trades unions, religious groups, groups representing the interests of women and of children, and smaller farming and fishing cooperatives. The term is used in place of 'non-governmental organisations' (NGOs), to distinguish this

Box 8.3 Civil society organisations and the prevention of cancer

Many types of civil society organisation (CSO) work in ways that do or may affect public health. Generally, CSOs have activated people on environmental issues more than on food and nutrition. Environmental groups focused on food and cancer are usually concerned more about exposure to pesticides and toxins from food than about the overall relationship between diet and cancer. Consumer representative groups such as Consumers International, which has a membership of over 250 organisations in over 100 countries, include health as part of their mission, as do many other CSOs with broad responsibilities such as international and national Women's Institutes.

The work of CSOs largely concerned with food security and equity, such as Oxfam, or with the physical environment, such as Greenpeace and Friends of the Earth, can have a substantial impact on food systems and patterns of diet and physical activity, as may that of organisations concerned with the rights and entitlements of women and of children, such as Save the Children.

Cancer and its prevention

The leading CSO dedicated to the prevention of cancer by means of healthy diets, sustained physical activity, weight control, and associated factors is WCRF. WCRF, together with its sister organisation AICR, commissioned the 1997 Diet and Cancer Report, the 2007 Diet and Cancer Report, and this Report. (For more details on the mission and work of the global network of which WCRF and AICR are members, see the inside front and back covers of this Report).

Many other international and national organisations whose main work is research on and surveillance and control of cancer are also concerned with its prevention. These include the US National Cancer Institute, the American Cancer Society, Cancer Research UK, the Brazilian national cancer institute (INCA) who co-published the Portuguese summary of the 2007 Report, and the International Union Against Cancer, as well as several others that were formally represented by observers on the Panel responsible for the 2007 WCRF/AICR Diet and Cancer Report. In addition, scientists from several of these bodies were individual members of or observers on the Panel.

Food and nutrition and physical activity

Many leading and effective CSOs are concerned specifically with food and nutrition. For example, most countries have national organisations that are members of Consumers International and eight countries have member organisations in the more focused International Association of Consumer Food Organizations. In some countries, while sporting activities may commonly be linked to clubs, most diet-relevant organisations are linked to universities, institutes, and other official bodies. In the USA and the UK, food and nutrition initiatives are often started by public interest groups. In the USA, these include the National Alliance for Nutrition and Activity and the Center for Science in the Public Interest, and in the UK Sustain (formerly the National Food Alliance), the Food Commission, and the Caroline Walker Trust. An example of a relevant CSO from Africa is the Food Basket Foundation International of Nigeria.

Agriculture groups include the International Federation of Agricultural Producers, the International Federation of Organic Farming Movements, and many other organisations representing the interests of family farmers and food producer cooperatives. Food policy councils are democratic forums that examine local and state food policies. Professional associations include the International Union of Nutritional Sciences (IUNS), the regional affiliated organisations to IUNS, and the World Public Health Nutrition Association. More specialist groups include Consensus Action on Salt and Health and Action and Information on Sugars. CSOs concerned with physical activity include the International Cycling Union and Sustrans.

Breastfeeding

A global campaign to protect and promote breastfeeding was instituted in the late 1970s by the International Baby Food Action Network (IBFAN), a worldwide 'network of networks', building on earlier work by La Leche League. Together with other civil society networks including the World Alliance on Breastfeeding Action and the Infant Feeding Action Coalition, IBFAN works in ways similar to those of the environmental organisations Greenpeace and Friends of the Earth.[5]

UN resolutions and codes of practice to promote breastfeeding and restrict infant formula have been made possible as a result of constant pressure from these CSOs.[6] They were essential partners with the relevant UN agencies and with UN member state representatives in reaching agreement on the current UN Strategy on Infant and Young Child Feeding.[7]

The physical environment

Friends of the Earth and Greenpeace are examples of particularly effective CSOs concerned with environmental protection. They are best known for their campaigning work, which involves direct action. They have very large memberships and global networks, and work with all other relevant actors, including multinational bodies, national governments, allied CSOs such as Oxfam and Save the Children, professional organisations, academics, and the media.

actor from industry and business interest organisations, which are also non-governmental. Civil society here excludes the media, and the health and other professionals (see pages 132, and 139, respectively).

Why this actor

Strong and effective CSOs are a vital part of democratic societies. They advocate and also develop and sustain public policies, often in association with multinational bodies, governments, and industry and by use of the media. They frequently take the initial lead in such work. Characteristically they are advocates and campaigners, and also 'watchdogs', holding governments, industry, and other actors to account. Good governance requires pressure and guidance from representative and accountable CSOs that represent important public interests — such as public health and the prevention of diseases, including cancer.

Reason for aim

Create, advocate, and develop sustainable policies and actions that ensure healthy food, nutrition, and physical activity for all

Governance is now more complex than it was a century or even a generation ago. Politicians and civil servants

increasingly depend on specialist CSOs to draft legislation and to advise on public policies and actions. Much legislation considered by multinational bodies and national governments is initially drafted by experts with legal, scientific, and other technical qualifications working within civil society. Policies and actions proposed by multinational bodies, governments, or industry often need support from CSOs in order to succeed.

Reasons for recommendations

All civil society organisations

Create, develop, and press governments and other actors to implement effective policies and programmes for nutrition and physical activity

Civil society has relative freedom to 'see the big picture' and to advocate and campaign for causes in the public interest. Well-resourced CSOs work strategically on issues that will remain important, such as urban planning designed to encourage physical activity, pricing and other legal and fiscal policies designed to make healthy food more affordable and accessible, or the marketing of processed high-energy foods and sugary drinks to children. They also work behind the scenes with multinational bodies, governments, and industry. For example, it is likely that the shift in public perception of climate change that followed the decision of some energy industry leaders to accept the judgement of scientists that climate change is real and human-made, is crucially owing to action by CSOs.

(See chapter 5.5.2.1)

Civil society organisations concerned with public health

Hold other actors to account regarding their policies and actions on food, nutrition, and physical activity, including the prevention of cancer

The independence of CSOs from the main institutions of government places them in a unique position. CSOs that are representative of and accountable to their members may be disinterested and expert. They have a special opportunity and responsibility publicly to hold other actors to account. The media may sometimes also act in this way (see page 132).

(See chapter 5.5.2.1)

Civil society organisations concerned with public health

Mobilise the media and public opinion in support of improved public health, including healthy nutrition, sustained physical activity, and the prevention of cancer

Despite usually having only relatively modest resources, leading CSOs are frequently seen as credible, and are given prominent coverage in media accounts of public policy issues, particularly when they challenge actions of governments or industry. In this way CSOs can and do shape public opinion and magnify the concerns of communities and citizens. Issues that need promotion, such as public health, often get the attention of legislators only when they are the subject of sustained campaigns initiated by CSOs that are then amplified in the media.

(See chapters 5.5.2.1, 5.5.2.2 and 6.1.2.4)

Table 8.3 Civil society organisations: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with civil society organisations in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
All civil society organisations: Create, develop, and press governments and other actors to implement effective policies and programmes for nutrition and physical activity	✔	✔	✔	✔	✔	✔	✔	✔	✔
Civil society organisations concerned with public health: Hold other actors to account regarding their policies and actions on food, nutrition, and physical activity, including the prevention of cancer		✔							
Civil society organisations concerned with public health: Mobilise the media and public opinion in support of improved public health, including healthy nutrition, sustained physical activity, and the prevention of cancer		✔			✔				✔
Civil society organisations concerned with public health: Form alliances with associated civil society organisations including those concerned with public policy, justice, equity, and environmental protection		✔							
Civil society organisations concerned with public health: Advocate traditional cultures and ways of life when these generate healthy, diverse, and sustainable dietary patterns and regular physical activity		✔							

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

Civil society organisations concerned with public health

Form alliances with associated civil society organisations including those concerned with public policy, justice, equity, and environmental protection

CSOs are often specialised, and sometimes insular, working separately from one another. This dissipates their impact, all the more so when organisations concerned with the same or similar topics are seen to disagree. Strength comes from alliances. In the area of food and health in the UK, Sustain is a model: it is an umbrella group representing and unifying the interests of around 100 national organisations concerned solely or partly with food and farming, nutrition, and public health; some are large and general, some small and specialist.

Given the range and scale of environmental, economic, social (including political), and personal factors that shape public health and affect the risk of cancer, alliances with organisations whose interests impinge on public health are vital. The most effective organisations characteristically form international, national, or local networks. They are well placed to identify and publicise cases of best practice, which can encourage other actor groups. The protection and improvement of public health in a full economic, social, and environmental context, of which the prevention of cancer is one part, is a broad theme capable of uniting many sectors of civil society.

(See chapter 5.1.2.1 and 5.5.2.1)

Civil society organisations concerned with public health

Advocate traditional cultures and ways of life when these generate healthy, diverse, and sustainable dietary patterns and regular physical activity

Industrial food systems have many benefits, including making food supplies relatively secure and safe. Comparably, employment in which manual labour is no longer needed and that is principally sedentary is more comfortable. But industrialised food systems tend to produce more processed foods and drinks, which together with sedentary living are causes of overweight and obesity, and so indirectly of various serious diseases including some common cancers.

Traditional food systems tend to support family farmers and small local producers and processors, and to be socially and culturally appropriate. They also tend to benefit rural development and local economies and to generate active ways of life and healthy, diverse, and sustainable food supplies. From a nutritional point of view traditional food systems may have unhealthy as well as healthy aspects, but when particular foods characterise the overall dietary pattern, making healthy food substitutions may interfere with their cultural significance. The potential of traditional food systems tends to be overlooked or neglected by governments. CSOs have a special role in the protection of healthy and sustainable ways of life.

(See chapter 5.1.2.2, and boxes 5.2 and 5.3)

GOVERNMENT[1]

AIM

Use legislation, pricing, and other policies at all levels of government to promote healthy patterns of diet and physical activity

RECOMMENDATIONS

Examine, audit, and revise legislation and regulations so that they protect public health and prevent disease, including cancer[2]

Ensure that built and external environments are designed and maintained in ways that facilitate physical activity and other healthy behaviour[2]

Encourage safe, nutrient-dense, and relatively unprocessed foods and drinks and discourage sugary and alcoholic drinks, 'fast food', and other processed foods[2 3]

Require schools to provide meals to high nutritional standards and facilities for recreation and sport, and to include nutrition and physical activity in core curricula[2]

Require all government and publicly funded facilities that provide catering to ensure that their meals, foods, and drinks are of high nutritional quality[2]

Require widespread dedicated walking and cycling facilities throughout built and external environments

Restrict advertising and marketing of 'fast food' and other processed foods[3] and sugary drinks to children, on television, in other media, and in supermarkets[2]

Incorporate UN recommendations on breastfeeding into law or appropriate public health and consumer protection rules[2]

Give greater priority to research on, and programmes to improve, public health including the prevention of cancer and other diseases[2]

Establish and maintain publicly funded information and education on, and surveillance of, food, nutrition, and physical activity status

Ensure that international food trade and aid sustains future health as well as providing immediate relief for populations in recipient countries

1. Policy-makers and decision-takers in national and also sub-national (state, provincial, municipal, local) government and its agencies. Relevant government departments include office of the head of state or prime minister, finance, trade, employment, social security, justice, home affairs, and foreign affairs as well as food, agriculture, and health. Also includes publicly funded agencies and institutions whose work affects public health. National government international trade and aid agencies are also included here. (Also see Media, Schools, Workplaces and institutions)
2. By means of legislation, pricing, or other regulation unless there is good independent evidence that existing voluntary codes have been proved to be effective.
3. 'Processed foods' here means those relatively high in sugars, refined starches, fat, or salt.

Nature of this actor

Governments included here are at national, state, provincial, municipal, and local levels. Government agencies are included. The actors here are policy-makers and decision-takers within government. More recommendations are directed towards this actor than any other, because government action has a special role to play in protecting and promoting public health. (See box 8.4)

It is commonly supposed that the government departments concerned with health and with food and agriculture are the only ones that have a significant impact on public health and prevention of disease, including cancer. This is not so. Finance ministries have the lead responsibility for deciding where public funds should be allocated. Other government departments whose policies and actions may and do affect public health include those responsible for science, employment, social security, housing, education, foreign affairs, home affairs, justice, sport, and urban and rural planning and development.

The same issues apply at sub-national government level. Local education, planning, food standards, and other departments, as well as health authorities, have responsibilities that have an impact on public health.

Government agencies include all relevant institutions and bodies, whether publicly or privately funded, whose work affects public health. Also included here are foreign relations and aid agencies. (For governments as employers or as responsible for publicly funded schools, see pages 137 and 134, respectively.)

Why this actor

Governments, and government departments and their agencies, have the chief and central responsibility for protecting, maintaining, and improving public health, including the prevention of diseases such as cancer. (See box 8.4)

Reason for aim

Use legislation, pricing, and other policies at all levels of government to promote healthy patterns of diet and physical activity

Evidence set out in Part 2 of this Report consistently shows that pricing and other fiscal policies affect affordability and availability of products. The two most frequently cited examples are the impact of taxes on and restriction of smoking and of alcoholic drinks, one subject of this Report. This is conspicuously the case with low-income and otherwise disadvantaged populations and communities that have only limited access to a wide range of foods and tend to purchase cheap processed food.

Policies need to include strict control of the contamination of foods and drinks, such as caused by aflatoxins and arsenic, and mandatory explicit labelling of processed foods and drinks. In addition, other policies, for instance on urban design and the advertising, promotion, and labelling of foods and drinks, can have profound influences on people's food consumption and activity patterns.

Box 8.4 Government and the protection of public health

Public health is a public good. Protection of public health is a prime responsibility of governments.

Until recently, this position has not been seriously questioned. However, beginning in the latter part of the 20th century, and particularly since the 1970s and 1980s, governments of higher-income countries have been inclined to minimise state supervision and intervention of any kind and instead to rely on 'market' mechanisms. This has involved the progressive privatisation of publicly funded institutions, the dismantling of regulatory systems, and pressure brought to bear on the governments of lower-income countries in the form of 'structural adjustment programmes' that sharply reduce resources and capacity for maintaining public health.

More generally, increased 'development', which is measured in terms of rising amounts of average income and expenditure within a population, is not in itself an indicator of improved population health. It can mask deterioration in health, particularly of relatively impoverished communities.

Governments need to accept their central responsibility for the protection of public health. Medical approaches will remain essential to screen for, detect and treat disease, but by their nature cannot deal with the underlying and basic environmental, economic, and social causes of diseases such as cancer. Improvement in population health requires the use of public funds in the public interest, and commitment from legislators and the executive working as leading partners with the other actors specified here.

Governments are necessarily responsible for legislation, including that which affects the price and supply of foods and drinks and of opportunities for physical activity, both directly and as members of UN and other multinational bodies. Governments also have a basic responsibility to provide resources and ensure capacity for programmes designed to support research, to guide relevant professions and the public, and to monitor the health of populations.

Reasons for recommendations

Examine, audit, and revise legislation and regulations so that they protect public health and prevent disease, including cancer

Many legal and fiscal policies, sometimes but not always enacted with public health as an intended consequence, distort food systems and supplies (also see box 2.2). Price support systems for major food commodities are an obvious example. Others are built environment regulations and codes that have the effect of discouraging physical activity. There is therefore need for comprehensive audits, resulting in strengthening or revision of legislation, regulation, and codes of practice. An initial approach is to ensure that current legal and fiscal instruments do not have the effect of making healthy food artificially expensive, or foods and drinks that increase the risk of cancer and other diseases artificially cheap.

(See chapters 3.4.2.2, 3.4.2.3, 4.2.2.1, 4.2.2.3, 5.1.2.2, 5.1.2.3, 5.4.2.1, 5.4.2.2 and 5.4.2.3)

Ensure that built and external environments are designed and maintained in ways that facilitate physical activity and other healthy behaviour

Governments at all levels need to be lead partners with other actors specified here in requiring that built and external environments for which they have direct responsibility are designed and operated with population health in mind. Laws and regulations governing and guiding specifications for public works need to give equal priority to the promotion of health and protection against disease. Thus, transportation systems and open spaces need to make walking and cycling safe, including for older people, women, and children; public buildings need to be built or refurbished in order to make stairways attractive; and healthy affordable food should be provided as appropriate. (Also see Schools and Workplaces and institutions, pages 134 and 137, respectively).

