Part 3

Recommendations

Chapter 12
Public health goals and personal recommendations 368

Introduction to Part 3

The culmination of the five-year process resulting in this Report is Chapter 12, in which the Panel's public health goals and personal recommendations are specified. These are preceded by a statement of the principles that have guided the Panel in its thinking.

The goals and recommendations are based on judgements made by the Panel in Part 2, as shown in the introductory matrices. Such judgements are of a 'convincing' or 'probable' causal effect, either of decreased or increased risk.

Judgements of 'convincing' or 'probable' generally justify goals and recommendations. These are proposed as the basis for public policies and for personal choices that, if effectively implemented, will be expected to reduce the incidence of cancer for people, families, and communities.

Eight general and two special goals and recommendations are specified. In each case a general recommendation is followed by public health goals and personal recommendations, together with footnotes when further explanation or clarification is required. These are all shown in boxed text. The accompanying text includes a summary of the evidence; justification of the goals and recommendations; and guidance on how to achieve them.

Reliable judgements are carefully derived from good evidence. But specific public health and personal goals and recommendations do not automatically follow from the evidence, however strong and consistent. The process of moving from evidence to judgements and to recommendations has been one of the Panel's main responsibilities, and has involved much discussion and debate until final agreement has been reached. The goals and recommendations here have been unanimously agreed.

Food, nutrition, body composition, and physical activity also affect the risk of diseases other than cancer. Informed by the findings of other reports summarised in Chapter 10, the goals and recommendations have therefore been agreed with an awareness of their wider public health implications.

The goals and recommendations are followed by the Panel's conclusions on the dietary patterns most likely to protect against cancer. As conventionally undertaken, epidemiological and experimental studies are usually sharply focused. In order to discern the 'big picture' of healthy and protective diets, it is necessary to integrate a vast amount of detailed information. This also has been part of the Panel's task.

The main focus of this Report is on nutritional and other biological and associated factors that modify the risk of cancer. *The Panel is aware* that, as with other diseases, the risk of cancer is critically influenced by social, cultural, economic, and ecological factors. Thus the foods and drinks that people consume are not purely because of personal choice; often opportunities to access adequate food or to undertake physical activity can be constrained, either for reasons of ill health or geography, economics, or equally powerfully, by culture.

There is a limit to what can be achieved by individuals, families, communities, and health professionals.

Identifying not only the nutritional and associated factors that affect the risk of cancer but also the deeper factors enables a wider range of policy recommendations and options to be identified. This is the subject of a separate report to be published in late 2008.

The members of the Panel and supporting secretariat, and the executives of the WCRF global network responsible for commissioning this Report, have been constantly reminded of the importance of their work during its five-year duration. The public health goals and personal recommendations of the Panel that follow are offered as a significant contribution towards the prevention and control of cancer throughout the world.

CHAPTER 12

Public health goals and personal recommendations

This Report is concerned with food, nutrition, physical activity, body composition, and the prevention of cancer, worldwide. Chapter 12 is the culmination of the Report. It explains the principles that guide the Panel's decisions; lists and explains the Panel's recommendations to prevent cancer; and identifies appropriate dietary patterns. The recommendations are in the form of a series of general statements; public health goals designed to be used by health professionals; and recommendations for people — as communities, families, and individuals — who can also be guided by the goals. Footnotes are included when needed for further explanation or clarity.

Most cancer is preventable. The risk of cancers is often influenced by inherited factors. Nevertheless, it is generally agreed that the two main ways to reduce the risk of cancer are achievable by most well informed people, if they have the necessary resources. These are not to smoke tobacco and to avoid exposure to tobacco smoke; and to consume healthy diets and be physically active, and to maintain a healthy weight. Other factors, in particular infectious agents, and also radiation, industrial chemicals, and medication, affect the risk of some cancers.

The Panel notes **that previous reports have attributed roughly one third of the world's cancer burden to smoking and exposure to tobacco, and roughly another one third to a combination of inappropriate food and nutrition, physical inactivity, and overweight and obesity. By their nature, these estimates are approximations, but *the Panel judges* that avoidance of tobacco in any form, together with appropriate food and nutrition, physical activity, and body composition, have the potential over time to reduce much and perhaps most of the global burden of cancer. This is in the context of general current trends towards decreased physical activity and increased body fatness, and projections of an increasing and ageing global population.**

The recommendations here are derived from the evidence summarised and judged in Part 2 of this Report. They have also taken into account relevant dietary and associated recommendations made in other reports commissioned by United Nations agencies and other authoritative international and national organisations, designed to promote nutritional adequacy and prevent cardiovascular and other chronic diseases. They therefore contribute to diets that are generally protective, and that also provide adequate energy and nutrients. The recommendations can therefore be the basis for policies, programmes, and choices that should prevent cancer, and also protect against deficiency diseases, infections especially of early life, and other chronic diseases.

Throughout its work, the Panel has also been conscious that enjoyment of food and drink is a central part of family and social life, and that food systems that generate adequate, varied, and delicious diets are one central part of human civilisation. From the cultural and culinary, as well as the nutritional point of view, the recommendations here amount to diets similar to cuisines already well established and enjoyed in many parts of the world.

12.1 Principles

The recommendations presented in this chapter are designed as the basis for policies, programmes, and personal choices to reduce the incidence of cancer in general. These are guided by a number of separate principles and also by one overall principle, which is, that taken together, the recommendations provide an integrated approach to establishing healthy patterns of diet and physical activity, and healthy ways of life.

In order to be useful both for health professionals who advise on cancer, and for people who are interested in reducing their own risk of cancer, the recommendations are quantified wherever possible and appropriate. See box 12.1.

12.1.1 Integrated

The Panel, in making its recommendations, has been concerned to ensure that most people in most situations throughout the world will be able to follow its advice. The recommendations are framed to emphasise aspects of food and nutrition, physical activity, and body composition that protect against cancer. They are also integrated with existing advice on promoting healthy ways of life, such as that to prevent other diseases. At the same time, the Panel has given special attention to making recommendations that can form the basis for rational policies, effective programmes, and healthy personal choices.

12.1.2 Broad based

In assessing the evidence, making its judgements, and in framing its recommendations, the Panel has, where appropriate, chosen to take a broad view. It has also agreed to base its advice on foods and whole diets rather than on specific nutrients. Thus, recommendations 4 and 5 concern plant foods and animal foods in general, while their specific public health goals and personal recommendations are mostly concerned with vegetables and fruits, and then with red meat and processed meat, where the evidence on cancer is strongest.

The same applies to physical activity. The evidence shows that all types and degrees of physical activity protect or probably protect against some common cancers. Recommendation 2 therefore does not specify any particular physical activity (of which sport and exercise are one type). Rather, it recommends sustained physical activity as part of active ways of life. What type of physical activity is most appropriate and enjoyable depends on individual abilities and preferences, as well as the settings in which populations, communities, families, and individuals live.

The Panel has taken the same approach in considering the recommendations altogether. As a whole, the recommendations contribute to whole diets and overall levels of physical activity most likely to prevent cancer. This does not imply one particular diet, or a specific form of physical activity, but rather key elements designed to be incorporated into existing and traditional diets and ways of life around the world. This is emphasised in section 12.3 of this chapter, on patterns of food, nutrition, and physical activity.

12.1.3 Global

This Report has a global perspective. It is therefore appropriate that the recommendations here are for people and populations all over the world; that they apply to people irrespective of their state of health or their susceptibility to cancer; and that they include cancer survivors.

Some factors that modify the risk of cancer are more common, and so of more concern, in some parts of the world than others. It is possible that such factors might become more widespread, but the recommendations on them in this Report are in the context of their current local importance.

Just as people's susceptibility to cancer varies, so will the extent to which they will benefit from following these recommendations, though most people can expect to benefit to some extent from each of them.