(See chapters 3.1.2.2, 3.3.2.2, 3.4.2.1, 3.4.2.2 and 3.4.2.3)

Encourage safe, nutrient-dense, and relatively unprocessed foods and drinks and discourage sugary and alcoholic drinks, 'fast food', and other processed foods

As part of their responsibility to promote public health, policy-makers and decision-takers working for and with governments at all levels need to emphasise and encourage the vital importance of healthy food supplies, diets, meals, snacks, foods, and drinks in all the ways open to them. This will take many forms. The most effective policies and actions will vary at different levels of government and also between different countries. Some specific initiatives are among the recommendations detailed here. In general, the declared unequivocal commitment of leaders in government to the improvement and maintenance of public health and prevention of disease including cancer through healthy diets will, of itself, send a signal to other actors. Other specific initiatives can range from support of horticulture to restrictions on locations for 'fast food' outlets and ensuring that key people in government are good role models in their own lives.

(See chapter 3.1.2.2, 3.2.2.1, 3.2.2.2, 3.2.2.3, 4.2.2.1, 4.2.2.2, 4.2.2.3 and 4.3.2.3)

Require schools to provide meals to high nutritional standards and facilities for recreation and sport, and to include nutrition and physical activity in core curricula

The experiences of early life are vitally important to lifelong health. School meals that conform to nutrition standards such as those specified in WHO strategies and reports issued as a result of UN expert consultations, or else to authoritative national standards, protect the health of children. As well as practical support and guidance, including that designed to encourage active recreation and games as well as physical training and sport, children need to be taught the value of good food and nutrition, including shopping, preparation, and cooking skills, and of regular physical activity as part of the compulsory school curriculum.

(See chapters 4.3.2.3, 5.2.2.1, 5.2.2.2, 5.2.2.3 and 5.4.2.2)

Require all government and publicly funded facilities that provide catering to ensure that their meals, foods, and drinks are of high nutritional quality

Good practice begins with setting a good example. Executives in governments at all levels need to ensure that that the food provided in their own catering facilities, and also in those of organisations and institutions of all types supported with public money, is appropriate and of high nutritional quality. 'Healthy choices' are not enough; unhealthy choices also need to be limited. A requirement to provide healthy food needs to be built into specifications and contracts. Best practice will include use of on-site booklets, leaflets, menus, and labels specifying what are healthy diets and also in what ways the meals and foods provided are healthy, with scope for suggestions for improvement.

(See chapters 4.3.2.3 and 5.2.2.4)

Require widespread dedicated walking and cycling facilities throughout built and external environments

Modern cities and other physical environments have been designed to facilitate motorised travel. The effect has been to impede walking and cycling. Governments at all levels have the opportunity and responsibility to strike a new balance between travel in vehicles and travel that is physically active, in both redesigning existing built environments and new design of cities and transportation systems. The general purpose of this new policy is to make walking (and also running) and cycling safe and enjoyable. More dedicated space therefore needs to be made available for pedestrians and cyclists. This will involve wider pavements (sidewalks) and more cycle paths. As well as stricter enforcement of speed limits especially within cities, more use needs to be made of traffic management systems that encourage pedestrians and cyclists, and also of restrictions on the use of private motorised transport within cities, such as congestion charges.

(See chapters 3.4.2.2 and 3.4.2.3)

Restrict advertising and marketing of 'fast food' and other processed foods and sugary drinks to children, on television, in other media, and in supermarkets

Incorporate UN recommendations on breastfeeding into law or appropriate public health and consumer protection rules

The incorporation of restrictions on advertising of infant formula recognises the vulnerability of infants and the need to protect their health. These two recommendations together emphasise that the same point applies to older children.

Heavy advertising and marketing of processed foods high in sugar, refined starches, fat or salt, and sugary drinks to children on television and other media, and promotion of artificial formula for infants, in particular by transnational food and drink manufacturing companies with extremely large promotion budgets, increases consumption of these products and discourages breastfeeding.

It is now generally agreed, including to some extent by industry itself, that such promotion should be restricted. Advertising and promotion of processed foods and drinks to children need to be restricted, such promotion aimed at younger children needs to be prohibited, and the UN strategies and codes of practice concerning breastfeeding, breastmilk substitutes, and weaning foods need to be upheld in practice as well as in principle. Restrictions on advertising and marketing of breastmilk substitutes can be complemented by promotion of breastfeeding, in particular in early pregnancy.

(See chapter 3.3.2.2, 4.4.2.1, 4.2.2.2, 5.1.2.3 and 6.2.2.2)

Give greater priority to research on, and programmes to improve, public health including the prevention of cancer and other diseases

Screening for and early detection of cancer and other diseases, medical and surgical treatment, and palliative care will remain central to the policy and practice of government health departments. However, such medical approaches do not address the underlying and basic causes of diseases. Governments need to rebalance research, policy, and action priorities to give more resources to the prevention of disease, including cancer, and the promotion of population health and well-being.

(See chapter 4.2.2.4, 5.4.2.3)

Establish and maintain publicly funded information and education on, and surveillance of, food, nutrition, and physical activity status

Governments need to ensure that food supplies are safe and healthy, that rates of overweight and obesity and chronic diseases such as cancer are controlled, and that environments enable safe and pleasant regular physical activity. As part of such basic responsibilities, adequate capacity and other resources are needed for high-quality research, regular surveillance and monitoring, and sustained information and education programmes and campaigns. In high-income countries, governments need to reserve public money for these purposes. In lower-income countries with inadequate resources, support can come from relevant UN agencies.

(See chapter 5.4.2.3)

Table 8.4 Government: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with governments at all levels in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
Examine, audit, and revise legislation and regulations so that they protect public health and prevent disease, including cancer	✔		✔						
Ensure that built and external environments are designed and maintained in ways that facilitate physical activity and other healthy behaviour	✔	✔	✔	✔		✔	✔	✔	
Encourage safe, nutrient-dense, and relatively unprocessed foods and drinks and discourage sugary and alcoholic drinks, 'fast food', and other processed foods	✔	✔	✔	✔	✔	✔	✔	✔	✔
Require schools to provide meals to high nutritional standards and facilities for recreation and sport, and to include nutrition and physical activity in core curricula	✔	✔	✔	✔		✔		✔	✔
Require all government and publicly funded facilities that provide catering to ensure that their meals, foods, and drinks are of high nutritional quality	✔	✔	✔	✔			✔	✔	✔
Require widespread dedicated walking and cycling facilities throughout built and external environments	✔	✔	✔	✔		✔	✔		
Restrict advertising and marketing of 'fast food' and other processed foods and sugary drinks to children, on television, in other media, and in supermarkets	✔	✔	✔	✔	✔	✔		✔	✔
Incorporate UN recommendations on breastfeeding into law or appropriate public health and consumer protection rules	✔	✔	✔	✔	✔		✔	✔	✔
Give greater priority to research on, and programmes to improve, public health including the prevention of cancer and other diseases	✔	✔	✔	✔				✔	
Establish and maintain publicly funded information and education on, and surveillance of, food, nutrition, and physical activity status	✔	✔	✔		✔			✔	
Ensure that international food trade and aid sustains future health as well as providing immediate relief for populations in recipient countries	✔	✔	✔	✔	✔			✔	

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

Ensure that international food trade and aid sustains future health as well as providing immediate relief for populations in recipient countries

International trade and aid can benefit recipient populations, but may also have adverse effects. Food aid is certainly essential in the circumstances of acute or severe food insecurity and inadequacy, especially at times of famine. However, the effect of food trade, especially in subsidised products, is often to benefit high-income countries and to disable the food systems and supplies of recipient countries and disempower producer communities. All food aid and trade needs to encourage long-term independence and autonomy in lower-income countries. While the literature considered in Part 2 of this Report did not contain direct evidence relating to this area, the Panel judged that this was a sensible precaution.

(See chapter 4.1.2.1)

INDUSTRY[1]

AIM

Emphasise the priority given to public health including cancer prevention in strategic planning and action

RECOMMENDATIONS

Built environment industries[1]

Plan, commission, construct, and operate all built environments so as to protect public health and facilitate physical activity

Food and drink industries[1]

Make public health an explicit priority in all stages of food systems including product research, development, formulation and reformulation, and promotion

Ensure that healthy meals, snacks, foods, and drinks are competitively priced compared with other products

Collaborate in order to stop advertising, promotion, and easy availability of sugary drinks and unhealthy foods to children[2]

Ensure that marketing and promotion of breastmilk substitutes and complementary foods follow the terms of UN codes and strategies on infant and young child feeding[3]

Ensure accuracy, uniformity, and availability of product information in all advertising and promotion and on food labels[2]

Physical activity industry [4]

Promote goods and services that encourage participation in physical activity by people of all ages, rather than in competitive or elite sporting performance

Entertainment and leisure industry

Give higher priority to entertainment products and services that enable everybody, especially children and young people, to be physically active

1. Owners, directors, executives, and other decision-takers in all transnational, international, and national industries whose policies and practices have an impact on health. These include food producers, manufacturers, distributors, retailers, and caterers. They also include all industries responsible for shaping built environments and the entertainment, leisure, and sports industries. (For advertising and publicity agents and health and other professionals, see pages 132 and 139, respectively.)
2. Relatively healthy processed foods and drinks are packaged or presented in appropriate portion sizes as recommended by national governments or UN agencies, are explicitly labelled, are relatively low in added saturated fats, fats and oils, and sugars and syrups and are therefore relatively nutrient-dense and low in energy density, low in salt, and contain minimal or no *trans*-fatty acids. Fresh or minimally processed energy-dense foods that are also nutrient-dense, such as nuts, seeds, and some oils, are healthy.
3. Correspondingly to discourage use of baby formula or commercial weaning foods in the first 6 months of life, unless otherwise recommended by a qualified health professional. This and all recommendations to do with breastfeeding endorse the UN Strategy on Infant and Young Child Feeding.
4. Such as sporting goods manufacturers and providers of health centres and sports facilities.

Nature of this actor

This group includes owners, directors, executives, and other decision-takers in all relevant industries, transnational, national, and local (see box 8.5). Industries whose activities have an impact on body composition and physical activity include not only those concerned with foods and drinks, but also those concerned with the built environment, such as with urban and rural planning and development, construction and engineering, and also with entertainment, leisure, and sports. (See also Health and other professionals, page 139).

The food and drink industries include producers (farmers and growers), commodity brokers, manufacturers (of processed products and also ingredients and additives), packagers, distributors, retailers, and caterers and their representative organisations. They also include research and information centres controlled or mainly funded by industry. (For small and family farming and fishing cooperatives, see Civil society organisations, page 121. For advertising, promotion and publicity companies, see Media, page 132).

Why this actor

Successful initiatives must inevitably involve industry. Industry is an indispensable actor and potential leader and can also be a partner in initiatives designed to improve and protect public health.

Industries responsible for the built environment are important influences on patterns of physical activity and thus of body composition. Similarly, industries directly or indirectly concerned with the production, preservation, processing, preparation, and promotion of foods and drinks shape food systems and supplies and thus dietary patterns. As one example related to cancer, the practices of producers affect levels of contamination of cereals (grains) and pulses (legumes) with moulds that produce aflatoxins.

Reasons for aim

Emphasise the priority given to public health including cancer prevention in strategic planning and action

The needs of public health as now generally understood and accepted are often not yet a priority for relevant industries. Industrial policies and practices need to be designed and carried out with public health, including prevention of cancer, in mind.

Reasons for recommendations

Built environment industries

Plan, commission, construct, and operate all built environments so as to protect public health and facilitate physical activity

The design of all built environments in the last century, including cities, transportation systems, and buildings, has given priority to mechanised transportation. This continues to have a profound effect on population levels of physical activity and thus of body fatness, and therefore on diseases including cancer the risks of which are increased by excess body weight and sedentary ways of life.

The mission and work of all industries concerned with the built environment need to incorporate protection of public health. Specifically this includes promotion of safe everyday physical activity such as walking and cycling above and beyond existing minimum legal requirements. The implications of this recommendation therefore include restriction on private motorised transport within cities. (Also see Government, page 124)

(See chapters 3.1.2.2, 3.3.2.1, 3.4.2.1, 3.4.2.2 and 3.4.2.3)

Food and drink industries

Make public health an explicit priority in all stages of food systems including product research, development, formulation and reformulation, and promotion

The ways in which food commodities are preserved and processed in the manufacture of leading products has a major effect on population and personal risk of cancer and other diseases, as shown in the 2007 WCRF/AICR Diet and Cancer Report and also in relevant current UN recommendations and strategies. One example is the use of salt. The development of industrial and domestic refrigeration has reduced the need for and use of salt as a preservative and has increased availability of fresh vegetables and fruits. This is likely to be an important reason why rates of stomach cancer have decreased all over the world.

As a general strategy, manufacturers need to make most use of processes that have a beneficial, neutral, or at least minimally deleterious effect on the risk of chronic diseases, and specifically on cancer risk. They also need to present foods and drinks in appropriate portion sizes and that are relatively low in added saturated and *trans*-fatty acids, refined starches, fats and oils, sugars and syrups, and salt.

Within the retail sector, priority needs to be given to the promotion of healthy products and restriction of the promotion of unhealthy foods and drinks, in general and particularly to children.

The evidence that foods and drinks promote health and protect against disease is derived from studies of diets comprising normal foods. The evidence that foods formulated as 'functional foods' or 'nutriceuticals' contribute to public health is insubstantial.

(See chapters 3.2.2.2, 4.3.2.1, 4.3.2.2, 4.3.2.3, 4.4.2.1 and 4.4.2.2)

Food and drink industries

Ensure that healthy meals, snacks, foods, and drinks are competitively priced compared with other products

One important determinant of choice is the relative price of products. Especially in the catering and food service sector,

Box 8.5 Industry and the prevention of cancer

The relationship between policy-makers and decision-takers committed to the protection of public health and their counterparts in industry as defined here has, since the mid-20th century, often been adversarial. The interests of public health and the commercial interests of industry, which include duties to shareholders and employees, are not coincident. Nonetheless, there is scope for the development of imaginative policies and actions that are mutually reinforcing, designed both to improve public health and specifically to prevent cancer and other diseases, and also to be the basis of profitable industries. This Report proposes that a new balance be struck in favour of health.

The issue of chronic diseases

As already stated, industrialised food systems tend to produce food supplies that are relatively safe but high in energy. When food insecurity and inadequacy were public health crises in newly industrialised Europe, the developing food and drink industries were seen as public benefactors. In the middle of the last century, following the success of nutrition science in understanding and addressing the classic micronutrient deficiency diseases, awareness grew that aspects of typical industrialised food supplies were a cause of coronary heart disease. Towards the end of the century, a consensus was established that typical diets consumed in industrialised countries are in various respects an important cause of overweight and obesity, high blood pressure and stroke, disordered blood lipids and heart disease, disorders and diseases of the digestive system — and of common cancers.[8 9]

The effect of motorised transport

Similarly, sedentary ways of life are agreed to be an independent cause of most of these disorders and diseases. As emphasised in this Report, this is not just a result of unwise personal choices. Since the early decades of the last century, a worldwide industry has developed that has had the effect of making societies dependent on motorised transport. Originally this was seen as almost wholly beneficial, just as processed foods high in sugar or fat were seen as supplying needed energy especially to growing children.

The rapid growth of international industries since the 1980s, enabled by global policies designed to promote trade and the free flow of capital, together with a general tendency towards concentration in many industry sectors, has globalised these trends. It is now apparent that the consequences of inactivity and unhealthy diets are no longer mostly confined to higher-income countries but are worldwide, and if anything are more diseases of relative poverty than of affluence.

The challenge for industry

This amounts both to a challenge and an opportunity for industry. For transnational and other very large industries the task can be compared with that of turning a great ocean tanker around: it will take time, but controls need to be reset. As proposed here, chief executive officers of leading industries can declare their commitment to public health as a priority, and develop explicit strategies that make this new priority consistent with the need to sustain profitability.

The UN Millennium Development Goals[10] form part of this challenge, which is being met by the consequent development of 'public–private partnerships' involving various actors including industry. Change for the better needs to involve the whole range of industry, not just for example car and food manufacturers. Engagement of and with industry to promote public health needs to follow guidelines such as those worked out within the UN system.[11]

pricing policies need to positively encourage healthy choices and so make such decisions the easier choices especially for people with little available income.