Recommendations for whole populations are usually now identified as also being of importance for people who, while not being clinically symptomatic, have known risk factors for disease. People at higher risk of various cancers include smokers and people regularly exposed to tobacco smoke; people infected with specific micro-organisms; overweight and obese people; sedentary people; people with high intakes of alcoholic drinks; people who are immunosuppressed; and those with a family history of cancer. Such people are often at higher risk of diseases other than cancer. *The Panel agrees* that the recommendations here apply to these people.

They also apply to cancer survivors, meaning people living with a diagnosis of cancer, including those identified as having recovered from cancer (see Chapter 9). This is subject to important qualifications, stated in the special recommendations for this group of people.

12.1.4 Cancer in general

This Report is concerned with the prevention of cancer in general. Evidence for particular cancer sites provided the building blocks. A key task for the Panel was to take this specific evidence and formulate recommendations that would, in general, lead to a lower burden from cancer regardless of site.

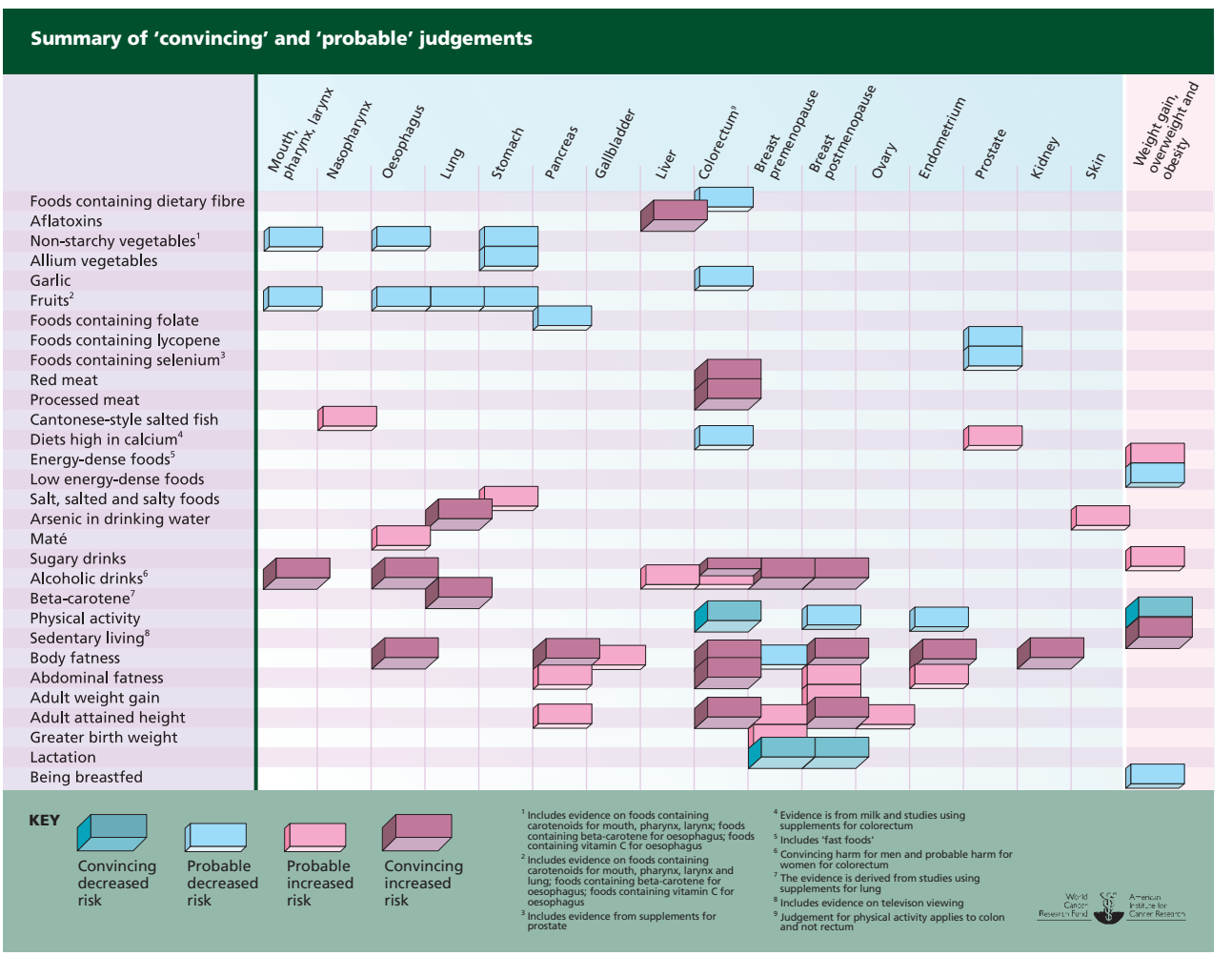
This broad approach is appropriate from the public health point of view. International agencies, national governments, other policy-makers, health professionals, and people within communities and families, and also as individuals, want to know how to prevent cancer in general.

12.1.5 Designed to have major impact

Every case of cancer is important. But the responsibility of those concerned with public health is to encourage policies, programmes, and choices that will have the greatest impact.

For this reason, the Panel has paid special attention to the more common cancers; cancers where there is the most clear-cut evidence of modification of risk by food, nutrition, physical activity, and body composition; and cancers that may most readily be prevented by achievable recommendations. Special attention has also been paid to those aspects of food and nutrition, physical activity, and body composition that seem most likely to prevent cancers of a number of sites.

FOOD, NUTRITION, PHYSICAL ACTIVITY, AND THE PREVENTION OF CANCER
OVERVIEW OF THE PANEL'S KEY JUDGEMENTS



This matrix displays the Panel's most confident judgements on the strength of the evidence causally relating food, nutrition, and physical activity to the risk of cancer. It is a synthesis of all the matrices introducing the text of Chapters 4, 5, 6, 7, and 8 of this Report, but shows only judgements of 'convincing' and 'probable', on which the following recommendations are based. It does not show a detailed breakdown of the individual foods, drinks, and their constituents. The full matrix, which also includes judgements of 'limited — suggestive', is on the fold-out section, which can be found inside the back cover of this Report.

In this matrix, the columns correspond to the cancer sites that are the subject of Chapter 7 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, or of weight gain, overweight, or obesity. 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.

Box 12.1 Quantification

Public health professionals who advise on preventing cancer, including those responsible for planning food supplies or exercise programmes (for example, for schools, hospitals, or canteens), or those working in clinical settings, need to be able to give specific, actionable, and relevant advice that includes prevention of cancer.

To do this they need to know how much of what foods and drinks, what levels of body fatness, and how much physical activity are most likely to protect against cancer. So do people in general, as members of communities and families, as well as individuals. For these reasons, the personal and public health goals in each of the recommendations are quantified wherever possible.

Translation of an overall body of current evidence into quantified recommendations is a challenge for all expert panels responsible for recommendations designed to guide public policy, and professional and personal decisions. This process is not and cannot be 'an exact science'. Within any population, people differ from one another, and there are differences between populations as well. A single, numerical recommendation is not able to encompass these differing needs and so will necessarily be imprecise.

Furthermore, the evidence rarely shows a clear point above or below which risk changes suddenly. Rather, there is usually a continuous relationship between the exposure, be it body fatness, physical activity, or level of consumption of a food or drink, and cancer risk. The shape of this 'dose response' may vary — sometimes it is a straight line, or it may be curved, for instance J-shaped or U-shaped. All of these factors need to be taken into account. The quantified recommendations are therefore based on the evidence but are also a matter of judgement.

For example, the evidence on alcoholic drinks and breast cancer, as shown in chapters 4.8 and 7.10, does not show any 'safe threshold'. The risk evidently increases, albeit modestly, at any level of intake of any alcoholic drink. And there is no nutritional need to consume alcohol. So in this case, the appropriate recommendation based solely on the evidence for breast cancer would be not to consume alcoholic drinks; the quantified recommendation would be zero.

However, the integrated approach that guides these recommendations means that the Panel has taken into account evidence for a likely protective effect of modest amounts of alcohol against coronary heart disease, and has not made this recommendation based only on the evidence for cancer (see recommendation 6).