(See chapter 4.2.2.1, 4.2.2.2 and 4.2.2.3)

Food and drink industries

Collaborate in order to stop advertising, promotion, and easy availability of sugary drinks and unhealthy foods to children

Research shows that the advertising and promotion of processed foods and drinks, particularly on television, on the internet, and at point of sale, is almost entirely of 'convenience' or 'fun' processed foods and drinks or 'fast food'. This advertising and marketing has adverse effects on healthy eating patterns and needs to be restricted. This will require willingness on the part of industry. Voluntary codes of practice are evidently ineffective, and so the main action needs to be taken by governments. (See Government, page 124)

(See chapters 3.3.2.2 and 4.4.2.1)

Food and drink industries

Ensure that marketing and promotion of breastmilk substitutes and complementary foods follow the terms of UN codes and strategies on infant and young child feeding

The UN Strategy on Infant and Young Child Feeding specifies the importance of exclusive breastfeeding until the age of 6 months. The 2007 WCRF/AICR Diet and Cancer Report concluded that lactation protects the mother against breast cancer and that being breastfed probably protects against excess weight gain in childhood. Infant formula manufacturers need to work within relevant agreed UN codes of practice on breastmilk substitutes and on hospital, community, and other practice.

(See chapter 4.4.2.2)

Food and drink industries

Ensure accuracy, uniformity, and availability of product information in all advertising and promotion and on food labels

Descriptions and claims made on the labels of foods and drinks and as part of their advertising and promotion need to be justified, clear, and accurate, and also uniform,

otherwise customers will be confused. This will also require willingness on the part of industry. As with advertising and marketing of processed foods, voluntary codes are evidently not effective in leading to adequate or universally applied labelling systems. The main action here needs to be taken by governments. (See Government, page 124)

(See chapters 3.3.2.2 and 4.3.2.2)

Physical activity industry

Promote goods and services that encourage participation in physical activity by people of all ages, rather than in competitive or elite sporting performance

Entertainment and leisure industry

Give higher priority to entertainment products and services that enable everybody, especially children and young people, to be physically active

Most of the products and services of the entertainment and leisure industries promote sedentary ways of life. Television viewing, and by inference computer games, is a probable cause of overweight and obesity. The sports industries cater for active people but usually only for a relatively small minority. The emphasis is not on participatory but on spectator sport. Promotion is principally of elite performance, by its nature beyond the capacity of most people. More initiatives are needed that involve more people in active pursuits, rather than just competitive or elite sports.

These industries also tend to sponsor or attract sponsorship from manufacturers of unhealthy products such as cigarettes, 'fast food' and other convenience foods, and sugary drinks. As with other forms of advertising, voluntary codes here are known not to be effective. Restriction of sports and other forms of sponsorship is mainly the responsibility of governments. (See Government, page 124)

These industries, like the others specified in this section, need to change their strategies in order to involve a higher proportion of populations in everyday active ways of life.

(See chapters 4.4.2.3 and 6.4.2.2)

Table 8.5 Industry: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with industry in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
Built environment industries: Plan, commission, construct, and operate all built environments so as to protect public health and facilitate physical activity	✔	✔	✔	✔		✔	✔	✔	
Food and drink industries: Make public health an explicit priority in all stages of food systems including product research, development, formulation and reformulation, and promotion	✔	✔	✔	✔				✔	
Food and drink industries: Ensure that healthy meals, snacks, foods, and drinks are competitively priced compared with other products	✔	✔	✔	✔		✔	✔	✔	
Food and drink industries: Collaborate in order to stop advertising, promotion, and easy availability of sugary drinks and unhealthy foods to children	✔	✔	✔	✔	✔	✔		✔	
Food and drink industries: Ensure that marketing and promotion of breastmilk substitutes and complementary foods follow the terms of UN codes and strategies on infant and young child feeding	✔	✔	✔	✔	✔	✔	✔	✔	
Food and drink industries: Ensure accuracy, uniformity, and availability of product information in all advertising and promotion and on food labels	✔	✔	✔	✔	✔			✔	
Physical activity industry: Promote goods and services that encourage participation in physical activity by people of all ages, rather than in competitive or elite sporting performance		✔	✔	✔	✔	✔	✔		✔
Entertainment and leisure industry: Give higher priority to entertainment products and services that enable everybody, especially children and young people, to be physically active	✔	✔	✔	✔	✔			✔	

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those agreed to be most important.

MEDIA[1]

AIM

Sustain increased coverage of public health and well-being and prevention of obesity and chronic diseases including cancer

RECOMMENDATIONS

All media

Emphasise news, features, and campaigns designed to promote public health and to prevent cancer, and put health coverage in context

Give executives resources and authority to ensure that their writers and editors have, or know how to access, expertise in public health

Distinguish between news and editorial coverage, and advertisements and other commercially sponsored material

Advertising and publicity media

Advise clients against campaigns that make misleading or unsubstantiated claims, or that promote unhealthy diets, physical inactivity, or overweight and obesity

1. Owners, directors, editors, journalists, and other opinion-formers from the lay, technical, and specialist broadcast, print, and electronic media and entertainment communication industries, and the advertising, publicity and public relations industries.

Nature of this actor

This grouping is of the electronic, broadcast, print, and other lay, technical, and specialist news, editorial, features, entertainment, and advertising media. It includes the main decision-takers — the media owners, directors, and executives. It also includes editors with general publishing, including commercial as well as journalistic, responsibilities and working journalists — writers and editors. It further includes decision-takers in the advertising, publicity, and public relations industries. (See box 8.6. For all other industries relevant to this Report, see Industry, page 128.)

Why this actor

The broadcast and print and now also the electronic communications media are crucial actors and potential partners in all areas of public interest and concern. The media have always influenced public knowledge, attitudes, and beliefs. Since the 1980s the electronic revolution has given information and publicity communicated by the media much greater immediacy, impact, and penetrative force. Health issues are given extensive coverage on the internet and in the popular and specialist broadcast and print media. As the media are a major source of information, the recommendations for this actor derive from the evidence that people's knowledge is an important determinant of their response to other health initiatives.

As with the food and drink industries, there is a general tendency for international media to become more concentrated among a few larger concerns, both within (such as television and radio networks and newspaper and magazine groups) and between types of media (such as conglomerates controlling groupings of electronic, broadcast, print, and other networks). This gives the owners and directors of such international industries unprecedented influence.

Reasons for aim

Sustain increased coverage of public health and well-being and prevention of obesity and chronic diseases including cancer

Since the 1980s and 1990s, editorial, news, features, and other coverage of health issues in all forms of the media has greatly increased. This is only partly because of the proliferation of the media themselves, following the electronic revolution. In addition, decision-makers in the media are aware of the significance of health issues, and of the concerns of viewers and readers.

Much health coverage focuses on news of possible successful treatments for diseases, news of outbreaks or epidemics of disease whose immediate cause is microbial (such as drug-resistant hospital infections), and features on how to enhance personal health (such as by slimming treatments). The commitment of the media to health issues is clear. The purpose of this aim is to encourage all branches of the media to sustain positive and constructive coverage of issues that have an impact on public health, including the understanding, control, and prevention of cancer, while also sustaining readership and holding authorities to account.

Reasons for recommendations

Judgement of the importance of the media is not derived from evidence collected in the systematic literature reviews commissioned for this Report. While the literature on the general influence of the media, including on health issues, is substantial, it does not relate specifically to cancer prevention, and the recommendations of the Panel made here reflect collective knowledge and experience.

All media

Emphasise news, features, and campaigns designed to promote public health and to prevent cancer, and put health coverage in context

Themes known to media decision-takers to be valuable and important are given priority in allocation of human and material resources and editorial prominence. Polls consistently show that people give high priority to their own and their family's health. Once people know that a disease can

Box 8.6 The media and the prevention of cancer

The media are a major source of information. They have a responsibility to ensure that such information is presented in a balanced way, so that people are not misled. While science may often be a subject of legitimate debate, in reporting that debate the media need to give an accurate reflection of the degree to which one side or another is or is not supported by the rest of the scientific community. The media have an unrivalled opportunity to aid the public understanding of science.

The influence of the media goes beyond reporting and amplification of news. Innovative strategic decisions shape editorial coverage, which influences public understanding of and attitudes to local and global issues. One example is attitudes to the physical environment, which since the 1992 World Summit on Sustainable Development held in Rio de Janeiro and more recently because of issues such as climate change has been given extensive coverage in sustained lead news stories, as well as in extensive specialist features. The environment is also a subject of regular campaigns undertaken by the media, often in association with leading CSOs.

Public health is a big issue

The maintenance and improvement of public health is an issue that is as important and urgent as social issues such as inequity, and environmental issues such as climate change and the protection of air, water, and soil quality.

This Report also shows that such issues are often interrelated. The rapid rise in overweight and obesity since the 1980s, especially among children and young people, appears to be relentless. The environmental, economic, and social causes of overweight and obesity also increase the risk of diabetes, cardiovascular disease, and common cancers. In collaboration with other actors, the media can address these challenges with increased and sustained energy.

The evidence for a causal connection between food and nutrition, physical activity, body composition, and the risk of cancer and other diseases is convincing. Such evidence is the basis for the recommendations made in the 2007 WCRF/AICR Diet and Cancer Report. Similarly strong evidence on other chronic diseases is the basis for recommendations made in relevant UN expert reports, and for the UN strategies on diet, nutrition, physical activity, and health and on infant and young child feeding.

Balancing controversy and consensus

Best media practice now and in future is to give a higher priority to coverage designed to improve public health and prevent cancer. This need not inhibit reasonable debate and controversy. Differences of view and emphasis exist within the scientific and other expert communities. It is right for such views to be reported. However, it is also right that when minority views challenging well-founded consensus are reported, it be made clear to what extent the scientific community supports or does not support such views.

be prevented, and that their health and well-being can be enhanced, they want to know what to do. The extensive coverage now given to personal slimming treatments, and more recently to the responses of government, industry, civil society, and other actors to the increase in early life overweight and obesity, both indicate that health issues that affect the public are attractive.

(See chapters 4.4.2.3, 5.1.2.3 and 6.4.2.2)

All media

Give executives resources and authority to ensure that their writers and editors have, or know how to access, expertise in public health

Recognition that public health is a topic as important as the environment and political and economic issues implies the

Table 8.6 Media: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with the media in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
All media: Emphasise news, features, and campaigns designed to promote public health and to prevent cancer, and put health coverage in context	✔	✔	✔	✔	✔	✔	✔	✔	✔
All media: Give executives resources and authority to ensure that their writers and editors have, or know how to access, expertise in public health		✔	✔		✔			✔	
All media: Distinguish between news and editorial coverage, and advertisements and other commercially sponsored material				✔	✔			✔	
Advertising and publicity media: Advise clients against campaigns that make misleading or unsubstantiated claims, or that promote unhealthy diets, physical inactivity, or overweight and obesity		✔	✔	✔	✔			✔	

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

need to increase and maintain financial, material, and human resources devoted to coverage of public health issues. The industry could develop qualifications in health reporting to promote acquisition of the necessary skills.

This implies reallocation of budgets to give health a greater expectation of major stories within news agendas. This also implies that knowledgeable journalists will be given scope to investigate and publish major stories. Well-qualified editors and contributors will have knowledge of and contacts in a large number of specialist fields within the biological and health sciences, including epidemiology, nutrition, sports sciences, and exercise physiology, and of how these relate to the other dimensions that shape population health. Where such expertise is lacking, executives need to have the resources to ensure staff are appropriately trained. Staff without specialist expertise, for instance in smaller organisations, need to be adequately trained to be able to find authoritative sources.

(See chapters 6.2.2.1 and 6.2.2.2)

All media

Distinguish between news and editorial coverage, and advertisements and other commercially sponsored material

Advertisements and other commercially sponsored material are an essential part of the media economy. These need to be obviously distinct from editorial material and when necessary clearly and prominently labelled as such. 'Advertorials' or 'infomercials' — material including supplements and features that seem to be independent editorial, but which in fact are commercially funded advertisement — have become increasingly common in all forms of media. They should be prominently and clearly identified as such. To this end, professional bodies representing the interests of the media need to review their codes of practice on 'advertorials' to ensure fair competition.

(See chapters 6.2.2.1 and 6.2.2.2)

Advertising and publicity media

Advise clients against campaigns that make misleading or unsubstantiated claims, or that promote unhealthy diets, physical inactivity, or overweight and obesity

Advertising, publicity, and public relations directors and agents are part of or associated with the media. Individual advertising agents have been known to refuse to accept cigarette accounts, before tobacco advertising was restricted. The professional bodies that represent the interests of the advertising, publicity, and public relations industries need to review their codes of practice to specify advising clients against campaigns that are unsubstantiated or misleading or in other respects not in the public interest, including those that have the effect of promoting unhealthy diets, physical inactivity, or overweight and obesity. This especially applies to campaigns designed to attract children.

(See chapters 6.2.2.1 and 6.2.2.2)

SCHOOLS[1]

AIM

Make food systems, food, nutrition, and regular physical activity essential parts of school life and learning

RECOMMENDATIONS

Provide healthy daily meals for all staff and pupils, together with facilities for active recreation, activity, and sports[2 3]

Incorporate food and nutrition (including food preparation and cooking skills) and physical education into the mandatory core curriculum[2]

Ensure that teaching materials are independently originated and free from commercial bias

Do not allow vending machines that offer snacks high in sugar, fat or salt, or sugary drinks, and withdraw such 'fast foods' and drinks from school canteens[2]

1. Includes directors and managers of nurseries, pre-schools, and primary and secondary schools. (For universities and other higher education institutions, see Workplaces and institutions, page 137.)
2. School performance here to be monitored by government departments of education as well as local governing bodies, and results to be included in the formal published evaluation and grading of schools.
3. Also see Workplaces and institutions, page 137.

Nature of this actor

This grouping is of publicly and privately funded primary and secondary schools, and of nurseries (kindergartens, crèches) and other pre-schools. It includes governors (both from government departments of education and local school boards), executives, and teachers both in their professional capacity and as role models for their pupils. It is also addressed to parents, (see box 8.7). For universities and other higher education institutions, and for more on parents, see Workplaces and institutions and People, pages 137 and 142, respectively.)

Why this actor

The administrators and governors of schools, together with pre-school carers and schoolteachers, are actors of special importance. After the family, school usually has the greatest influence on children. Schools act on behalf of parents as carers for children as well as in providing their formal education. These dual functions are interrelated and mutually reinforcing. Schools shape habits and ways of life that often persist into adult life. Learning and experiencing the value of healthy diets and sustained physical activity is enhanced when the policies and actions of schools and teachers set good examples. (Also see box 8.7)

Box 8.7 Schools and the prevention of cancer

Experiences in childhood can be an important determinant of health in adult life. Factors operating in early life affect the risk of cancer. Body weight within a healthy range and regular physical activity protect against overweight and obesity and a number of serious chronic diseases including common cancers. Conversely, sedentary living and overweight and obesity are both causes of a number of diseases, including common cancers. The evidence that sedentary living is a cause of overweight and obesity is convincing, and processed energy-dense foods, 'fast food', and sugary drinks are all probable causes of overweight and obesity, as is television viewing, a particularly sedentary behaviour. By inference, it is likely that video games and other pastimes that make extensive use of computers are also probably a cause of overweight and obesity.

Schools have a dual role — both as places of work for staff and pupils (see Workplaces and institutions) and as places of learning for pupils. Schools therefore need to ensure that both aspects of school life promote health and are mutually reinforcing. Equally, schools are part of the community and they need to ensure that pupils and teachers work together as well as with the wider community, including parents or other carers, to define and implement school health policy.

Within the whole life course, childhood is a critical period. What children experience, whether in the physical environmental, economic, or social dimension, during their years at pre-school and school is critical for them then and also throughout life. Parents and teachers need to know this. So do other actors identified in this Report, in particular policy-makers and decision-takers in government. Public health is a public good, and healthy populations are more active and more productive. In particular, children are a vulnerable group, and the protection of their current and future health should be a priority.

Reasons for aim

Make food systems, food, nutrition, and regular physical activity essential parts of school life and learning

This aim is not new. It is a basis of the original concept of education as developed in classical Greece and then throughout Europe and the Arab world, with analogies in the Eastern world. The 'academy' or 'gymnasium' combined physical with mental training and learning and included dietetics, which originally was the philosophy of the wisely led life, with diet in its modern sense as one part.

The integrated approach to education persisted until well into the 20th century. It then generally became displaced and reduced, as nutrition and physical activity increasingly became seen as relatively unimportant. The rationale for the change has been the belief that children are generally healthy, and that the responsibility of governments and school governors need not include provision of meals or physical training. Pressure to pass examinations has become more intense. Also, the idea that people should be left free to make their own individual choices, irrespective of circumstances, has been extended to children.

This shift away from the holistic concept of education has created problems. Without set standards of school meals and physical activity, children tend to become increasingly unfit and overweight, and childhood obesity and early life diabetes is now a public health emergency in many countries.[12] There is also evidence that poor nutrition can impair academic performance.[13]

Restoration of school meals and of physical training as a central and essential part of school life and learning will often be an expensive undertaking. In many schools kitchens have been dismantled and recreation and sports grounds sold off. Trained teachers and ancillary staff have also been lost. Further, space needs to be found in core curricula for nutrition and physiology as academic as well as practical subjects. Good understanding of the value of healthy diets is increased by the practical experience of consuming appropriate and delicious meals at school, by learning about nutrition as part of the core curriculum, and by practical and academic physical education. Also, children need to know about all aspects of food systems, from how food is produced and processed to how they can make a difference in the home by discriminating use of food labels, and by the enjoyment of domestic economy and food preparation and cooking.

National government has the main responsibility here, for both publicly and privately funded schools. An implication is that assessment and ranking of the achievement of schools will incorporate judgement of their performance in both theoretical and practical nutrition and physical training. (See Government, page 124)

Reasons for recommendations

Provide healthy daily meals for all staff and pupils, together with facilities for active recreation, activity, and sports

Meals need to be supplied for all pupils and staff. Nutrition and other standards for school meals need to be implemented, as issued by governments, UN agencies, or leading civil society organisations. Price support for meals will take into account comparative costs of 'fast food' and other convenience foods obtainable off the school premises. Meals need to be served to staff together with pupils, preferably in the same attractive dining areas. When a school has no space for organised physical education, this can be obtained by arrangement with another school or institution in the area, or else rented. Otherwise see the overall aim, above. (Also see Workplaces and institutions, page 137)

(See chapters 4.3.2.3, 5.2.2.2, 5.2.2.3 and 6.4.2.2. The main responsibility here is that of government, see page 124.)

Incorporate food and nutrition (including food preparation and cooking skills) and physical education into the mandatory core curriculum

It is all the more essential, given the current epidemic of childhood and early life overweight and obesity, that the teaching of nutrition as an academic and also practical subject, as well as physical activity, be mandatory in both

primary and secondary schools. The great increase in pre-prepared ready-to-heat meals and dishes and of convenience foods and drinks means that many parents and their children have lost or have never gained cooking skills, which therefore need to be taught in school together with related practical skills such as household economy. Otherwise see the overall aim.

(See chapter 5.2.2.1. The main responsibility here is that of government, see page 124.)

Ensure that teaching materials are independently originated and free from commercial bias

Schools need up-to-date teaching materials, increasingly now originated and accessed on the internet. Authorities responsible for publicly and privately owned and directed schools need to insist that budgets for all core subjects enable access to and supply of adequate independently originated teaching materials.

One consequence of pressure on school budgets has been that teaching materials for some subjects, especially those seen to be 'practical' or otherwise of relatively low academic importance, are increasingly originated or supported by commercially interested parties other than publishers and made available to schools often at discounted prices or free of charge. These are a type of 'advertorial': material that seems to be independent, but which in fact is an advertisement (see Media, page 132). Such materials, when they concern food and nutrition, may acknowledge their origin as from a specific company (usually a giant transnational manufacturer or retailer) or else from an organisation representing the interests of a trade group (such as manufacturers or caterers in general, or say the meat or sugar industry). Others are issued by foundations or institutions mainly or solely governed and funded by processed food and drink manufacturers and associated industries.

The responsibility of administrators and governors of schools includes ensuring that the main materials used to learn about food and nutrition and exercise physiology are independently originated. Teachers can identify materials that are commercially originated or supported and use those to show how messages about food, nutrition, physical activity, and health can be and are manipulated and distorted by interested parties.

Regularly updated independent materials such as those issued by governments or by independent CSOs (such as the Center for Science in the Public Interest in the USA, the Food Commission in the UK, WCRF, and AICR), valuable as part of core teaching, can be used for comparison.

(See chapters 6.2.2.1 and 6.2.2.2)

Do not allow vending machines that offer snacks high in sugar, fat or salt, or sugary drinks, and withdraw such 'fast foods' and drinks from school canteens

Vending machines serving 'fast food' and other convenience snacks and drinks have become a feature in school premises since the 1980s. The economy of a growing number of schools has become increasingly dependent on money given by the manufacturers of the products sold in the machines in return for the concession. The machines usually take the form of advertisements for a transnational drink or sometimes food manufacturer. The products are typically heavily advertised and marketed worldwide, and their ingredients, including refined starches, fats, sugars, salt, and sometimes other additives, can be habit forming.

These vending machines and their products undermine good nutrition and their presence within school premises is insidious. It is time for them to be withdrawn, together with similar snacks, foods, and drinks sold in school canteens. (Also see Workplaces and institutions, page 137)

(See chapters 5.2.2.2 and 5.2.2.3. The main responsibility here is that of government, see page 124.)

Table 8.7 Schools: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with schools in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
Provide healthy daily meals for all staff and pupils, together with facilities for active recreation, activity, and sports		✔	✔	✔		✔		✔	✔
Incorporate food and nutrition (including food preparation and cooking skills) and physical education into the mandatory core curriculum	✔	✔	✔	✔		✔		✔	✔
Ensure that teaching materials are independently originated and free from commercial bias	✔	✔	✔			✔		✔	✔
Do not allow vending machines that offer snacks high in sugar, fat or salt, or sugary drinks, and withdraw such 'fast foods' and drinks from school canteens		✔	✔	✔	✔	✔		✔	✔

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

WORKPLACES AND INSTITUTIONS[1]

AIM

Institute and implement policies that promote physical activity, and healthy meals and body weight

RECOMMENDATIONS

Workplaces and institutions

Use price and other incentives to encourage healthy eating and active commuting, and to discourage motorised transport

Ensure that physical environments are designed or adapted and maintained to facilitate physical activity and weight control

Encourage sustained breastfeeding with supportive environments and employment contracts, and access to childcare

Do not allow vending machines that offer snacks high in sugar, fat, or salt, or sugary drinks, and withdraw such 'fast foods' and drinks from canteens

Institutions

Provide healthy meals, facilities for physical activity, and access to advice on nutrition, fitness, weight control, and disease prevention

1. Includes all managers and directors in all workplaces, public and private. Also universities and other higher education institutions, hospitals, hostels, care homes (for people without and with cancer), armed forces facilities, prisons, and other institutional settings.

Nature of this actor

This grouping is of workplaces and institutions other than schools. It is addressed to those who make corporate or institutional policy and take decisions in their capacity as employers (including owners and directors or governors and on-site managers). Institutions other than schools include universities and other places of higher education, hospitals, hostels, and care homes (for people without and with cancer), the armed forces, and prisons. (For schools, see Schools, page 134.)

Why this actor

Workplaces and institutions are settings in which behaviour is at least to some extent constrained, and in which healthy choices can be encouraged by improving access, availability, and affordability. The context is different from schools in that most people in these settings are adults.

Nonetheless, employers have a duty of care to their staff and also act as examples. Duty of care is more obvious in institutional settings. This responsibility is as clear cut in hostels, care homes, and prisons as it is in schools, because people who are infirm or imprisoned are largely or completely dependent on these institutions for catering and physical activity facilities. Hospitals have a dual role, as a workplace for the staff and an institution for the patients. The evidence that physical and mental performance is enhanced when people are well nourished and physically fit makes healthy diets and physical activity a matter of prudence as well as a public duty in university and armed forces settings.

Reasons for aim

Institute and implement policies that promote physical activity, and healthy meals and body weight

The duty of care of employers and those responsible for institutions is to do all that is practicable to support healthy choices. This includes physical environmental, economic, and social support, necessarily adapted to circumstances and allowing for what is feasible. In this, employers themselves need support from governments and relevant industries, and from CSOs, health and other professionals, their own employees and the people within institutional settings, and their colleagues.

Employers, and those responsible for institutions, who facilitate or provide and maintain high standards of nutrition and physical activity and encourage weight control, will help to promote health including preventing cancer among their staff and the people for whom they are responsible.

Employers who look after the interests of their staff are likely to make them feel valued. This is especially so in workplaces when the nature of the work itself involves consideration of health and well-being, such as in relevant government departments, CSOs concerned with health and welfare, health services, hospitals, and schools.

The duty of care of those responsible for institutions other than schools are broadly the same as those for schools, except that other institutions are usually for adults, and for people at different times of life in different circumstances. (See the recommendations following in this section, and also see Schools, page 134.)

Reasons for recommendations

Workplaces and institutions

Use price and other incentives to encourage healthy eating and active commuting, and to discourage motorised transport

Larger firms can provide staff canteens in pleasant surroundings with price-supported choices of healthy meals, foods, and drinks, as price and easy availability of cheap, unhealthy food can impede healthy choices. Firms of all sizes can supply fresh or dried fruits or nuts to internal meetings instead of biscuits (cookies), and water, tea, or coffee instead of sugary drinks, or ensure that healthy foods and drinks are brought in for sale daily.

Good employment practice includes reliable advice on

healthy ways of life. This can be as sections in company newsletters or by provision of authoritative information, such as from government agencies or CSOs. Hours of employment can be staggered or varied to make active transport more practical. Firms of all sizes can encourage active travel to and from work by offering flexible working hours, or by personal example of senior staff. (Also see the general aim on pages 137, and the recommendation on vending machines and 'fast food', see below.)

(See chapters 5.2.2.3 and 5.2.2.4)

Workplaces and institutions

Ensure that physical environments are designed or adapted and maintained to facilitate physical activity and weight control

Larger firms may be able to provide sports and recreation facilities in their own grounds or by sharing these facilities with other firms. Firms of all sizes can make sure that stairs are attractive and well signed, provide maps of local running, cycling, and exercise routes, and encourage staff to use break times to be physically active. Larger firms can also offer free or discounted membership of local health clubs, and provide bicycle storage and changing and showering facilities.

Different types of institutions, including universities and the armed forces, can provide such facilities but will need to adapt their use to particular circumstances. The constraints of hospitals, care homes, and prisons lay a special duty of care on those responsible, supported by laws, regulations, and quality codes issued by government, and as necessary with public money. (Also see Schools, page 134)

(See chapters 3.3.2.2 and 5.2.2.4)

Workplaces and institutions

Encourage sustained breastfeeding with supportive environments and employment contracts, and access to childcare

In many countries, employment laws protect the interests of mothers of babies and young children, and of their partners and families, by requiring employers to give substantial paid maternity leave. Good practice is for employers to welcome such laws and offer reasonable further extensions of maternity leave, flexible working hours, and supported access to childcare facilities. In addition, time and space in the workplace can be reserved for expressing and storing of breastmilk. The same general principle applies and needs to be adapted for institutions that include women with babies and young children. Mothers serving in the armed forces or who are imprisoned need special support in those circumstances.

(See chapters 3.4.2.1 and 5.2.2.4)

Workplaces and institutions

Do not allow vending machines that offer snacks high in sugar, fat, or salt, or sugary drinks, and withdraw such 'fast foods' and drinks from canteens

The case against vending machines that offer 'fast food' and other convenience snacks, foods, and drinks is similar to that for schools. However, adults in workplaces and most institutional settings, including those of higher education, are likely to expect to be able to choose what they purchase and consume. This is not a case for on-site vending machines, and they are best discouraged. They are particularly inappropriate in workplaces concerned with health and

Table 8.8 Workplaces and institutions: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with schools in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
Workplaces and institutions: Use price and other incentives to encourage healthy eating and active commuting, and to discourage motorised transport		✔	✔	✔			✔	✔	✔
Workplaces and institutions: Ensure that physical environments are designed or adapted and maintained to facilitate physical activity and weight control		✔	✔	✔			✔	✔	✔
Workplaces and institutions: Encourage sustained breastfeeding with supportive environments and employment contracts, and access to childcare	✔	✔	✔		✔		✔	✔	✔
Workplaces and institutions: Do not allow vending machines that offer snacks high in sugar, fat or salt, or sugary drinks, and withdraw such 'fast foods' and drinks from canteens		✔	✔	✔	✔		✔	✔	✔
Institutions: Provide healthy meals, facilities for physical activity, and access to advice on nutrition, fitness, weight control, and disease prevention		✔	✔	✔			✔	✔	✔

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

institutions that care for sick and infirm people. Any such machines are best reserved for the vending of healthy snacks such as fruits. Bottled water, with or without added micronutrients and other additives, is not needed where tap water is safe. (See Schools, page 134)

(See chapter 5.2.2.3)

Institutions

Provide healthy meals, facilities for physical activity, and access to advice on nutrition, fitness, weight control, and disease prevention

In all workplaces and institutions, healthy diets and physical activity suited to circumstances and settings, together with access to authoritative advice on weight control and prevention of disease (see box 8.1), is best seen as a basic and invariable part of their purpose. The quality of these services can be formally assessed. (See Schools, page 134)

(See chapters 4.3.2.3, 5.2.2.3 and 5.2.2.4)

HEALTH AND OTHER PROFESSIONALS[1]

AIM

Conduct professional practice to realise the potential for promoting health including cancer prevention

RECOMMENDATIONS

All professionals[1]

Include food, nutrition, physical activity, and cancer prevention in core professional training and continuing development

Work with other disciplines to help understand how to improve public health, including cancer prevention, through food, nutrition, and physical activity

Health professionals

Prioritise public health including cancer prevention, and food, nutrition, and physical activity, in core training, practice, and professional development

Take a lead in educating and working with colleagues, other professionals, and other actors to improve public health including cancer prevention

Involve people as family and community members, and take account of their personal characteristics in all types of professional practice

1. Health professionals include relevant academics and researchers, and physicians, nutritionists, dietitians, nurses, and other health workers in medicine, public health, environmental health, and associated fields. Other professionals include architects and engineers, relevant civil servants, trades unionists, social scientists, economists, environmentalists, agronomists, food scientists and technologists, journalists, and teachers.

Nature of this actor

This group includes all professionals, usually formally qualified in their fields, and their professional bodies, whose policies, decisions, and work may have an impact on public health, and specifically on cancer, (see box 8.8). Professionals whose practice has an impact on public health include architects and engineers, relevant civil servants, trades unionists, social scientists, economists, environmentalists, agronomists, food scientists and technologists, journalists, and teachers. (For these other relevant professionals, also see Multinational bodies, Government, Civil society organisations, Industry, Media, and Schools.) Health professionals include relevant academics and researchers and physicians, surgeons, nutritionists, dietitians, nurses, and other health workers in medicine, public health, environmental health, and associated fields.

Why this actor

Health professionals have a direct and obvious influence on people's health. Medical doctors in particular are trusted by the public and are expected to be qualified to give advice and guidance on good health and well-being and prevention of disease, as well as diagnosis and treatment of disorders and diseases. In their daily interactions with people, health professionals have unrivalled opportunities to provide information and encouragement in support of healthy ways of life. The systems in which they work, while different between and within countries and resourced and organised at different levels, all provide opportunities for promoting health as well as treating disease.

The practice of other professionals can have a profound impact on public health. Particular examples are architects, engineers, and associated professions who are responsible for built environments. Professionals whose practice shapes food systems and food supplies include agronomists, environmentalists, and food scientists and technologists. Such professionals are likely to be aware that their work has some effect on public health. Others, such as civil servants working outside government departments of food or health, may not think in these terms. Teachers and journalists educate and inform, including about health.

Reasons for aim

Conduct professional practice to realise the potential for promoting health including cancer prevention

All relevant professionals need to be aware of the vital importance of public health within any society, and to accept their responsibility to protect and promote public health. This is more obviously so for health professionals and for those like teachers and journalists responsible for education and information. It is also true for those outside the health professions, in particular those whose work shapes built environments and food systems and supplies.