In addition, in some cases, there is evidence for adverse effects unrelated to cancer risk that might help to quantify recommendations. Physical activity is a case in point. The evidence, as shown in Chapters 5 and 7, shows that high levels of all types of physical activity protect or may protect against some cancers, and also that low levels increase the risk of these cancers. But there is also evidence (not derived from the systematic literature reviews), that above certain high levels, which vary depending on people's general state of fitness, physical activity can provoke an undesirable inflammatory response.

The Panel also used such an approach in considering the minimum limit for healthy body mass index, which does not derive from the evidence on cancer. The implication is that upper as well as lower limits may need to be recommended.

These quantified recommendations are also guided by the ranges of foods and drinks, physical activity, and body composition identified in the studies whose results, taken together, form the basis for the Panel's judgements. High and low limits can be set by simply following the ranges in the studies themselves, mostly cohort studies.

The case for doing this is quite strong; this prospective evidence provides a robust basis for defining the dose response. On the other hand, many studies have been carried out among populations who have only a rather narrow range of dietary intakes, levels of physical activity, and degree of body fatness, which makes detection of associations difficult. Further, these ranges may not themselves be optimal, and this makes it difficult to define what is healthy. In such cases, a recommended range based only on the results of such studies would be flawed. Ecological studies, which often address a much wider range of intakes, were also part of this review and, though not central to the judgement of causality, nevertheless inform the quantification of the recommendations.

As well as considering the evidence from studies on cancer, the Panel, in common with others, has also used its collective knowledge of other relevant considerations in making the quantified recommendations in this chapter. It has also taken into account the ranges of intake of foods and drinks, and the ranges of advisable body composition and physical activity recommended in other reports.

12.1.6 Prevention of other diseases taken into account

Chapter 10 of this Report is based on a systematic review of secondary sources — other reports — on other diseases where the risk is modified by food and nutrition and related factors. These diseases are nutritional deficiencies; relevant infectious diseases, especially diarrhoea and respiratory infections of early childhood; and chronic diseases other than cancer.

As stated above, the recommendations here are designed to prevent cancer as a whole. For similar reasons of public health, the Panel, in considering and judging the secondary evidence presented in Chapter 10, has made sure that the recommendations here take the prevention of other diseases into account.

Often recommendations to prevent cancer are much the same as recommendations to control or prevent other diseases. When this is evidently so, the Panel has stated that its recommendations are supported or reinforced. Occasionally, recommendations to prevent other diseases include factors that evidently do not apply to cancer: for example, saturated fatty acids, contained mostly in animal foods, are accepted to be a cause of coronary heart disease, but have no special relevance to the risk of cancer.

There are also some cases where recommendations to prevent other diseases conflict, or seem to conflict, with those for cancer. One example is alcoholic drinks. While no report on cardiovascular disease has ever recommended consumption of alcoholic drinks, low levels of consumption of alcoholic drinks are likely to protect against coronary heart disease; whereas there is no evidence that alcoholic drinks at any level of consumption have any benefit for any cancer. In cases like this, the Panel's recommendations may be modified to take such a conflict into account; this is clearly indicated in the recommendations.

12.1.7 Challenging

The Panel emphasises that food and life should be enjoyed. *The Panel recognises* that for many people, these recommendations will involve change. People tend to enjoy ways of life that they have become used to. However, when they change, people often enjoy their new ways of life as much or more. *The Panel is aware* of the importance of aspirational goals and recommendations. To achieve substantial public and personal health gain, some of these need to be challenging.

For many populations and people, especially in industrialised or urban settings, achieving all of these recommendations will not be easy. Levels of physical activity within societies that are basically sedentary, and energy density of diets, are often well outside the ranges recommended here. But *the Panel believes* that populations and people who achieve these recommendations will not only reduce their risk of cancer, as well as of other diseases, but are also likely to improve their positive health and well-being.

Sometimes it may take time for people to achieve changes. The Panel has taken this into account when applying the evidence to framing these recommendations. See box 12.2.

Some people will not be able to follow some or all of these recommendations because of their situation or circumstances. For such people, the recommendations as stated here may be unattainable, but working towards them will also reduce the risk of cancer, although to a lesser degree.

Box 12.2 Making gradual changes

The evidence reviewed by the Panel more often than not does not show thresholds of food and drink consumption, body fatness, or physical activity below or above which the risk of cancer suddenly changes. In such cases, any change in the exposure would be expected to lead to a change in cancer risk, whatever the starting level, and no single point lends itself to being an obvious recommended level. Recommendations might then simply state 'the less the better' or 'the more the better'. However, while that would be faithful to the evidence, it is less helpful for people trying to implement change — the question arises of how much more or less, or of what level should be a target.

These judgements take account of several factors — the range of foods and drinks consumed, the level of physical activity or degree of body fatness found in the studies reviewed, or the possibility of adverse effects at particularly high or low levels, but also the precise nature of the relationship between them and the risk of cancer. In some cases, this may be a relatively straight line, in others it may be curved, for instance either U-shaped or J-shaped. Therefore the Panel has chosen to make quantified recommendations that in its judgement would result in a real health gain, and are achievable yet challenging. However, it would be wrong to interpret this as meaning that any movement towards them, but which did not reach them, was valueless. On the contrary, these recommendations should act as a spur to change of any amount. While it is true that a smaller change than recommended would lead to less reduction in risk, any change at all would nevertheless provide at least some benefit.

A perceived inability to achieve the targets should not be a disincentive to making changes to move in that direction. So a change from eating two portions of vegetables daily to three, or a reduction in body mass index from 29 to 27, while not meeting the goals, would nevertheless be valuable.

12.2 Goals and recommendations

The Panel's goals and recommendations, the culmination of five years of work, are guided by the principles above. They are based on the best available evidence, which has been identified, collected, analysed, displayed, summarised, and judged systematically, transparently, and independently. The public health goals are for populations and are therefore principally for health professionals; the recommendations are for people, as communities, families, and individuals. The eight general recommendations are followed by two special recommendations. Together they are designed to be integrated and to contribute to healthy dietary patterns, healthy ways of life, and general well-being.

The Panel emphasises that the setting of recommendations is not and cannot be 'an exact science'. Recommendations derive from judgements based on the best evidence but that evidence and those judgements may still not be such that only one possible recommendation would follow. Several aspects of recommendations designed to improve health can be questioned. *The Panel believes* nevertheless that its recommendations are as firmly based as the science currently allows, and therefore represent a sound base for developing policy and action.

The 10 recommendations here derive from the evidence on food, nutrition, and physical activity but not on their wider socioeconomic, cultural, and other determinants. *The Panel is aware* that patterns of diet and physical activity, as well as the risk of diseases such as cancer, are also crucially influenced by social and environmental factors. These broader factors, and recommendations designed as the basis for policies and programmes that can create healthier societies and environments, are the subject of a further report to be published in late 2008.

The Panel has agreed that its recommendations normally derive from evidence that justifies judgements of 'convincing' and 'probable', as shown in the top halves of the matrices in the chapters and sections of Part 2. This means that the evidence is sufficiently strong to make recommendations designed as the basis for public health policies and programmes. Therefore judgements that evidence is 'limited — suggestive' do not normally form the basis for recommendations.

As shown in the following pages, the goals and recommendations themselves are boxed. They begin with a general statement. This is followed by the public health goals and the personal recommendations, together with any necessary footnotes. These footnotes are an integral part of the recommendations. The boxed texts are followed by passages summarising the relevant judgements made by the Panel. Then the specifications made in the public health goals and personal recommendations are explained. This is followed by passages of further clarification and qualification as necessary: in special circumstances, the points made here are also integral to the recommendations. Finally, guides showing how people can sustain the recommendations are included.

The public health goals are for populations and so are primarily for health professionals, and are quantified where appropriate. 'Population' includes the world population, national populations, and population groups such as schoolchildren, hospital patients, and staff who eat in canteens, generally or in specific settings. The personal recommendations are for people as communities, families, and as individuals. This allows for the fact that decisions on the choice of foods and drinks are often taken communally or within families, or by the family members responsible for buying and preparing meals and food, as well as by individuals. Personal recommendations are best followed in conjunction with public health goals. For example, the recommendation that people walk briskly for at least 30 minutes every day is

RECOMMENDATIONS

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

to enable them to increase their average physical activity level (PAL) by about 0.1.

The Panel concludes that the evidence that high body fatness and also physical inactivity are causes of a number of cancers, including common cancers, is particularly strong. For this reason, the first three sets of goals and recommendations are designed as a basis for policies, programmes, and choices whose purpose is to maintain healthy body weights and to sustain physical activity, throughout life. The remaining five general recommendations are not in any order of priority; instead, they follow the order that their subjects appear in the chapters in Part 2. After the eight general recommendations, there are two special recommendations, one on breastfeeding and one for cancer survivors, that are targeted at specific groups of people.

These goals and recommendations are concerned with food and nutrition, physical activity, and body fatness. Other factors that modify the risk of cancer outside the remit of this Report, such as smoking, infectious agents, radiation, industrial chemicals, and medication, are specified in Chapter 2 and throughout Chapter 7.

The Panel emphasises the importance of not smoking and of avoiding exposure to tobacco smoke.

Greater birth weight, and adult attained height

The evidence that the factors that lead to greater adult attained height, or its consequences, increase the risk of cancers of the colorectum and breast (postmenopause) is convincing; and they probably also increase the risk of cancers of the pancreas, breast (premenopause) and ovary. In addition, the factors that lead to greater birth weight, or its consequences, are probably a cause of premenopausal breast cancer. Also see chapter 6.

The Panel has agreed that height and birth weight are themselves unlikely directly to modify the risk of cancer. They are markers for genetic, environmental, hormonal, and nutritional factors affecting growth during the period from preconception to completion of linear growth. However, the precise mechanisms by which they operate are currently unclear. In addition, they are known to have different associations with other chronic diseases such as cardiovascular disease. For these reasons, they are not the subject of recommendations in this chapter.

Understanding the factors that influence growth, and how they might modify the risk of cancer and other chronic diseases, is an important question for future research, including the relative importance of genetic and environmental factors, and when in the life course nutritional factors might be most relevant. Identifying optimal growth trajectories that protect health not only in childhood but also throughout life is a major challenge for the research and public health communities.

RECOMMENDATION 1

BODY FATNESS

Be as lean as possible within the normal range[1] of body weight

PUBLIC HEALTH GOALS

Median adult body mass index (BMI) to be between 21 and 23, depending on the normal range for different populations[2]

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

PERSONAL RECOMMENDATIONS

Ensure that body weight through childhood and adolescent growth projects[3] towards the lower end of the normal BMI range at age 21

Maintain body weight within the normal range from age 21

Avoid weight gain and increases in waist circumference throughout adulthood

[1] 'Normal range' refers to appropriate ranges issued by national governments or the World Health Organization
[2] To minimise the proportion of the population outside the normal range
[3] 'Projects' in this context means following a pattern of growth (weight and height) throughout childhood that leads to adult BMI at the lower end of the normal range. Such patterns of growth are specified in International Obesity Task Force and WHO growth reference charts

Evidence

The evidence that overweight and obesity increase the risk of a number of cancers is now even more impressive than in the mid-1990s. Since that time, rates of overweight and obesity, in adults as well as in children, have greatly increased in most countries.

The evidence that greater body fatness is a cause of cancers of the colorectum, oesophagus (adenocarcinoma), endometrium, pancreas, kidney, and breast (postmenopause) is convincing. It is a probable cause of cancer of the gallbladder. Body fatness probably protects against premenopausal breast cancer, but increases the risk of breast cancer overall. This is because postmenopausal breast cancer is more common. The evidence that abdominal (central) fatness is a cause of cancer of the colorectum is convincing; and it is a probable cause of cancers of the pancreas and endometrium, and of postmenopausal breast cancer. Adult weight gain is a probable cause of postmenopausal breast cancer. Greater birth weight is a probable cause of premenopausal breast cancer. Also see Chapters 6 and 7.

Justification

Maintenance of a healthy weight throughout life may be one of the most important ways to protect against cancer. This will also protect against a number of other common chronic diseases.

Weight gain, overweight, and obesity are now generally much more common than in the 1980s and 1990s. Rates of overweight and obesity doubled in many high-income countries between 1990 and 2005. In most countries in Asia and Latin America, and some in Africa, chronic diseases including obesity are now more prevalent than nutritional deficiencies and infectious diseases.

Being overweight or obese increases the risk of some cancers. Overweight and obesity also increase the risk of conditions including dyslipidaemia, hypertension and stroke, type 2 diabetes, and coronary heart disease. Overweight in childhood and early life is liable to be followed by overweight and obesity in adulthood. Further details of evidence and judgements can be found in Chapters 6 and 8. Maintenance of a healthy weight throughout life may be one of the most important ways to protect against cancer.

Public health goals

The points here are additional to those made in the footnotes to the goals above.

Median adult BMI for different populations to be between 21 and 23, depending on the normal range

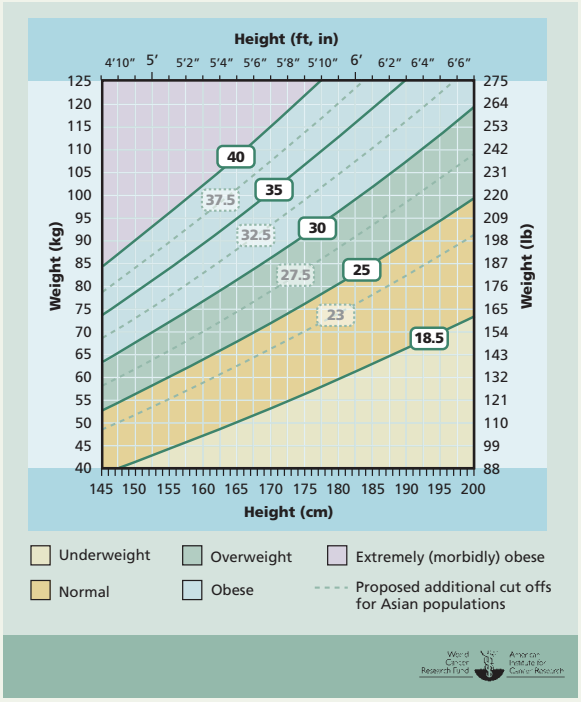
To date, the range of normal weight has been usually identified as a BMI between 18.5 and 24.9; overweight and obesity has been identified as a BMI of 25 or over 30, respectively. However, the evidence that is the basis for this Report does not show any threshold at a BMI of 25. The relationship between BMI and risk of disease varies between different populations (see chapter 8.4), and so the median population BMI that accompanies lowest risk will vary. *The Panel therefore recommends* that the population median lies between 21 and 23, which allows for this variation. Within any population, the range of individual BMIs will vary around this.

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

The context for this goal, which like the others specified here is designed as a guide for national and other population policies, is the current general rapid rise in overweight and obesity. The goal proposes a time-frame. Policy-makers are encouraged to frame specific goals according to their own circumstances. The implications of the goal for countries where there is a current increasing trend are that over the 10-year period, the increase would stop, and then rates of overweight and obesity would begin to drop.

While it is clear that obesity itself is a cause of some cancers and of other diseases, it is also a marker for dietary and physical activity patterns that independently lead to poor health.

Box 12.3 Height, weight, and ranges of body mass index (BMI)



In the chart above, a BMI between 18.5 and 25 is highlighted. A BMI between 18.5 and 25 has conventionally been regarded as normal or healthy. BMIs under 18.5 represent underweight, which is unhealthy; BMIs between 25 and 30 are called overweight; BMIs over 30 are called obesity; and BMIs over 40 are designated as extremely (morbidly) obese.

However, different cut-off points for overweight and obesity have been agreed in some countries; these cut-offs usually specify overweight at BMI less than 25, and obesity at BMI less than 30. Such specifications should be used for and by people living in those countries. These are shown in dotted lines.