Reasons for recommendations

All professionals

Include food, nutrition, physical activity, and cancer prevention in core professional training and continuing development

Public health can be and is taught and practiced as a specialist subject. However, the forces that impinge on public health are general. Decisions taken by legislators and civil servants in government at all levels with direct responsibility other than for health, such as for finance, trade, and education, may have particularly significant impacts on public health. Typically such effects are not planned but inadvertent. Equally the practice of architects and town planners can shape the physical environment in ways that influence the opportunities people have for physical activity.

Comparably, the practice of medical professionals is likely to have less effect on population health than the policies and actions of other professionals in multinational bodies and industry as well as governments, particularly those responsible for food systems and supplies and built environments. Sometimes such practices are planned and carried out with public health in mind. Often they are not. An important example is transportation systems planned to facilitate motorised transport.

The first step is for all relevant professionals to be aware that their decisions can impinge on public health. The next step is that the training of such professionals includes knowledge of how their practice can protect and promote public health. Then, competence in public health impact needs to be built into formal training, professional development, and assessment systems for which governing bodies and peer groups are responsible.

(See chapters 3.4.2.1, 3.4.2.2, 3.4.2.3, 4.2.2.4, 5.2.2.3, 5.2.2.4, 6.2.2.1 and 6.2.2.2)

Box 8.8 Health and other professionals and the prevention of cancer

All relevant professionals inside and outside the medical and health professions need to have knowledge of public health to an appropriate degree, build the need to protect public health into their work, and include the effect of their work on public health in assessment by their governing bodies and their peers.

Revival of classic public health

Such recommendations in effect revive the classic period of public health of the first period of industrialisation in Europe in the mid- and later 19th century. This was the time when water supplies of cities in industrialised countries were made safe by engineers who constructed and maintained comprehensive sewage and water purification systems. Laws and regulations began to be introduced in order to provide more light, less pollution, better sanitation, less crowding, adequate and more varied food supplies, shorter working hours, paid holidays, child-care facilities, publicly funded schools, and more open spaces and facilities for recreation, as well as safe water.

From the later 19th century and especially in the 20th century, with evidence of improvement in population health, the increased efficacy of medical treatment, and the then general belief that most diseases are caused by infectious and other single agents, public health became more specialised.

The role of medicine

The role of the medical and other health professionals in the diagnosis, treatment, and care of people with disorders and diseases will remain fundamental. At the same time, understanding the economic, social, environmental, and behavioural determinants of health, well-being, and disease, as summarised in the case of cancer in this Report, implies a revival of the integrated approach to public health and a return to the precepts and principles of the 19th century pioneers, in a form suitable for the circumstances of the 21st century.

The health professions have an additional responsibility to act as role models, and to lead the promotion of public health in both training and practice, within their own and other professions.

All professionals

Work with other disciplines to help understand how to improve public health, including cancer prevention, through food, nutrition, and physical activity

A key theme running through these recommendations is the need for all actors to work together. It is equally important that practitioners collaborate both within and between different professions. For instance, architects may work with health specialists to shape the built environment in ways that promote physical activity. Interdisciplinary research will improve the evidence base for actions likely to promote health, including preventing cancer.

(See chapters 3.4.2.1, 3.4.2.2, 3.4.2.3 and 6.2.2.2)

Health professionals

Prioritise public health including cancer prevention, and food, nutrition, and physical activity, in core training, practice, and professional development

Medical professionals, in particular physicians, are often given relatively cursory training in public health, including the environmental, economic, social, and behavioural drivers of well-being, health, and disease. Systematic medical training in nutrition and physical activity is the exception rather than the rule and is often virtually absent. The governing bodies responsible for the academic and other training and qualifications of health professionals have a responsibility to recognise and change this.

(See chapters 6.2.2.1, 6.2.2.2, 6.3.2.1, 6.4.2.1 and 6.4.2.2)

Health professionals

Take a lead in educating and working with colleagues, other professionals, and other actors to improve public health including cancer prevention

Professionals whose work has an impact on public health need training and support of a type that has become relatively unusual in an era when disciplines have tended to become increasingly specialised and narrowly focused.

Public health teaching and practice suitable for the circumstances of the 21st century crosses traditional boundaries between disciplines. This complexity is potentially true of nutrition, especially in relation to physical activity, energy metabolism, and body composition. Further complexity is introduced by the relevance of the economic, social, and environmental determinants of patterns of diet, physical activity, body weight, and fatness, and thus of health and diseases including cancer.

Individual professionals cannot be expected to become expert in all relevant fields. Rather, fair general knowledge and understanding is needed, together with detailed knowledge of specific areas. This all implies teamwork, within and between professional disciplines. Health professionals have a responsibility to take the lead in promoting health though their interactions with colleagues in their own professions, with other professionals as described here, and also with other actors, as identified in the other sections of this chapter.

(See chapters 5.1.2.3, 5.4.2.3, 6.2.2.1 and 6.4.2.2)

Table 8.9 Health and other professionals: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with health and other professionals in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
All professionals: Include food, nutrition, physical activity, and cancer prevention in core professional training and continuing development		✔	✔					✔	
All professionals: Work with other disciplines to help understand how to improve public health, including cancer prevention, through food, nutrition, and physical activity	✔	✔	✔	✔	✔	✔	✔	✔	
Health professionals: Prioritise public health including cancer prevention, and food, nutrition, and physical activity, in core training, practice, and professional development			✔					✔	
Health professionals: Take a lead in educating and working with colleagues, other professionals, and other actors to improve public health including cancer prevention	✔	✔	✔	✔	✔	✔	✔	✔	✔
Health professionals: Involve people as family and community members, and take account of their personal characteristics in all types of professional practice			✔					✔	✔

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

Health professionals

Involve people as family and community members, and take account of their personal characteristics in all types of professional practice

This recommendation is addressed to investigators concerned with research involving humans that is designed to examine factors influencing well-being, health, and disease, including cancer, as well as to practitioners in their daily work. The evidence shows that interventions are most likely to be significant and effective when they address clusters of possible influences rather than single factors, and when they involve people as family or other group members rather than as collections of isolated individuals. At the same time it is also important to take account of people's personal characteristics such as their age, sex, social and ethnic background, knowledge, attitudes, beliefs, and emotional states.

This observation creates a problem for scientists who wish to isolate causal factors, but it is likely that various associated factors that affect human health, including the risk of cancer, act in combination, and sometimes synergistically.

(See chapters 5.5.2.2, 6.1.2.2, 6.2.2.1, 6.3.2.1 and 6.4.2.1)

PEOPLE[1]

AIM

Act as members of households and communities and as citizens, not just as customers and consumers, in achieving healthy ways of life

RECOMMENDATIONS

Support organisations and initiatives whose purpose is to improve public and personal health and to prevent chronic diseases including cancer

Develop policies and set examples within the household and community to enable healthy eating, sustained physical activity, and weight control

Ensure that personal, household, family, and community good health and protection against disease are priorities when making major decisions

Use independent nutrition guides, food labels, and other reliable information when planning household supplies and purchasing foods and drinks

1. As members of networks, communities, clubs, families, and households, not just as individuals.

Nature of this actor

This group includes people as policy-makers and decision-takers, in their capacities as members of close-knit groups such as networks, communities, clubs, friends, families, and households, and as individuals. Personal recommendations are included in the 2007 WCRF/AICR Diet and Cancer Report. Here, people are also addressed as having responsibility for others, as parents and citizens. (See box 8.9. Also see Civil society organisations, page 121)

Why this actor

In any society, people usually do not make decisions and choices in isolation. As shown in Part 2 of this Report, even simple decisions such as choosing one product or one dish rather than another in a supermarket or restaurant, or going for a long walk on a sunny day, are likely to be shaped by physical environmental, economic, social, and behavioural factors. Household purchases of foods and drinks and of goods that reinforce sedentary or active behaviour are decisions shaped by such factors and also by awareness of the needs and preferences of others. In lower-income countries and communities, opportunity for individual choice may be limited and among impoverished communities may often be practically non-existent.

People are citizens, often parents, and usually friends and relations of others, not just individual customers and consumers. Within families one or another person often makes decisions on the purchase of foods and drinks on behalf of the family as a whole. The same applies to food grown for family and community consumption.

Reasons for aim

Act as members of households and communities and as citizens, not just as customers and consumers, in achieving healthy ways of life

Eventually it is people who make the difference in society, not simply as accumulations of individuals, but as members, and leaders, of groups. This is a fundamental aspect of democracy, and of public health. Individual consumer demand is not the only or even the main force driving food systems and supplies and thus what is available for purchase. This is particularly so in lower-income and impoverished countries and communities where freedom of choice is limited.

By contrast, the influence of people acting together as citizens, and as represented by effective civil society organisations and amplified by the media, is considerable and can have a decisive and lasting effect on the policies and actions of governments and industry.

Reasons for recommendations

Support organisations and initiatives whose purpose is to improve public and personal health and to prevent chronic diseases including cancer

Dissemination of healthy ways of life by active membership and support of relevant community, local, national, and international CSOs will help to improve personal and public health.

People can help to protect themselves as customers and consumers by acting as citizens, and by supporting relevant CSOs in their own interests and those of their households or families and communities, as well as the general public interest. They can also support scientists whose research is designed to help prevent chronic diseases including cancer,

Box 8.9 People and the prevention of cancer

Expert reports produced by UN agencies, national governments, and other authoritative bodies, designed to control and prevent disease by means of diet or physical activity frequently include both population goals and personal recommendations. Until the 1990s, these usually focused on nutritional and other biological factors believed to affect the risk of disease, and the personal recommendations were usually addressed to individuals.

More than just individuals

The recommendations of this Report take into account the physical environmental, economic, and social as well as the personal factors that affect health, well-being, and disease — in particular cancer. Here, people are addressed socially as well as individually, in the light of evidence showing that focus on people as members of families and other close-knit groups rather than as individuals is more likely to enable effective and lasting moves towards healthier ways of life.

Citizen representation

In an area directly relevant to recommendations made in this chapter, an outstanding example of successful citizen advocacy is, as already mentioned, the work of international and national networks mostly of women who, since the 1970s and 1980s, have made the case for breastfeeding. This has led to laws and codes of practice at national and international level designed to facilitate breastfeeding that are now formally accepted by manufacturers of infant formula and also of weaning foods.

Another example of advocacy by and on behalf of parents, also directly relevant to recommendations made in this chapter, are the current campaigns to ensure nutritional standards for school meals, the withdrawal of snack and drink vending machines in schools, and the restriction of advertising and marketing of foods and drinks to children. The influence of such civil society organisations crucially depends on the scale and breadth of the support from people acting as citizens.

(Also see Civil society organisations, page 121)

Table 8.10 People: working with other actors

All relevant actors need to work together in developing policies and turning them into effective actions. This table shows the actors immediately needed as partners with health and other professionals in achievement of the recommendations made here

	Multinational bodies	Civil society organisations	Government	Industry	Media	Schools	Workplaces, institutions	Health and other professionals	People
Support organisations and initiatives whose purpose is to improve public and personal health and to prevent chronic diseases including cancer		✔			✔	✔	✔	✔	✔
Develop policies and set examples within the household and community to enable healthy eating, sustained physical activity, and weight control		✔			✔	✔	✔	✔	✔
Ensure that personal, household, family, and community good health and protection against disease are priorities when making major decisions		✔				✔			✔
Use independent nutrition guides, food labels, and other reliable information when planning household supplies and purchasing foods and drinks		✔			✔			✔	✔

The left hand column of this table lists the recommendations for this actor, and the other columns list all actors. Absence of a tick does not necessarily imply that an actor is irrelevant. The actors ticked are those judged to be most important.

by enlisting in research projects, preferably as families or other groups.

(See chapters 5.5.2.1 and 6.1.2.4)

Develop policies and set examples within the household and community to enable healthy eating, sustained physical activity, and weight control

Almost everybody lives as part of a group in society. Personal behaviour and habits affect other members of households or families, friends, networks, and communities, and especially children and young and other vulnerable people. When a member of a household or family creates time to prepare home-made meals, and to be moderately or vigorously physically active, this sets an example that can also benefit companions and family members. Foods and drinks purchased for home preparation and consumption tend to be more healthy than products purchased for individual consumption in restaurants, bars, the street, or at home.

(See chapters 6.1.2.1, 6.1.2.2, 6.1.2.3 and 6.4.2.2)

Ensure that personal, household, family, and community good health and protection against disease are priorities when making major decisions

In societies where medical and other health services are well established, people sometimes tend to take good health for granted until illness strikes, when they come into contact with health professionals. However, by this time many diseases and disorders may be difficult or even impossible to treat successfully. This is true of several types of cancer. Healthy ways of life are the best first line of protection. At a personal level, prevention of disease and promotion of positive health and well-being is a responsibility of people individually and as partners, parents, and family and community members. This applies also to people in professional as well as social capacities. Major decisions are best taken with personal including household or family and community health in mind, as a priority equal with those of income and security.

(See chapters 6.1.2.1, 6.1.2.2, 6.1.2.3, 6.1.2.4, 6.2.2.1, 6.2.2.2, 6.3.2.1, 6.4.2.1 and 6.4.2.2)

Use independent nutrition guides, food labels, and other reliable information when planning household supplies and purchasing foods and drinks

Guides to healthy eating and to ways of staying physically active are issued by UN agencies, national governments and professional and CSOs such as WCRF and AICR, and are often featured in the electronic, broadcast, and print media. Processed foods and drinks, and sometimes fresh foods, often carry information about their ingredients and nutrient composition, as well as health claims. Food advertisements, including health claims, may be misleading, even when technically accurate. Ingredient and nutrient composition labels are useful, but need to be interpreted in order to be of value.

(See chapter 4.3.2.2 and box 8.1)

8.2 Research issues

The conclusions and recommendations of this Report are based on systematically reviewed evidence, reinforced by other information.

The range of evidence covered by this Report, both from peer-reviewed journals and other literature, is vast. Many of the most potent environmental, economic, and social forces that determine patterns of diet, physical activity, and body fatness, and so cancer risk, have not yet been the subject of sustained research. Thus, as summarised in chapter 3, climate change is likely to have a profound impact on food systems and supplies, but its precise nature is unpredictable.

A constraint on reports concerned with public health, including the prevention of cancer, is that the range of literature usually considered relevant has been inappropriately narrow. The concept of 'prevention' has tended to be seen as a medical matter, and so mostly the concern of health professionals. Prevention in this sense is of course essential. But in the broad sense used in this Report, prevention is — or needs to be — the concern of policy-makers and decision-takers among all the actors identified in this chapter. A constant theme of this Report is the need for the protection of public health to be built into all relevant public policy.

8.2.1 Future reviews of evidence

Future work to establish the rational basis for policy and actions needs to be built on the findings from this Report. Transparent and systematic methods need to be developed that cover the wide and varied relevant evidence base, and the great variety of sources in which it appears, on a national and regional basis, to ensure fuller knowledge and understanding of specific environments.

8.2.2 Specifically directed research

Much conventional research is not undertaken specifically to aid decisions on policy and action. In many cases, new research needs to take the form of studies that monitor the effect of existing and new programmes and actions. Such research will provide direct evidence for their relative failure or success, but may also provide information that can be of wider application. Specific research is also needed in areas where the impact of policies and actions is likely to be relatively high, but where evidence seems to be lacking.

8.2.3 Systems analysis

What is also needed is systems analysis. This is designed to help understand complex and dynamic processes, such as the multi-dimensional impact of the industrial production of animals, or of the replacement of local shops and street markets with supermarkets, or of cities redesigned in ways that make cycling safe and pleasant. Frequently used to model environmental and economic impacts, systems analysis is less used to understand external factors that may impact on public health, including prevention of cancer. The result of such analysis is likely to reshape conceptual frameworks and structures such as that in chapter 1 of this Report and as evident in the way the whole Report is presented. This is both a challenge and an opportunity.

8.3 The future

This Report is the culmination of a complex project. It also marks the beginning of work to translate its recommendations into policies and actions.

8.3.1 The overall recommendation

The overarching recommendation of this Report does not appear among those addressed to the individual actors in this chapter. This is for all actors to work together to control and prevent cancer and other diseases and to promote positive health and well-being throughout life.

The key to success in promoting public health is integration. All relevant actors need to work together as partners. Policies and actions designed to prevent cancer will be most effective within a broader context of prevention of other diseases, and especially those with causes in common with cancer.