BMI is calculated using weight and height. Using the graph above, a person who is 170 cm tall and weighs 68 kg has a BMI within the normal range. To calculate BMI, divide weight (kg) by height (m) squared. Therefore, a person who is 1.7 m tall and who weighs 68 kg has a BMI of 23.5.

It should be noted that BMI should be interpreted with caution, as in some cases it may be misleading, for instance in muscular people such as manual workers and some athletes, and older people, children, or people less than 5 feet tall (152 cm).

Personal recommendations

The points here are additional to those made in the footnotes to the recommendations above.

Ensure that body weight through childhood and adolescent growth projects towards the lower end of the normal BMI range at age 21

Maintain body weight within the normal range from age 21

These two related recommendations emphasise the importance of prevention of excess weight gain, overweight, and obesity, beginning in early life — indeed, in infancy and childhood. As stated, the normal range of BMI is within 18.5 to 25, with some variation between countries; where the agreed range is different this should be used as the guide. See box 12.3.

These recommendations do not mean that all healthy people within the normal range of BMI need necessarily aim to lower their BMI. However, people who have gained weight, even within the normal range, are advised to aim to return to their original weight.

People above the normal range of BMI are recommended to lose weight to approach the normal range. See 'Guidance' and also recommendations 2 and 3.

Avoid weight gain and increases in waist circumference throughout adulthood

There may be specific adverse effects from gaining weight during adulthood (see chapter 6.1.1.3), and so maintenance of weight within the normal range throughout adult life is recommended.

The World Health Organization reference values for waist circumferences of 94 cm (37 inches) in men and 80 cm (31.5 inches) in women (on a population basis) are based on their rough equivalence to a BMI of around 25, whereas waist circumferences of 102 cm (40.2 inches) in men and 88 cm (34.6 inches) in women are equivalent to a BMI of around 30. For Asian populations, cut-offs for waist circumferences of 90 cm (35.4 inches) for men and 80 cm (31.5 inches) for women have been proposed.

Guidance

This overall recommendation can best be achieved by being physically active throughout life, and by choosing diets based on foods that have low energy density and avoiding sugary drinks.

People who are already outside the normal BMI range should seek advice from appropriately qualified professionals with a view to returning towards the normal range. However, for weight control, recommendations 1, 2, and 3 can be followed.

RECOMMENDATION 2

PHYSICAL ACTIVITY

Be physically active as part of everyday life

PUBLIC HEALTH GOALS

The proportion of the population that is sedentary[1] to be halved every 10 years

Average physical activity levels (PALs)[1] to be above 1.6

PERSONAL RECOMMENDATIONS

Be moderately physically active, equivalent to brisk walking,[2] for at least 30 minutes every day

As fitness improves, aim for 60 minutes or more of moderate, or for 30 minutes or more of vigorous, physical activity every day[2 3]

Limit sedentary habits such as watching television

[1] The term 'sedentary' refers to a PAL of 1.4 or less. PAL is a way of representing the average intensity of daily physical activity. PAL is calculated as total energy expenditure as a multiple of basal metabolic rate
[2] Can be incorporated in occupational, transport, household, or leisure activities
[3] This is because physical activity of longer duration or greater intensity is more beneficial

Evidence

The evidence that physical activity of all types protects against cancer and also against obesity, and therefore indirectly those cancers whose risk is increased by obesity, has continued to accumulate since the early 1990s.

The evidence that physical activity protects against colon cancer is convincing. It probably protects against postmenopausal breast cancer and endometrial cancer. Also see Chapter 5.

The evidence that physical activity protects against weight gain, overweight, and obesity is convincing. The evidence that sedentary living increases the risk of weight gain, overweight, and obesity is also convincing. Television viewing, a form of very sedentary behaviour, is probably a cause of weight gain, overweight, and obesity. Also see Chapter 8.

Justification

Most populations, and people living in industrialised and urban settings, have habitual levels of activity below levels to which humans are adapted.

With industrialisation, urbanisation, and mechanisation, populations and people become more sedentary. As with overweight and obesity, sedentary ways of life have been

usual in high-income countries since the second half of the 20th century. They are now common if not usual in most countries.

All forms of physical activity protect against some cancers, as well as against weight gain, overweight, and obesity; correspondingly, sedentary ways of life are a cause of these cancers and of weight gain, overweight, and obesity. Weight gain, overweight, and obesity are also causes of some cancers independently of the level of physical activity. Further details of evidence and judgements can be found in Chapters 5, 6, and 8.

The evidence summarised in Chapter 10 also shows that physical activity protects against other diseases and that sedentary ways of life are causes of these diseases.

Public health goals

The points here are additional to those made in the footnotes to the goals above.

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

As above, the context for this goal, which like the others specified here is designed as a guide for national and other population policies, is the current general rapid rise in sedentary ways of life. Again as above, the goal proposes a time-frame. Its achievement will require leadership from governments, city planners, school boards, and others. Policy-makers are encouraged to frame goals according to their specific circumstances.

The recommendation takes account of the magnitude of health gain expected from moving, even modestly, from sedentary ways of life, compared to increasing the level of activity for already active people.

Average physical activity levels to be above 1.6

Average PALs for people in high income populations are between around 1.4 and 1.6. PALs for people in the normal range of BMI often average around 1.6. *The Panel emphasises* that the goal is to move above a PAL of 1.6. Levels of 1.7 and more are readily achieved by active and fit people. See Chapter 5.

Personal recommendations

The points here are additional to those made in the footnotes to the recommendations above.

Be moderately physically active, equivalent to brisk walking for at least 30 minutes every day

As fitness improves, aim for 60 minutes or more of moderate, or for 30 minutes or more of vigorous, physical activity every day

These recommendations are linked. The first derives from the evidence on cancer. The second derives from the evidence on overweight and obesity, themselves a cause of some cancers. In making these two recommendations, the Panel also recognises that for people who have been habitually sedentary for some time, a first recommendation, which is also meant to be intermediary, is sensible. Levels of activity above those recommended here are likely to be additionally beneficial, unless excessive, which may lead to an acute inflammatory response indicated by muscle pain and vulnerability to infections.

Limit sedentary habits such as watching television

Watching television is a form of very sedentary behaviour. Children may commonly watch television for more than three hours a day, and are often also exposed to heavy marketing of foods that are high in energy and of sugary drinks on television.

Table 12.1 How to achieve a healthy physical activity level (PAL)

This table provides guidance on the impact of specific periods of activity on overall physical activity levels. Increasing activity can be achieved in many different ways. See Chapter 5.

The table lists some examples of the effect on average daily PAL of doing different activities for different periods of time. The estimates are approximate and rounded.

So for a person with a PAL of 1.6, an extra 30 minutes daily of moderate activity would increase PAL to around 1.7.

Category	Increase in daily PAL (for an hour of activity *a week*)	Increase in daily PAL (for 20 minutes of activity *a day*)	Increase in daily PAL (for 30 minutes of activity *a day*)	Increase in daily PAL (for 40 minutes of activity *a day*)	Increase in daily PAL (for an hour of activity *a day*)
Sedentary					
Lying down quietly	0	0	0	0	0
Light					
Walking slowly, light gardening, housework	0.01	0.03	0.05	0.06	0.09
Moderate					
Walking briskly, cycling, dancing, swimming	0.03	0.07	0.10	0.13	0.20
Vigorous					
Running, tennis, football	0.07	0.17	0.25	0.35	0.50

Guidance

Most people can readily build regular moderate, and some vigorous, physical activity into their everyday lives.

Moderate physical activity can readily be built into everyday life. It is not necessary to devote a continuous half hour every day to moderate activity. With walking as an example, walk briskly all or part of the way to and from work, or on local errands, or at school; take a break for a walk in the middle of the day or the evening; use stairs rather than the elevator. The same applies to other moderate activities.

The best choice of vigorous physical activity is that which is most enjoyable for the family or the individual — be it swimming, running, dancing, rowing, cycling, hill walking, aerobic workouts, or team games such as football and badminton. Resistance and balance training are also beneficial. Some sports and recreations such as golf are not vigorously active. A good test that activity is vigorous is that it involves sweating and raises heart rate to 60–80 per cent of its maximum.

People whose work is sedentary should take special care to build moderate and vigorous physical activity into their everyday lives.

It is also important to avoid long periods of sedentary behaviour, such as watching television. This behaviour is also often associated with consumption of energy-dense food and sugary drinks.

A common misconception is that sport or exercise is the only way in which to be physically active. Physical activity includes that involved with transport (such as walking and cycling), household (chores, gardening), and occupation (manual and other active work), as well as recreational activity.

See table 12.1 for guidance on how to achieve and maintain a healthy PAL. This table provides guidance on the impact of specific periods of activity on overall PALs. Increasing activity can be achieved in many different ways.

The table lists some examples of the effect on average daily PAL of doing different activities for different periods of time. The estimates are approximate and rounded. So for a person with a PAL of 1.6, an extra 30 minutes daily of moderate activity would increase their PAL to around 1.7.

RECOMMENDATION 3

FOODS AND DRINKS THAT PROMOTE WEIGHT GAIN

Limit consumption of energy-dense foods[1]
Avoid sugary drinks[2]

PUBLIC HEALTH GOALS

Average energy density of diets[3] to be lowered towards 125 kcal per 100 g

Population average consumption of sugary drinks[2] to be halved every 10 years

PERSONAL RECOMMENDATIONS

Consume energy-dense foods[1 4] sparingly

Avoid sugary drinks[2]

Consume 'fast foods'[5] sparingly, if at all

[1] Energy-dense foods are here defined as those with an energy content of more than about 225–275 kcal per 100 g
[2] This principally refers to drinks with added sugars. Fruit juices should also be limited
[3] This does not include drinks
[4] Limit processed energy-dense foods (also see recommendation 4). 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
[5] The term 'fast foods' refers to readily available convenience foods that tend to be energy-dense and consumed frequently and in large portions

Evidence

Evidence shows that foods and diets that are high in energy, particularly those that are highly processed, and sugary drinks, increase the risk of overweight and obesity. Some foods low in energy density probably protect against some cancers.

Energy-dense foods and sugary drinks probably promote weight gain, especially when consumed frequently and in large portions. Correspondingly, low energy-dense foods, (often relatively unprocessed) probably protect against weight gain, overweight, and obesity. Specific types of low energy-dense foods, such as vegetables and fruits and foods containing dietary fibre, probably protect against some cancers. Also see recommendation 4, Chapter 8, and box 12.4.

Justification

Consumption of energy-dense foods and sugary drinks is increasing worldwide and is probably contributing to the global increase in obesity.

This overall recommendation is mainly designed to prevent and to control weight gain, overweight, and obesity. Further details

of evidence and judgements can be found in Chapter 8.

'Energy density' measures the amount of energy (in kcal or kJ) per weight (usually 100 g) of food. Food supplies that are mainly made up of processed foods, which often contain substantial amounts of fat or sugar, tend to be more energy-dense than food supplies that include substantial amounts of fresh foods. Taken together, the evidence shows that it is not specific dietary constituents that are problematic, so much as the contribution these make to the energy density of diets.

Because of their water content, drinks are less energy-dense than foods. However, sugary drinks provide energy but do not seem to induce satiety or compensatory reduction in subsequent energy intake, and so promote overconsumption of energy and thus weight gain.

Public health goals

The points here are additional to those made in the footnotes to the goals above.

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

Diets appropriately low in energy density are identified as supplying around 125 kcal (or 525 kJ) per 100 g, excluding any drinks. These of course will include foods whose energy density is higher than this average.

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

The context for this goal, which like others specified here is designed as a guide for national and other population policies, is the current general rapid rise in weight gain, overweight, and obesity, especially in children and young people, and the rapid rise in consumption of sugary drinks. As above, the goal proposes a time-frame. Achievement of this challenging goal implies support from regulatory authorities and from manufacturers of sugary drinks. Policy-makers are encouraged to frame goals according to their specific circumstances.

Personal recommendations

The points here are additional to those made in the footnotes to the recommendations above.

Consume energy-dense foods sparingly

Energy-dense foods are here defined as those supplying more than about 225–275 kcal (950–1150 kJ) per 100 g. Foods naturally high in dietary fibre or water, such as vegetables and fruits, and cereals (grains) prepared without fats and oils, are usually low in energy density. Non-starchy vegetables, roots and tubers, and fruits provide roughly between 10 and 100 kcal per 100 g, and cereals (grains) and pulses (legumes) between about 60 and 150 kcal per 100 g. Breads and lean meat, poultry, and fish usually provide between about 100 and 225 kcal per 100 g. Most foods containing substantial amounts of fats, oils, or added sugars, including many 'fast foods' as defined here, as well as many pre-prepared dishes and snacks, baked goods, desserts, and confectionery, are high in energy density.

This recommendation does not imply that all energy-dense foods should be avoided. Some, such as certain oils of plant origin, nuts, and seeds, are important sources of nutrients; their consumption has not been linked with weight gain, and by their nature they tend to be consumed sparingly.

Avoid sugary drinks

This recommendation is especially targeted at soft drinks (including colas, sodas, and squashes) with added sugars. Consumption of such drinks, including in 'super-sizes', has greatly increased in many countries. The evidence that such drinks 'fool' the human satiety mechanism, thereby promoting weight gain, is impressive. They are best not drunk at all. The implication of this recommendation is to prefer water. Low-energy soft drinks, and coffee and tea (without added sugar), are also preferable. Fruit juices, even with no added sugar, are likely to have the same effect and may promote weight gain, and so they should not be drunk in large quantities.

Consume 'fast foods' sparingly, if at all

As already stated, 'fast foods' does not refer to all foods (and drinks) that are readily available for consumption. The term refers to readily available convenience foods that tend to be energy-dense, and that are often consumed frequently and in large portions. Most of the evidence on 'fast foods' is from studies of such foods, such as burgers, fried chicken pieces, French fries (chips), and fatty or sugary drinks, as served in international franchised outlets.

Guidance

Foods and diets that are low in energy density, and avoidance of sugary drinks, are the best choices, in particular for people who lead generally sedentary lives.

The recommendation above can be best achieved by replacing energy-dense foods, such as fatty and sugary processed foods and 'fast foods', with those of low energy density, such as plant foods including non-starchy vegetables, fruits, and relatively unprocessed cereals (grains) (see recommendation 4), and replacing sugary drinks with unsweetened drinks such as water, and unsweetened tea or coffee.

The total energy content of diets is related not only to the energy density of individual foods consumed, but also to the frequency with which they are eaten and the portion size. The physical capacity of the human stomach and digestive system is limited. In general, people usually consume roughly the same amount of food from day to day, measured by weight. Energy-dense diets can undermine normal appetite regulation and therefore lead to greater energy intake.

Sugary drinks are a particular problem as these can be drunk in large quantities without a feeling of satiety. By replacing these foods and drinks with those of low energy density, such as vegetables and fruits, relatively unprocessed cereals (grains) and pulses (legumes), water and non-caloric drinks, the risk of weight gain is reduced, which therefore would be expected to reduce the risk of developing some cancers.

RECOMMENDATION 4

PLANT FOODS

Eat mostly foods of plant origin

PUBLIC HEALTH GOALS

Population average consumption of non-starchy[1] vegetables and of fruits to be at least 600 g (21 oz) daily[2]

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

PERSONAL RECOMMENDATIONS

Eat at least five portions/servings (at least 400 g or 14 oz) of a variety[2] of non-starchy vegetables and of fruits every day

Eat relatively unprocessed cereals (grains) and/or pulses (legumes) with every meal[3]

Limit refined starchy foods

People who consume starchy roots or tubers[4] as staples also to ensure intake of sufficient non-starchy vegetables, fruits, and pulses (legumes)

[1] This is best made up from a range of various amounts of non-starchy vegetables and fruits of different colours including red, green, yellow, white, purple, and orange, including tomato-based products and allium vegetables such as garlic
[2] Relatively unprocessed cereals (grains) and/or pulses (legumes) to contribute to an average of at least 25 g non-starch polysaccharide daily
[3] These foods are low in energy density and so promote healthy weight
[4] For example, populations in Africa, Latin America, and the Asia-Pacific region

Evidence

The evidence that diets high in vegetables and fruits protect against cancer is overall less compelling than in the mid-1990s. However, vegetables and fruits, and other foods containing dietary fibre, probably protect against a number of cancers.