Further, as stated in the WHO Alma Ata Declaration[14] and many other statements, health is more than the absence of disease. Positive health and well-being are central to the full enjoyment of life, and it is good public health policy to emphasise that policies and actions that prevent cancer also promote good health.

In any policy or programme designed to prevent cancer, it is likely that one actor will take the lead, or else in an equal partnership will take responsibility for coordination. For example, national governments, supported by civil society and professional organisations, will take the lead in any initiative involving legislation, and food manufacturers have the most direct responsibility for formulation and reformulation of products to ensure that they are healthy.

This said, initiatives most likely to be successful, in the sense of having lasting positive impact, will usually involve several or even all actors working together from the outset. Many actors dedicated to working in the public interest are specialised and work separately from one another. When possible, allowing for the value of independence, partnerships are essential.

Policies and actions need to be equitable, and where appropriate favour populations who are disadvantaged and who may have most to gain from avoidance of disease. Policies and actions also need to be sensitive to the fact that all types of resource are not inexhaustible, and to the compelling evidence of the deterioration of water supplies, air quality, and land, and also of climate change.

Sustainable and equitable policies and actions will for example prefer patterns of diet based on locally available produce, will build physical activity into everyday life rather than depend on private and often expensive facilities, and will favour breastfeeding most of all in countries where water supplies may be unsafe and where families do not have the money for infant formula. This approach also affects the ways in which research and interventions are carried out; these should make economic use of materials, not assume that 'the bigger the better', and make sparing use of long-distance travel.

8.3.2 Health is everybody's business

The task ahead is ambitious, but it is feasible.

This Report is designed to empower everybody. It is offered to policy-makers and decision-takers working within and for multinational bodies, CSOs, governments at national and all other levels, industry, the media, schools, other institutions and workplaces, health and other professionals, and people as citizens and as customers and consumers.

Rationally based, it is also a call to action to people or groups in a position to source, inspire, and sustain what will amount to a new movement in the interests of public health. Among these there are key people or groups. They may be heads of state or prime ministers, with their teams. They may be chief executive officers of great transnational companies. They may be leaders of CSOs.

The success of this Report remains to be seen. It is offered to all its readers throughout the world as a rational basis for, and a spur to, a great new public health movement in which all work together in the interests of health for all and the common good.







Appendices

APPENDIX A

Preventability of cancer by food, nutrition, and physical activity

Background and objectives

In order to estimate the potential to prevent cancer through food, nutrition, physical activity, and body fatness, the proportion of cancer cases in four selected populations that could be attributed to specific exposures (population attributable fractions — PAFs) were computed based on the 2007 World Cancer Research Fund /American Institute for Cancer Research (WCRF/AICR) Diet and Cancer Report.

Conventionally, PAFs are sometimes also referred to as preventable fractions, but these are not identical. To estimate the proportion of cancers attributable to any factor it is necessary to consider the exposure to that factor over the period leading to diagnosis. Therefore, the proportion attributable at any one time depends on the exposure during earlier periods, though this may change over time. Conversely, the proportion preventable in the future — the objective of the current exercise — depends to a greater extent on current exposures.

Estimates were made for the UK, the USA, Brazil, and China, representing high- (the UK and the USA), middle- (Brazil), and low-income (China) countries. Estimates were for specific cancers as well as total (all) cancers in relation to food, nutrition, physical activity, and body fatness, with separate estimates for men and women for body fatness.

Methods

Risk estimates from the 2007 WCRF/AICR Diet and Cancer Report

PAFs were calculated where possible for exposures graded convincing or probable causes of cancer in the 2007 WCRF/AICR Diet and Cancer Report, with some exceptions. No calculations were made where the 2007 WCRF/AICR Diet and Cancer Report made no recommendations. This applies to foods containing calcium/dairy and to adult attained height. In addition, no specific recommendation was made for foods containing selenium, and a trial published during the preparation of this report found no benefit from selenium supplements.[1]

Of the 17 cancer sites that were the subject of systematic literature reviews for the 2007 WCRF/AICR Diet and Cancer Report, 12 are included in this report: mouth, larynx, and pharynx; oesophagus; lung; stomach; pancreas; gallbladder; liver; colorectum; breast; endometrium; prostate; and kidney. Nasopharynx and skin cancers were not included as it was not possible to obtain good-quality information on consumption of Cantonese-style salted fish or arsenic in drinking water, respectively. Cervix and bladder cancers were not included as there were no relevant convincing or probable exposures. Ovarian cancer was excluded because the only exposure graded convincing or probable was for adult attained height, which was not the subject of a recommendation. Cancer incidence data were not available specifically for postmenopausal breast cancer as menopausal status at diagnosis was not recorded in cancer registries. Risk estimates were therefore only calculated for total breast cancer. PAFs for premenopausal breast cancer were not calculated as it was not the subject of a recommendation.

There are several approaches for deriving the information needed to make these estimates. All rely on various assumptions and therefore are imperfect to some extent. Each method may rely on different assumptions and therefore may result in different answers and no single method can be regarded as inherently superior. The method used here is also based on several assumptions, so the caution that needs to be used in interpreting other estimates of preventability also needs to be applied to this exercise.

Relative risk estimates were derived from the comparison of highest versus lowest exposure analyses. Dose-response summary estimates from the meta-analyses in the WCRF/AICR Diet and Cancer Report were not used as many studies could not be included in the meta-analyses. Furthermore, these estimates were based on the assumption that the dose response was linear and this may not be so, and is not an issue when comparing risk between highest and lowest exposure categories. Highest versus lowest risk estimates for each exposure were selected from a single study included in the 2007 WCRF/AICR Diet and Cancer Report. Summary estimates of highest versus lowest exposure were not used in the 2007 WCRF/AICR Diet and Cancer Report, and were not calculated for this exercise. Because the level of exposure varies between studies, any summary estimate is difficult to interpret. Cohort studies were chosen in preference to case-control studies wherever possible. Studies were chosen where the size of effect was representative of all studies in the specified analysis. As far as possible, large and recent studies were preferred. In addition, the study had to provide cut-points for the highest and lowest exposure categories and these cut-points had to be comparable to actual exposure data in the four countries studied. Where possible, summary estimates from

cohort studies from pooling projects were used; if not, forest plots and tabulated results of all highest versus lowest risk estimates were examined to identify several possible studies. The full articles of these studies were used to assess cut-points for each of the quantiles and the final decision was made. The same relative risk estimates were used for all countries.

Risk estimates derived from the selected studies were converted into three categories: high, medium, and low risk. Risk estimates were selected for the outer quantiles of exposure (for low and high risk) and for either a central quantile or two central quantiles pooled using a random effects model (for medium risk). For example, if a study reported results in quintiles, the risk estimate for the third (central) quantile was used to represent medium risk.

The exposure category cut-points in the country-specific exposure data did not usually reflect the recommendations of the 2007 WCRF/AICR Diet and Cancer Report (see below). For example, for alcohol it was not possible to compare high and moderate intake with one drink for women and two drinks for men.

Country-specific distributions of exposure

For the four countries studied, raw data from dietary survey datasets were obtained. Information for the UK and the USA was complete. For the UK, the National Diet and Nutrition Survey (NDNS) based on 7-day weighed records and a physical activity questionnaire (collected in 2000–2001) in adults aged 19 to 64 years was used.[2] For the USA, the WWEIA-NHANES (2003–2004)[3] based on two 24-hour recalls was used for food and nutrition exposures and NHANES 2005–2006[4] for anthropometric measures and physical activity measures based on a questionnaire on activities in the last 30 days. For China, the China Health and Nutrition Survey 2006 based on three 24-hour recalls was used[5] and information on physical activity was obtained from reports on the World Health Organization Global Infobase.[5a] For Brazil, several surveys were used: the 'Food surveys in the city of São Paulo 2003 (ISA-SP)' for foods and nutrients based on one 24-hour recall, the Pesquisa Orcamentos Familiares family budget survey 2002/2003 for weight and height data, and the International Physical Activity Questionnaire for São Paulo city for physical activity (personal communication, Carlos Monteiro). The age range included in each survey differed. To be consistent across all surveys, subjects aged between 19 and 64 years were selected. It was not possible to obtain the necessary dietary information for salt or for foods containing lycopene for China and Brazil, or for foods containing fibre for China. Maté was only included for Brazil.

Country-specific cancer incidence data

Cancer incidence data were obtained from GLOBOCAN 2002.[6]

Population attributable fraction calculations

PAF is the proportional reduction in disease incidence that would be achieved in a population by eliminating (or reducing to the lowest achievable level) the causal exposure(s) of interest, while other risk factors remain unchanged. This method uses the lowest risk category as the reference category for the risk estimates. For exposures that are causes of cancer, this is the lowest consumption quantile. For exposures that are protective such as vegetables and fruits, the comparator is the highest *consumption* (i.e. lowest *risk*) quantile.

PAFs were calculated using the following formula:

$$\text{PAF } \% = \frac{[PF1\times(RR1-1)] + [PF2\times(RR2-1)] + [PF3\times(RR3-1)]}{1 + [PF1\times(RR1-1)] + [PF2\times(RR2-1)] + [PF3\times(RR3-1)]} \times 100$$

where:
PF1 = proportion of population in exposure category at low risk
RR1 = reference category (relative risk of 1.0 for the low-risk exposure category)
PF2 = proportion of population in exposure category at medium risk
RR2 = relative risk of the medium-risk exposure category
PF3 = proportion of population in exposure category at high risk
RR3 = relative risk of the high-risk exposure category

Estimates by cancer site for all exposures combined were calculated from the PAFs for each exposure. Because no individual case of cancer can be prevented more than once, this calculation was done in a way that avoided the possibility of 'double counting'. The PAF for the first exposure was subtracted from 100 per cent and the PAF for the second exposure was applied to the remainder. This process was performed sequentially for all relevant exposures, resulting in an estimated PAF for all exposures combined. In order to estimate combined PAFs for each country across several cancer sites, the individual estimates of PAF at specific cancer sites were weighted according to the incidence of the relevant cancers in that country.

Box A1 Example. Preventability estimate for red meat intake and colorectal cancer in the UK

Steps:

1. An appropriate cohort study for a highest versus lowest risk estimate was selected and cut-points identified for highest and lowest categories. The largest, most recent study consistent in terms of direction and size of effect with other studies was by Norat et al. in 2005 (Figure 4.3.1 in the 2007 WCRF/AICR Diet and Cancer Report).[7] It showed **RR3** of **1.17** and highest and lowest categories of ≥ 80 g/day and < 10 g/day, respectively. The RR of the medium exposure category was **1.03 (RR2)**, whereas by definition **1.0** was the risk in the reference category **(RR1)**.
2. Using the UK NDNS dietary data for 19–64 year olds, exposures for individual red meats (beef, pork, etc.) were aggregated into a single variable (red meat).
3. The proportions of the population with intakes in the three risk categories were ≥ **80 g/day (PF3 = 25%)**, **10 – < 80 g/day (PF2 = 49%)**, and < **10 g/day (PF1 = 26%)**.
4. PAF was calculated as:

$$\frac{[0.26\times(1-1] + [0.49\times(1.03-1)] + [0.25\times(1.17-1)]}{1 + [0.26\times(1-1] + [0.49\times(1.03-1)] + [0.25\times(1.17-1)]} \times 100 = 5\%$$

An example is shown in box A1.

For body fatness, PAF calculations were based on body mass index (BMI in kg/m^2). Other highly correlated variables were not included (e.g. waist to hip ratio, waist circumference, weight gain). PAF was also estimated for men and women separately. A combined estimate of PAF for body fatness across the relevant cancers (oesophagus, pancreas, gallbladder, colorectum, breast, endometrium, and kidney) was calculated as described above.

Each estimate of relative risk for a specific exposure and cancer site is presented both as a point estimate and as a 95% confidence interval. Each estimate of PAF is also presented as a point estimate. In addition, a range with upper and lower limits around the point estimate was calculated, to indicate its imprecision. The lower range was calculated as above, but using the lower limit of the 95% confidence interval (instead of the point estimate) of the relative risk for each exposure. Upper limits for combined estimates of PAF were calculated using the upper limits of the 95% confidence intervals of the relative risk for each exposure. The range produced by this method is therefore more extreme than a 95% confidence interval.

Methodological issues

These estimates are subject to some methodological limitations.

The preventability estimates for individual or groups of exposures were based on highest versus lowest exposure relative risk estimates. These risk estimates were from single studies and although selection criteria were applied (see methods), the results should be interpreted with caution. While the use of per unit exposure risk estimates is based on more than one study, it may nevertheless be associated with a number of limitations and was not used for these estimates.

Measurement errors associated with assessment of diet and physical activity will tend to reduce the apparent size of the relative risk calculated in the studies used for this exercise. On the other hand, they may also lead to misclassification of individuals into extreme exposure categories: this might exaggerate apparent PAF. It is difficult to predict the net effect of these two opposite influences.

Although adult attained height was identified by the 2007 WCRF/AICR Diet and Cancer Report as a risk factor for cancers of the colorectum and breast (postmenopause), it was not included in the total preventability estimates. Adult attained height was excluded because, while it is likely to be in part determined by early life experiences including nutrition, it is not modifiable in adult life, the mechanisms underpinning the association are unclear, and no recommendation was made in the 2007 WCRF/AICR Diet and Cancer Report. Similar considerations apply to foods containing calcium/dairy and to selenium. In addition, a clinical trial of prostate cancer published during the preparation of this Report failed to show benefit from selenium supplements.[1]

Some exposures could not be taken into account in the total estimate calculations because data were not available (for instance a value for garlic was not imputed; there were no data from China on fibre from food sources). Estimates for aflatoxin and liver cancer were not presented as data were not considered to be reliable, although for some populations aflatoxin exposure is an important preventable cause of cancer. Regarding prostate cancer, there were no data for lycopene exposure in China and Brazil.

The figures for breast cancer are likely to be an overestimate as the impact of body fatness differs between pre- and postmenopausal breast cancers, and only total breast cancer incidence was available. Although menopausal status is not recorded in cancer registries, other data suggest that approximately 20–25 per cent of breast cancers in the USA and the UK are diagnosed before the age of 50 years. Oesophageal cancer was not divided by histological type: only total oesophageal cancer was used, as in the 2007 WCRF/AICR Diet and Cancer Report. However, while the impact of body fatness, a cause of adenocarcinoma, may be overestimated in the USA and the UK because of inclusion of squamous carcinoma, this may be offset by the impact of alcohol and maté on squamous carcinomas in China and Brazil where this is the predominant type.

These preventability estimates were based only on food, nutrition, physical activity, and body fatness. Other relevant risk factors such as smoking were taken account of in the relative risk calculations in the studies used for this exercise. However, no attempt was made to estimate the additional risk fractions attributable to these other exposures, which are also important for cancer prevention.

Results and discussion

The information used to estimate the PAFs is shown in table A1. For each study the table gives the relative risk (point estimate and 95% confidence interval) for each exposure; the cut-points used for categorising high, medium, and low risk; and in the last four columns, the proportion of the

population in each of these categories for the four countries studied. Table A2 shows, for each country, the estimates of PAF for each exposure by cancer site, as well as combined estimates either for the 12 cancer sites included in this report, or for all cancers (listed in GLOBOCAN 2002[6] excluding non-melanoma skin cancer).

The potential preventability of different cancers through food, nutrition, body fatness, and physical activity varied for the different cancers and between countries, although findings were broadly similar for the USA and the UK. Thus, about 38 per cent of breast cancers were estimated to be preventable in the USA and 42 per cent in the UK, compared to 20 per cent in China. These differences arise because of the different patterns of exposure to the factors influencing breast cancer risk between these countries.

For most cancer sites, the estimates of preventability were lowest in China, with the exception of lung cancer. For all countries, the cancer sites with the highest estimated preventability were oesophagus and mouth, pharynx, and larynx, and the lowest estimates were for liver, gallbladder, and kidney.

In the USA and the UK, the most common cancers (i.e. cancer contributing at least 10 per cent of total cancer incidence) were of the breast, colorectum, lung, and prostate. In Brazil, they were breast and prostate, and in China they were liver, lung, oesophagus, and stomach.[6] The total estimate of preventability for the 12 cancer sites covered by this report was about 34 per cent in the USA and 39 per cent in the UK, 30 per cent for Brazil, and 27 per cent for China. As some estimates are missing for Brazil and particularly China, these must be regarded as underestimates. However, it should be noted that although exposure data are not available for China for foods containing lycopene, prostate cancer is not common in China.

Table A1 Exposure data used to calculate preventability estimates for food, nutrition, physical activity, and body fatness by cancer site for the USA, UK, Brazil, and China

Exposure	Study selected	RR (95% CI)*	Exposure categories used in the study (high-, medium-, and low-risk groups)	Prevalence (%) of exposure for each category shown in the previous column (high, medium, low or PF3, PF2, PF1)**			
				USA	UK	Brazil	China
Mouth, pharynx, larynx							
Non-starchy vegetables	De Stefani, 2000[8]***	1.75 (0.93–3.33)	≤ 54.1, > 54.1– < 120.0, ≥ 120.0 grams/day	44, 27, 29	29, 40, 31	60, 20, 21	5, 14, 81
Fruits	Chyou, 1995[9]	1.54 (0.94–2.56)	≤ 11.4, > 11.4– < 57.1, ≥ 57.1 grams/day	49, 11, 41	25, 24, 51	73, 3, 24	75, 6, 19
Alcoholic drinks	Grønbaek, 1998[10]	2.8 (1.6–6.0)	≥ 37.7, > 0– < 37.7, 0 grams/day	10, 27, 63	12, 63, 26	4, 17, 79	4, 5, 91
Oesophagus							
Non-starchy vegetables	Guo, 1994[11]	1.25 (1.00–1.67)	≤ 80, > 80– < 160, ≥ 160 grams/day	55, 24, 21	45, 37, 18	70, 15, 15	9, 22, 68
Fruits	Tran, 2005[12]	1.25 (1.10–1.43)	≤ 0.24, > 0.24–2.88, > 2.88 grams/day	47, 0, 53	21, 1, 78	73, 0, 27	75, 0, 25
Maté	Sewram, 2003[13]	1.69 (0.85–3.35)	≥ 0.1, > 0– < 0.1 versus 0 litres/day	N/A	N/A	0, 0, 100	N/A
Alcoholic drinks	Sakata, 2005[14]	2.40 (1.20–4.80)	drinkers versus non-drinkers	37, 0, 63	75, 0, 26	21, 0, 79	9, 0, 91
Body fatness	Lindblad, 2005[15]	1.93 (1.24–3.01)	≥30, 25– < 30, < 25 kg/m^2	35, 32, 34	22, 36, 42	11, 29, 60	5, 24, 72
Lung							
Fruits	Voorrips, 2000[16]	1.67 (1.25–2.50)	< 80, 80–160, > 160grams/day	69, 17, 15	58, 21, 22	77, 9, 14	84, 8, 9
Stomach							
Non-starchy vegetables	Kobayashi, 2002[17]	1.33 (0.96–1.85)	< 105, 105– < 160, ≥ 160 grams/day	65, 14, 21	60, 22, 18	77, 8, 15	15, 17, 68
Fruits	Kobayashi, 2002[17]	1.43 (0.99–2.08)	≤ 11.4, > 11.4– < 57.1, ≥ 57.1 grams/day	49, 11, 41	25, 24, 51	73, 3, 24	75, 6, 19
Salt	van den Brandt, 2003[18]	1.18 (0.77–1.80)	> 7, > 6– 7, ≤ 6 grams/day	67, 12, 21	64, 10, 26	N/A	N/A
Pancreas							
Foods containing folate	Skinner, 2004[19]	1.52 (0.97–2.38)	men < 300, 300– < 500, ≥ 500 mg/day; women < 200, 200– < 400, ≥ 400 mg/day	19, 48, 34	36, 55, 9	29, 45, 26	N/A
Body fatness	Michaud, 2001[20]	1.72 (1.19–2.48)	≥ 30, 23– < 30, < 23 kg/m^2	35, 46, 19	22, 54, 24	11, 49, 40	5, 45, 51
Gallbladder							
Body fatness	Engeland, 2005[21]	1.66 (1.23–2.23)****	≥ 30, 25– < 30, < 25 kg/m^2	35, 32, 34	22, 36, 42	11, 29, 60	5, 24, 72
Liver							
Alcoholic drinks	Sharp, 2005[22]	2.60 (0.53–13.58)	≥ 30, > 0– < 30, 0 grams/day	12, 25, 63	17, 58, 26	5, 16, 79	4, 4, 91
Colorectum							
Foods containing fibre	Park, 2005[23]	1.14 (1.05–1.22)	< 10, 10– < 30, ≥ 30 grams/day	26, 69, 6	27, 72, 1	29, 63, 9	N/A
Red meat	Norat, 2005[7]	1.17 (0.92–1.49)	≥ 80, 10– < 80, < 10 grams/day	26, 29, 45	25, 49, 26	45, 13, 43	37, 38, 25
Processed meat	Norat, 2005[7]	1.42 (1.09–1.86)	≥ 80, 10– < 80, < 10 grams/day	22, 36, 42	9, 63, 28	9, 11, 80	1, 4, 96
Alcoholic drinks	Wei, 2004[24]	1.27 (1.03–1.56)	≥ 20, > 0– < 20, 0 grams/day	18, 19, 63	27, 47, 26	7, 14, 79	5, 3, 91
Physical activity	WCRF/AICR[25]	1.33 (1.10–1.64)	0, > 0– < 150, ≥ 150 minutes/week	30, 55, 15	21, 49, 31	49, 8, 43	11, 26, 64
Body fatness	Engeland, 2005[21]	1.22 (0.93–1.60)****	≥ 30, 25– < 30, < 25 kg/m^2	35, 32, 34	22, 36, 42	11, 29, 60	5, 24, 72
Breast							
Alcoholic drinks	Willett, 1987[26]	1.60 (1.29–1.98)	≥ 15, > 0– < 15, 0 grams/day	13, 15, 72	24, 45, 31	4, 14, 82	1, 1, 98
Physical activity	McTiernan, 2003[27]	1.20 (1.02–1.43)	0, > 0– 20, > 20 MET hours/week	30, 66, 4	16, 45, 39	50, 13, 37	12, 27, 62
Body fatness	van den Brandt 2000[28]	1.26 (1.09–1.46)	≥ 25, 21– < 25, < 21 kg/m^2	61, 28, 12	53, 35, 13	39, 38, 23	28, 45, 27
Endometrium							
Physical activity	Schouten, 2004[29]	1.75 (1.28–2.44)	< 30, 30– < 60, ≥ 60 minutes/day	91, 6, 3	51, 17, 32	60, 10, 30	25, 25, 50
Body fatness	Silvera, 2005[30]	3.40 (2.68–4.33)	≥ 30, 25– < 30, < 25 kg/m^2	36, 24, 39	20, 32, 48	13, 26, 61	5, 24, 72
Prostate							
Foods containing lycopene	Gann, 1999[31]	1.33 (0.94–1.85)	≤ 0.488, > 0.488–1.081, > 1.081 mmol/litre	19, 59, 22	63, 33, 4	N/A	N/A
Kidney							
Body fatness	Bjorge, 2004[32]	1.70 (1.43–2.02)****	≥ 30, 25– < 30, < 25 kg/m^2	35, 32, 34	22, 36, 42	11, 29, 60	5, 24, 72

* Relative risk (RR3) for high versus low risk category.
** PF3, PF2, PF1: population fraction for high, medium, and low risk exposure levels, respectively.
*** Case-control study.
**** Pooled RR for men and women using random effects model for the log of the RRs.
N/A: Exposure data not available.

The 12 cancer sites studied contribute around two thirds to three quarters of the incidence of all cancers. If it is assumed that the additional cancers are not preventable at all through food, nutrition, physical activity, and body fatness, then the estimate for preventability of all cancer is about 24 per cent for the USA, 26 per cent for the UK, 19 per cent for Brazil, and 20 per cent for China. Again, these must be regarded as minimal estimates. Any potential impact of food, nutrition, physical activity, and body fatness on the risk of the remaining cancers would increase these estimates.

Tables A3 and A4 show the preventability estimates for body fatness. Figures for men and women are shown separately. Most studies used the standard cut-points for normal body weight, overweight, and obesity; however the cut-point between the medium- and high-risk categories was a BMI of < 23 kg/m^2 for pancreas[20] and a BMI of < 21 kg/m^2 for breast cancer.[28] Preventability estimates were largest for oesophagus (men and women), endometrium (women), and

Table A2 Preventability estimates (PAF%)* for 12 cancer sites for the USA, UK, Brazil, and China

Exposure**	USA PAF%	(range)	UK PAF%	(range)	Brazil PAF%	(range)	China PAF%	(range)
Mouth, pharynx, and larynx								
Non-starchy vegetables	34	(0–60)	34	(2–57)	37	(0–63)	12	(1–26)
Fruits	23	(0–48)	17	(0–43)	29	(0–54)	30	(0–56)
Alcoholic drinks	27	(4–52)	41	(4–67)	17	(2–38)	10	(2–24)
Total estimate	*63*	*(0–90)*	*67*	*(0–92)*	*63*	*(0–90)*	*44*	*(0–75)*
Oesophagus								
Non-starchy vegetables	20	(3–38)	21	(4–40)	19	(2–38)	11	(2–22)
Fruits	11	(4–17)	5	(2–9)	15	(7–24)	16	(7–24)
Maté	N/A***	N/A	N/A***	N/A	0	(0–1)	N/A***	N/A
Alcoholic drinks	34	(7–58)	51	(13–74)	23	(4–46)	11	(2–25)
Body fatness	35	(12–53)	31	(11–49)	23	(7–39)	17	(5–30)
Total estimate	*69*	*(24–90)*	*75*	*(27–93)*	*60*	*(18–84)*	*44*	*(15–69)*
Lung								
Fruits	36	(18–54)	33	(17–51)	36	(18–55)	38	(19–57)
Stomach								
Non-starchy vegetables	21	(0–41)	21	(0–41)	22	(0–42)	10	(0–22)
Fruits	21	(1–38)	18	(3–33)	25	(0–45)	26	(0–46)
Salt	16	(0–41)	14	(0–39)	N/A***	N/A	N/A***	N/A
Total estimate	*47*	*(0–78)*	*45*	*(0–76)*	*41*	*(0–68)*	*33*	*(0–58)*
Pancreas								
Foods containing folate	16	(0–32)	23	(0–43)	19	(0–38)	N/A***	N/A
Body fatness	28	(3–47)	24	(0–43)	18	(0–36)	14	(0–30)
Total estimate	*39*	*(1–64)*	*41*	*(0–67)*	*34*	*(0–60)*	*14*	*(0–30)*
Gallbladder								
Body fatness	21	(4–36)	16	(1–30)	10	(0–21)	6	(0–14)
Liver								
Alcoholic drinks	15	(0–70)	17	(0–79)	6	(0–52)	6	(0–40)
Colorectum								
Foods containing fibre	11	(5–17)	12	(5–18)	11	(5–17)	N/A***	N/A
Red meat	5	(0–17)	5	(0–21)	7	(0–20)	7	(0–22)
Processed meat	12	(0–24)	10	(0–23)	5	(0–10)	1	(0–2)
Alcoholic drinks	5	(0–11)	7	(0–18)	2	(0–6)	1	(0–3)
Physical activity	15	(5–24)	12	(4–20)	15	(5–25)	7	(2–12)
Body fatness	9	(0–22)	7	(0–17)	5	(1–11)	3	(1–7)
Total estimate	*45*	*(0–73)*	*43*	*(0–73)*	*37*	*(1–63)*	*17*	*(0–40)*
Breast								
Alcoholic drinks	11	(5–19)	22	(10–35)	6	(2–12)	1	(0–1)
Physical activity	17	(2–30)	12	(2–22)	11	(1–22)	8	(1–15)
Body fatness	17	(6–26)	16	(5–25)	14	(4–22)	12	(4–20)
Total estimate	*38*	*(13–58)*	*42*	*(16–62)*	*28*	*(8–46)*	*20*	*(5–33)*
Endometrium								
Physical activity	41	(20–58)	30	(11–47)	32	(13–49)	20	(3–36)
Body fatness	49	(39–58)	38	(27–48)	29	(20–39)	18	(10–25)
Total estimate	*70*	*(51–82)*	*56*	*(35–72)*	*52*	*(31–68)*	*34*	*(13–52)*
Prostate								
Foods containing lycopene	11	(0–32)	20	(0–42)	N/A***	N/A	N/A***	N/A
Kidney								
Body fatness	24	(16–32)	19	(12–27)	13	(7–18)	8	(4–12)
12 cancers combined								
Total estimate	*34*	*(9–56)*	*39*	*(10– 61)*	*30*	*(5–48)*	*27*	*(7–51)*
All cancers								
Total estimate	*24*	*(7–40)*	*26*	*(6– 42)*	*19*	*(3–31)*	*20*	*(5–37)*

* PAF: population attributable fractions were based on highest versus lowest exposure risk estimates; see text. Values were rounded to the nearest whole number.

** Based on the 2007 WCRF/AICR Diet and Cancer Report. Adult attained height was not included; for colorectum, a value for garlic was not imputed due to missing exposure data; for prostate, plasma measures for lycopene were used; for breast, recreational activity was used rather than total activity; for stomach cancer, salt intake was estimated from analysis of 24-hour urine samples for the UK, and from the 24-hour dietary recalls for the USA.

*** N/A: Data were not available for: foods containing fibre for China, salt for China and Brazil, foods containing folate for pancreas for China, and foods containing lycopene for prostate cancer for China and Brazil. Maté consumption data apply only to Brazil.

pancreas (men) in all four countries. Estimates were calculated for all the body fatness-related cancers combined, and weighted by the specific cancer incidence. Estimates were slightly higher for men compared with women. The estimates were similar for the USA (20 per cent for men and 19 per cent for women) and the UK (18 per cent for men and 16 per cent for women). Figures were also similar for Brazil (13 per cent for men and women) and China (11 per cent for men and 12 per cent for women). These figures are likely to be an underestimate as the lowest risk would be expected from achieving a BMI at the lower end of the normal range (18.5–25 kg/m^2), rather than simply a BMI of < 25 kg/m^2 as used in many studies.

Although lactation was identified in the 2007 WCRF/AICR Diet and Cancer Report as a protective factor for both pre- and post-menopausal breast cancer, the Panel considered lactation as a different type of exposure because it is a normal physiological process, and dissimilar to the

Table A3 Data for cancer preventability estimates for body fatness by sex for the USA, UK, Brazil, and China

Cancer Site	Study selected	RR (95% CI)*	Categories of BMI in kg/m^2 used in the study (high, medium, low)	Prevalence (%) of exposure for each catgory shown in the previous column (high, medium, low or PF3, PF2, PF1)**			
				USA	UK	Brazil	China
Oesophagus	Lindblad, 2005[15]						
male		1.76 (1.03–3.02)	≥ 30, 25– < 30, < 25	33, 39, 28	24, 41, 35	9, 32, 59	4, 24, 72
female		2.13 (0.97–4.71)	≥ 30, 25– < 30, < 25	36, 24, 39	20, 32, 48	13, 26, 61	5, 24, 72
Pancreas	Michaud, 2001[20]						
male		1.76 (0.90–3.45)	≥ 30, 23– < 30, < 23	33, 52, 14	24, 58, 17	9, 54, 37	4, 46, 50
female		1.70 (1.09–2.64)	≥ 30, 23– < 30, < 23	36, 40, 24	20, 50, 30	13, 44, 43	5, 44, 51
Gallbladder	Engeland, 2005[21]						
male		1.38 (1.01–1.89)	≥ 30, 25– < 30, < 25	33, 39, 28	24, 41, 35	9, 32, 59	4, 24, 72
female		1.88 (1.60–2.21)	≥ 30, 25– < 30, < 25	36, 24, 39	20, 32, 48	13, 26, 61	5, 24, 72
Colorectum	Engeland, 2005[21]						
male		1.40 (1.32–1.48)	≥ 30, 25– < 30, < 25	33, 39, 28	24, 41, 35	9, 32, 59	4, 24, 72
female		1.06 (1.02–1.10)	≥ 30, 25– < 30, < 25	36, 24, 39	20, 32, 48	13, 26, 61	5, 24, 72
Breast	van den Brandt, 2000[28]	1.26 (1.09–1.46)	≥ 25, 21– < 25, < 21	61, 28, 12	53, 35, 13	39, 38, 23	28, 45, 27
Endometrium	Silvera, 2005[30]	3.40 (2.68–4.33)	≥ 30, 25– < 30, < 25	36, 24, 39	20, 32, 48	13, 26, 61	5, 24, 72
Kidney	Bjorge, 2004[32]						
male		1.55 (1.36–1.76)	≥ 30, 25– < 30, < 25	33, 39, 28	24, 41, 35	9, 32, 59	4, 24, 72
female		1.85 (1.66–2.06)	≥ 30, 25– < 30, < 25	36, 24, 39	20, 32, 48	13, 26, 61	5, 24, 72

* Relative risk (RR3) for high versus low BMI level.
** PF3, PF2, PF1: population fraction with high, medium, and low risk exposure levels, respectively.