Non-starchy vegetables probably protect against cancers of the mouth, pharynx, larynx, oesophagus, and stomach. Allium vegetables in particular probably protect against cancer of the stomach. Garlic probably protects against cancers of the colon and rectum. Fruits probably protect against cancers of the mouth, pharynx, larynx, oesophagus, lung, and stomach. Also see chapter 4.2.

Foods containing dietary fibre probably protect against cancers of the colorectum. Foods containing folate probably protect against cancer of the pancreas. Foods containing carotenoids probably protect against cancers of the mouth, pharynx, larynx, and lung; foods containing beta-carotene probably protect against oesophageal cancer; and foods containing lycopene probably protect against prostate cancer. Foods containing vitamin C probably protect against oesophageal cancer; and foods containing selenium probably protect against prostate cancer. It is unlikely that foods containing beta-carotene have a substantial effect on the risk of cancers of the prostate or skin (non-melanoma). It cannot be confidently assumed that the effects of these foods can be attributed to the nutrient specified, which may be acting as a marker for other constituents in the foods. Also see chapter 4.2.

Justification

An integrated approach to the evidence shows that most diets that are protective against cancer are mainly made up from foods of plant origin.

Higher consumption of several plant foods probably protects against cancers of various sites. What is meant by 'plant-based' is diets that give more emphasis to those plant foods that are high in nutrients, high in dietary fibre (and so in non-starch polysaccharides), and low in energy density.

Non-starchy vegetables, and fruits, probably protect against some cancers. Being typically low in energy density, they probably also protect against weight gain. Further details of evidence and judgements can be found in Chapters 4 and 8.

Non-starchy vegetables include green, leafy vegetables, broccoli, okra, aubergine (eggplant), and bok choy, but not, for instance, potato, yam, sweet potato, or cassava. Non-starchy roots and tubers include carrots, Jerusalem artichokes, celeriac (celery root), swede (rutabaga), and turnips.

The goals and recommendations here are broadly similar to those that have been issued by other international and national authoritative organisations (see Chapter 10). They derive from the evidence on cancer and are supported by evidence on other diseases. They emphasise the importance of relatively unprocessed cereals (grains), non-starchy vegetables and fruits, and pulses (legumes), all of which contain substantial amounts of dietary fibre and a variety of micronutrients, and are low or relatively low in energy density. These, and not foods of animal origin, are the recommended centre for everyday meals.

Public health goals

The points here are additional to those made in the footnotes to the goals above.

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

This goal represents amounts well above average population intakes in almost all parts of the world. Non-starchy vegetables exclude starchy roots and tubers (such as potatoes and potato products).

In populations where most people consume at least 400 g

of vegetables and fruits daily (see below), the average consumption is likely to correspond roughly to at least 600 g per day.

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

All cereals (grains) and pulses (legumes) undergo some form of processing before they can be consumed. Cooking is a form of processing. This goal is designed to emphasise the value of wholegrains, and generally of plant foods naturally containing substantial amounts of dietary fibre. This does not include processed foods with forms of dietary fibre added, for which evidence of a protective effect is lacking. A total of 25 g of non-starch polysaccharide is roughly equivalent to 32 g of dietary fibre. Also see box 4.1.2 in chapter 4.1.

Personal recommendations
The points here are additional to those made in the footnotes to the recommendations above.

Eat at least five portions/servings (at least 400 g or 14 oz) of a variety of non-starchy vegetables and of fruits every day

Eat relatively unprocessed cereals (grains) and/or pulses (legumes) with every meal

Limit refined starchy foods

These three linked recommendations also relate to the public health goals above. It is likely that there is further protective benefit from consuming more than five portions/servings of non-starchy vegetables and fruits. The recommendation on relatively unprocessed cereals (grains) and pulses (legumes) is designed to ensure that these become a feature of all meals. Refined starchy foods include products made from white flour such as bread, pasta, pizza; white rice; and also foods that are fatty and sugary, such as cakes, pastries, biscuits (cookies), and other baked goods.

People who consume starchy roots and tubers as staples to ensure intake of sufficient non-starchy vegetables, fruits, and pulses (legumes)

In many parts of the world, traditional food systems are based on roots or tubers, such as cassava, sweet potato, yam, or taro. Traditional food systems should be protected: as well as their cultural value, and their suitability to local climate and terrain, they are often nutritionally superior to the diets that tend to displace them. However, monotonous traditional diets, especially those that contain only small amounts of non-starchy vegetables, fruits, and pulses (legumes), are likely to be low in nutrients, which may increase susceptibility to infection and so be relevant to the risk of some cancers.

Other plant foods

Some plant foods are not the subject of goals or recommendations.

Nuts, seeds, plant oils. The evidence on nuts, seeds, and plant oils, and the risk of cancer, is not substantial. However, nuts and seeds are sources of dietary fibre, essential fatty acids, and vitamins and minerals. Though they are energy-dense, and so should be eaten sparingly, they have not been associated with weight gain. Similarly, modest amounts of appropriate plant oils can be used as the primary form of fat for use in cooking and food preparation. See chapter 4.2.

Sugars. Sugars and also syrups in their various forms are refined from cane, beet, or corn. The evidence on sugary drinks is strong enough to generate goals and recommendations (3, above). The evidence suggesting that foods containing substantial amounts of added sugars increase the risk of colorectal cancer is limited, and so the Panel has made no recommendation. However, the general implication of the goals and recommendations made here is that consumption of foods containing added sugars would be limited. See chapter 4.6.

Guidance

Maintaining plant-based diets is easily done by planning meals and dishes around plant foods rather than meat and other foods of animal origin.

Meat and other animal foods became centrepieces of meals as a result of industrialisation, one consequence of which is that meat becomes cheap. As stated above, foods of plant origin are recommended to be the basis of all meals. A healthy plate is one that is at least two thirds full of plant foods; and instead of processed cereals and grains, wholegrain versions are better choices.

As stated in recommendation 3, vegetables and fruits are generally low in energy density. Therefore, by consuming the amount of vegetables and fruits recommended above, and limiting the amount of energy-dense foods consumed, people can reduce their risk of cancer directly, as well as the risk of overweight and obesity.

One portion of vegetables or fruits is approximately 80 g or 3 oz. If consuming the recommended amount of vegetables and fruits stated above, average consumption will be at least 400 g or 14 oz per day.

RECOMMENDATION 5

ANIMAL FOODS

Limit intake of red meat[1] and avoid processed meat[2]

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

PERSONAL RECOMMENDATION

People who eat red meat[1] to consume less than 500 g (18 oz) a week, very little if any to be processed[2]

[1] 'Red meat' refers to beef, pork, lamb, and goat from domesticated animals including that contained in processed foods
[2] 'Processed meat' refers to meat preserved by smoking, curing or salting, or addition of chemical preservatives, including that contained in processed foods

Evidence

The evidence that red meat, and particularly processed meat, is a cause of colorectal cancer is stronger now than it was in the mid-1990s.

The evidence that red meat is a cause of colorectal cancer is convincing. The evidence that processed meat is a cause of colorectal cancer is also convincing. Cantonese-style salted fish (see chapter 4.3, box 4.3.5, and also box 12.5) is a probable cause of nasopharyngeal cancer: this conclusion does not apply to fish prepared (or salted) by other means. Milk from cows probably protects against colorectal cancer. Diets high in calcium are a probable cause of prostate cancer; this effect is only apparent at high calcium intakes (around 1.5 g per day or more). Also see chapters 4.3 and 4.4.