Table A4 Preventability estimates (PAF%)* for body fatness by sex for the USA, UK, Brazil, and China

Cancer site**	USA PAF% (range)		UK PAF% (range)		Brazil PAF% (range)		China PAF% (range)	
Oesophagus								
male	32	(6–55)	29	(6–52)	20	(5–39)	14	(3–30)
female	38	(0–66)	33	(0–61)	26	(0–54)	20	(0–44)
Pancreas								
male	34	(0–62)	32	(0–60)	25	(0–51)	20	(0–45)
female	25	(0–48)	19	(0–42)	14	(0–36)	10	(0–30)
Gallbladder								
male	11	(0–27)	8	(0–22)	3	(0–12)	2	(0–7)
female	28	(19–36)	21	(13–28)	15	(9–22)	10	(5–14)
Colorectum								
male	16	(13–16)	14	(11–16)	8	(6–9)	5	(4–6)
female	3	(0–5)	2	(0–3)	1	(0–3)	1	(0–2)
Breast	17	(6–26)	16	(5–25)	14	(4–22)	12	(4–20)
Endometrium	49	(39–58)	38	(27–48)	29	(20–39)	18	(10–25)
Kidney								
male	20	(14–26)	17	(12–23)	10	(6–13)	6	(4–9)
female	28	(23–33)	21	(17–26)	16	(12–20)	10	(8–14)
Total estimate for body fatness-related cancers (male)	20	(10–28)	18	(8–27)	13	(3–23)	11	(2–22)
Total estimate for body fatness-related cancers (female)	19	(9–28)	16	(6–25)	13	(4–21)	12	(2–23)

* PAF (population attributable fraction) based on high versus low BMI level; see text for methodology used to calculate range. Values were rounded to the nearest whole number.
** Cancer sites listed were graded convincing or probable for body fatness in the 2007 WCRF/AICR Diet and Cancer Report.

other food, nutrition, and physical activity exposures. It is not possible to conduct analyses in the same way for lactation as for the other exposures because good-quality data on total (lifetime) duration of lactation are not available for the countries studied. Most data are either for ever versus never breastfeeding or duration in relation to one child. A collaborative reanalysis of individual data from 47 studies[33] reported a 4.3 per cent reduction in the risk of breast cancer for every 12 months of breastfeeding. This reduction was in addition to a 7 per cent reduction in risk for each birth. Therefore, compared to a woman who has two children who did not breastfeed, a woman who breastfed each child for 6 months (total breastfeeding duration of 12 months) was estimated to have about a 4 per cent reduction in risk, and if she breastfed each child for 1 year (total breastfeeding duration of 24 months), the reduction in risk would be around 8 to 9 per cent.

Project process

This Report builds on the 2007 report *Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective,* commissioned by the World Cancer Research Fund (WCRF) and American Institute for Cancer Research (AICR). The aim of this Report is to make robust evidence-based recommendations for policies and actions that will help to achieve the recommendations of the 2007 WCRF/AICR Diet and Cancer Report, to reduce the incidence of cancer worldwide.

Commissioning this Report

The 2007 WCRF/AICR Diet and Cancer Report has been accepted as the most authoritative and comprehensive report on the causal links between cancer and food, nutrition, and physical activity. A total of 25 000 copies of the Report have been printed, the great majority of which have been sold or distributed to senior scientists and policy-makers throughout the world. That report specified population goals and personal recommendations, but did not address how these can best be achieved. The Panel, with WCRF and AICR, decided that this additional work should be the subject of this complementary Report on policy and action for cancer prevention.

It was recognised that the process for preparing a policy report would necessarily be different to that of preparing the 2007 WCRF/AICR Diet and Cancer Report. An evidence-based approach was still regarded as essential to produce the most meaningful product. It was also recognised, however, that the evidence relating to how policy affects cancer incidence, especially with regards to food, nutrition, and physical activity, is of a different nature and open to greater interpretation than the evidence for the 2007 Report.

Reviewing the literature

Two systematic literature reviews of the evidence were commissioned from independent research institutions with instructions to present the evidence without drawing conclusions based on that evidence. The first reviewed the determinants of dietary patterns, nutrition, and physical activity and the interventions to maintain or modify them, and the second reviewed the effectiveness of population and community interventions to prevent cancer through food, nutrition, or physical activity. Additional information obtained from Panel members, reviewers, and independent organisations was also used as an important source of evidence.

Judging the evidence

The same Panel of 21 experts that examined the evidence for the 2007 WCRF/AICR Diet and Cancer Report over a 6-year period, supplemented by an additional three with specific expertise in policy, deliberated over the evidence. Members of the Panel came from all the main continents and from 11 countries. Its collective expertise included public policy, economics, psychology, physical activity, nutrition, cancer, obesity, other chronic diseases, epidemiology, biochemistry, statistics, and public health. The Panel included members of the Panel from the first WCRF/AICR report published in 1997 and relevant World Health Organization expert consultations, as well as observers from six relevant United Nations and other international organisations. The Panel convened twice a year for 1 or 2 day meetings between 2007 and 2008.

The Panel was responsible for assessing the evidence, for agreeing judgements based on their assessments, and for the recommendations.

Managing the project

This Policy and Action Report was commissioned by WCRF International and has been funded and published by WCRF and AICR. WCRF International set up a multilevel process to manage the project, and an Executive Team was established with the specific responsibility of directing it.

Executive Team:	Executive body responsible for Report. Composed of WCRF International and AICR executives and advisors.
Secretariat:	Managed the whole Report process.
Advisory Group:	Guided the Executive Team and the Panel on strategic and technical issues.

The Secretariat included WCRF International staff in the UK, AICR staff in the USA, and consultants, including in the following positions:

Project Director:	Overall responsible for the Report and its scientific content. Chair of Executive Team.
Chief Editor:	Responsible for editorial quality of the Report.
Project Manager:	Responsible for day-to-day management of the project; Chair of Secretariat.
Chapter Manager:	Drove progress on chapters of the Report.

In addition, a Communications Strategy Group from within the WCRF global network was set up to be responsible for all aspects of the promotion of this Report before, during, and after its launch in February 2009.

Glossary

Actors
In the context of this Report, those (either as individuals, groups, or organisations) whose actions could contribute to achieving a **policy** outcome, such as policy-makers and decision-takers working within multinational bodies; **civil society** organisations, government; industries; the media; schools; workplaces and other institution; health and other professions; and people, both as members of communities and families and as individuals.

Aflatoxins
Naturally occurring toxins that are produced by many species of *Aspergillus*, a fungus, most notably *Aspergillus flavus* and *Aspergillus parasiticus*. Aflatoxins are toxic and carcinogenic to animals, including humans.

Agricultural policy
Policy relating to domestic agriculture, export of domestic production, imports of foreign agricultural products, and aspects of international trade relating to agriculture.

Bioavailability
The degree to which a nutrient (or other substance) can be absorbed and used by the body.

Body mass index (BMI)
Body weight expressed in kilograms divided by the square of height expressed in metres (BMI = kg/m^2). It provides an indirect measure of body fatness. Also called Quetelet's Index.

Built environment
A general term covering residential, commercial, and public buildings, roads, open spaces, and services (such as water and electrical supplies and sewerage) in human settlements.

Cantonese-style salted fish
Fish that has been treated with varying amounts of salt and dried in natural conditions outdoors. It is characterised by treatment with less salt than typically used and is also subject to fermentation during the drying process due to relatively high outdoor temperatures and moisture levels.

Carcinogen
Any substance or agent capable of causing cancer.

Civil society
Organisations, individuals, and other groups that are neither part of the state nor the (extended) family. In the context of this Report, this group includes international and national civil society organisations, such as political parties, professional associations, charities, trades unions, and religious groups, and excludes industry and business interest organisations, the health and other professions and their organisations, and the media. Each of these latter groups is addressed separately.

Chronic disease
A disease that develops or persists over a long period of time. Includes noncommunicable diseases such as cancer, cardiovascular disease, and diabetes and some infectious diseases such as tuberculosis.

Correlation
In statistics, the (often linear) relationship between two variables, such that high scores on one tend to go with high scores on the other (positive correlation), or such that high scores on one tend to go with low scores on the other (negative correlation).

Determinant
A definable entity that is a cause of, or induces, an outcome.

Elasticity
(see **Price elasticity**)

Energy density
The amount of energy (kilojoules or Calories) in a given weight of food. Energy-dense foods contain more than about 225–275 kcal/100 grams.

FAO
The Food and Agriculture Organization of the United Nations (www.FAO.org)

Fast foods
Readily available meals, snacks, foods, and drinks that tend to be high in sugar, refined starches, fat, salt and energy, and to be consumed frequently or in large portions; particularly the fast foods served in transnational restaurants and similar establishments.

Foreign direct investment
A diversification strategy pursued for instance by multinational corporations involving the purchase of assets, usually associated with manufacturing or distribution facilities, in another country. Often regarded as the second stage of overseas involvement after agency or licensing agreements have been used to establish a market.

Globalisation
The process whereby local or regional phenomena are transformed into global ones through a combination of economic, technological, sociocultural, and political forces. Often used to refer to economic globalisation, that is, integration of national economies into the international economy through trade, **foreign direct investment**, capital flows, migration, and the spread of technology.

Healthy foods
This shorthand term is used occasionally in this Report to describe foods that are relatively high in micronutrient content, relatively unprocessed, and likely to form the main part of a healthy diet as described in the 2007 WCRF/AICR Diet and Cancer Report.

High-income countries
Countries with an average annual gross national product of more than an agreed figure per head (in 2006 this was US$ 10 726). This term is less judgemental and more descriptive than 'economically developed' countries.

Incidence
The rate of appearance of new cases of a condition such as a disease in a population, expressed per defined number of people in the population, for example, per 100 000, over a specified period of time, usually a year.

Intervention
Any action taken for instance by a government or health professional aimed at achieving a desired outcome, such as preventing, curing, or relieving a health problem.

Life course approach
A way of considering health or the development of susceptibility to disease as a function of the integrated experience of a person over the whole of their lives, from fetal life to old age; and the recognition that certain periods of life may be critically sensitive to environmental factors in determining later health.

Low-income countries
Countries with an average annual gross national product of less than an agreed figure per head (in 2006 this was US$ 875). This term is less judgemental and more descriptive than 'economically developing' countries.

Mass media
The various agents of mass communication and entertainment, printed, broadcast, or electronic: newspapers, magazines, and other publications, television, radio, the cinema, and the internet.

Maternity leave
The period of time away from work that a woman is entitled to take during pregnancy and following the birth of her child. Many countries provide a legal entitlement to maternity leave, although the length of time varies from country to country, and some organisations provide enhanced leave beyond the statutory legal minimum.

Micronutrients
Vitamins and minerals; substances present in foods and required in small quantities, conventionally of less than 1 g/day, for normal body function.

Middle-income country
Countries with an average annual gross national product of between two agreed figures per head (in 2006 this was more than US$ 875 and less than US$ 10 726). This term is less judgemental and more descriptive than 'economically developing' countries.

Migrant study
A study of people who migrate from one country to other countries with different environments and cultural backgrounds. The experience, such as mortality or disease **incidence**, of the migrant group is compared with that of people in their current country of residence and in their country of origin.

Modelling study
The use of existing data in computer programs that have been devised to simulate real-life events and predict patterns into the future.

Non-starchy vegetables
All vegetables, except those that have relatively high starch content, such as potatoes, cassava, yams, sago, and taro.

Nutrition transition
The phenomenon whereby diets and activity patterns in rural areas or **low-income countries** change to resemble those in urban areas or **high-income countries**, with an increase in fats, salt, sugars, and refined foods and a reduction in physical activity and fibre, contributing to escalating rates of **obesity** and **chronic diseases**.

Obesity
Excess body fat to a degree that increases the risk of various diseases. Conventionally defined as a **body mass index (BMI)** of 30 kg/m^2 or more. Different cut-points have been proposed for specific populations.

OECD
The Organisation for Economic Cooperation and Development (www.oecd.org).

Overweight
A **body mass index (BMI)** above 'normal' (25 kg/m^2) but below 30 kg/m^2, i.e., not sufficient to be defined clinically as **obesity.** Different cut-points have been proposed for specific populations.

Policy
The written or unwritten aims, objectives, targets, strategy, tactics, and plans that guide the actions of a government, political party, business, other organisation, or people. Policies have three interconnected and ideally continually evolving stages: development, implementation, and evaluation. Policy development is the creative process of identifying and establishing a policy to meet a particular need or situation. Policy implementation consists of the actions taken to set up or modify a policy, and evaluation is assessment of how, and how well, the policy works in practice.

Prevalence
The total number of designated conditions, such as people with a disease, that are present in a population at a point in time. This is often called point prevalence, in contrast to period prevalence, which describes the total number present for a designated period of time, usually a calendar year.

Prevention
The avoidance of an adverse condition such as a disease, or its reduction in **incidence** at a specified age.

Price elasticity
The variation in an economic quantity in response to a change in price. Price elasticity of demand is the degree to which demand for a commodity varies with price.

Primary prevention
Prevention of disease through actions taken before the appearance of disease.

Primordial prevention
Prevention of disease through the maintenance and promotion of environmental or other external factors that protect against disease, and reduction or elimination of external causal factors. (See box 1.2)

Processed food
In the context of this Report, food that has been industrially transformed from the raw ingredients before it is purchased, often reducing its content of **micronutrients** or fibre and increasing its content of sugar, refined starches, fat or salt, and its **energy density**.

Processed meat
Meat (usually **red meat**) preserved by smoking, curing, salting, or the addition of preservatives. Definitions vary between countries and studies as to what precisely is included.

Public health
The activities of preventing disease, prolonging life, and promoting health through the organised actions of society.

Randomised controlled trial (RCT)
A study in which a comparison is made between one **intervention** (often a treatment or **prevention** strategy) and another (control). Sometimes the control group receives an inactive agent (a placebo). Groups are randomised to one intervention or the other, so that any difference in outcome between the two groups can be ascribed with confidence to the intervention. Neither investigators nor subjects usually know to which condition they have been randomised; this is called 'double-blinding'.

Red meat
Meat from domesticated cattle, pigs, sheep, and goats; not poultry and fish, or meat from wild animals.

Secondary prevention
Prevention of the progression or complications of a disease in people once it has appeared.

Self-efficacy
A person's degree of self-belief about how well they will be able to carry out an intended action.

Socioeconomic status
A combined product of social and economic status reflecting education level, personal wealth, class, and associated factors.

Systematic literature review (SLR)
A means of compiling and assessing published evidence that addresses a scientific question with a predefined protocol and transparent methods.

Trade barriers
Laws, institutions, or practices that hinder trade between countries.

Transition cultures
Countries in the process of changing from one predominant social or cultural structure to another, for instance moving from predominantly rural to urban, or from traditional to Western-type diet and activity patterns.

UN
The United Nations (www.un.org).

Unhealthy foods
This shorthand term is used occasionally in this Report to describe foods that are relatively low in micronutrient content or high in sugar, refined starches, fat or salt and **energy density**, and relatively processed or refined, and that are consumed only infrequently or in small amounts as part of a healthy diet as described in the 2007 WCRF/AICR Diet and Cancer Report.

UNICEF
The United Nations Children's Fund (www.unicef.org).

Walkability
The extent to which the **built environment** encourages people living, shopping, visiting, or spending time in an area to walk. Factors affecting walkability include, but are not limited to: land use mix, street connectivity, residential density, and street designs.

WHO
World Health Organization (www.who.int).

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Chapter 4

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Chapter 5

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Chapter 6

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Appendix A

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