Justification

An integrated approach to the evidence also shows that many foods of animal origin are nourishing and healthy if consumed in modest amounts.

People who eat various forms of vegetarian diets are at low risk of some diseases including some cancers, although it is not easy to separate out these benefits of the diets from other aspects of their ways of life, such as not smoking, drinking little if any alcohol, and so forth. In addition, meat can be a valuable source of nutrients, in particular protein, iron, zinc, and vitamin B12. *The Panel emphasises* that this overall recommendation is not for diets containing no meat — or diets containing no foods of animal origin. The amounts are for weight of meat as eaten. As a rough conversion, 300 g of cooked red meat is equivalent to about 400–450 g raw weight, and 500 g cooked red meat to about 700–750 g raw weight. The exact conversion will depend on the cut of meat, the proportions of lean and fat, and the method and degree of cooking, so more specific guidance is not possible.

Red or processed meats are convincing or probable causes of some cancers. Diets with high levels of animal fats are often relatively high in energy, increasing the risk of weight gain. Further details of evidence and judgements can be found in Chapters 4 and 8.

Public health goal

The points here are additional to those made in the footnotes to the goal above.

> 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

This goal is given in terms of weekly consumption to encourage perception that red meat need not be a daily food. The goal of 300 g or 11 oz a week corresponds to the level of consumption of red meat at which the risk of colorectal cancer can clearly be seen to rise. The evidence on processed meat is even more clear-cut than that on red meat, and the data do not show any level of intake that can confidently be shown not to be associated with risk.

Other animal foods

Many animal foods are not the subject of goals or recommendations.

Poultry, fish. The evidence on poultry and the risk of cancer is not substantial. The evidence suggesting that fish protects against colorectal cancer is limited. (Cantonese-style salted fish is a special case — see chapter 4.3.) However, people who eat flesh foods are advised to prefer poultry, and all types of fish, to red meat. Flesh from wild animals, birds, and fish, whose nutritional profiles are different from those of domesticated and industrially reared creatures, is also preferred. See chapter 4.3.

Eggs. The evidence on eggs and the risk of cancer is not substantial. There is no basis for recommending avoidance of eggs to prevent cancer. See chapter 4.3.

Milk, cheese, other dairy products. The evidence on cow's milk, cheese, and foods high in calcium, and the risk of cancer, is hard to interpret. The evidence on colorectal cancer and on prostate cancer seems to be in conflict. After long discussion, the Panel chose to make no recommendations here. See chapter 4.4.

Animal fats. The evidence suggesting that animal fats are a cause of colorectal cancer is limited. Animal fats are high in energy and the Panel integrated the limited evidence suggesting that animal fats are a cause of overweight and obesity into its findings on energy-dense foods. The implication is that it is best to limit consumption of animal fats, as part of meat and also as contained in processed foods, in part because of the relation with cardiovascular disease. See chapter 4.5.

Personal recommendation
The points here are additional to those made in the footnotes to the recommendation above.

People who regularly eat red meat
to consume less than 500 g (18 oz) a week,
very little if any to be processed

This recommendation relates to the goal above. In populations where most people consume less than 500 g (18 oz) a week, the population average is likely to correspond to no more than roughly 300 g (11 oz) a week.

Guidance

There are many ways to enjoy meat and other animal foods as part of plant-based diets.

For those who eat flesh foods, the amount of red meat consumed can be limited by choosing poultry and fish instead. It is better also to consume the lean parts of red meat.

It is best that processed meats are avoided. They are generally energy-dense and can also contain high levels of salt (see recommendation 7). They also tend to be preserved by smoking, curing, or salting, or with the addition of chemical preservatives. Some of these methods of preservation are known to generate carcinogens; while the epidemiological evidence that these are causes of cancer is limited, it is a wise precaution to avoid them. Processed meat includes ham, bacon, pastrami, and salami. Sausages, frankfurters, and 'hot dogs', to which nitrates/nitrites or other preservatives are added, are also processed meats. Minced meats sometimes, but not always, fall inside this definition if they are preserved chemically. The same point applies to 'hamburgers'. Fresh meats that have simply been minced or ground and then shaped and cooked are not considered to be 'processed'.

Substantial amounts of meat are not needed to sustain adequate consumption of protein and iron. All flesh foods are high in protein, and for people who consume varied diets without any flesh foods, more than adequate protein can be derived from a mixture of pulses (legumes) and cereals (grains). Iron is present in many plant foods, as well as in meat.

RECOMMENDATION 6

ALCOHOLIC DRINKS

Limit alcoholic drinks[1]

PUBLIC HEALTH GOAL

Proportion of the population drinking more than the recommended limits to be reduced by one third every 10 years[1 2]

PERSONAL RECOMMENDATION

If alcoholic drinks are consumed, limit consumption to no more than two drinks a day for men and one drink a day for women[1 2 3]

[1] This recommendation takes into account that there is a likely protective effect for coronary heart disease
[2] Children and pregnant women not to consume alcoholic drinks
[3] One 'drink' contains about 10–15 grams of ethanol

Evidence

The evidence that all types of alcoholic drink are a cause of a number of cancers is now stronger than it was in the mid-1990s.

The evidence that alcoholic drinks are a cause of cancers of the mouth, pharynx, and larynx, oesophagus, and breast (pre- and postmenopausal) is convincing. The evidence that alcoholic drinks are a cause of colorectal cancer in men is convincing. Alcoholic drinks are a probable cause of liver cancer, and of colorectal cancer in women. It is unlikely that alcoholic drinks have a substantial adverse effect on the risk of kidney cancer. Also see chapter 4.8.

Justification

The evidence on cancer justifies a recommendation not to drink alcoholic drinks. Other evidence shows that modest amounts of alcoholic drinks are likely to reduce risk of coronary heart disease.

The evidence does not show a clear level of consumption of alcoholic drinks below which there is no increase in risk of the cancers it causes. This means that, based solely on the evidence on cancer, even small amounts of alcoholic drinks should be avoided. Further details of evidence and judgements can be found in Chapter 4. In framing the recommendation here, the Panel has also taken into account the evidence that modest amounts of alcoholic drinks are likely to protect against coronary heart disease, as described in Chapter 10.

The evidence shows that all alcoholic drinks have the same effect. Data do not suggest any significant difference

depending on the type of drink. This recommendation therefore covers all alcoholic drinks, whether beers, wines, spirits (liquors), or other alcoholic drinks. The important factor is the amount of ethanol consumed.

The Panel emphasises that children and pregnant women should not consume alcoholic drinks.

Public health goal

The points here are additional to those made in the footnotes to the goal above.

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

The context for this goal, which like the others specified here is designed as a guide for national and other population policies, is the current common rise in regular and heavy consumption of alcoholic drinks, including among young people. The focus of the goal is especially on those consuming above the recommended limits, rather than regular modest drinkers. Again as above, the goal proposes a timeframe. Achievement of this goal requires substantial support from regulatory authorities, the manufacturers of alcoholic drinks, and from the owners of bars and other locations where alcoholic drinks are sold and consumed. Policy-makers are encouraged to frame goals according to their specific circumstances.

Personal recommendation

The points here are additional to those made in the footnotes to the recommendation above.

If alcoholic drinks are consumed, limit consumption to no more than two drinks a day for men and one drink a day for women

Modest consumption of alcoholic drinks has been shown to be protective against coronary heart disease compared to no drinking, with higher levels of drinking in some cases showing increased risk. Nevertheless, no authoritative body has made specific recommendations for alcohol consumption to avoid coronary heart disease because of the adverse biological, behavioural, physical, social, and other effects of higher levels of consumption.

For those who do consume alcoholic drinks, no more than two drinks per day (men) and no more than one drink per day (women) are the recommended limits. These limits are expressed as amounts per day, because occasional heavy drinking (say, at weekends) while at other times alcoholic drinks are not consumed, is particularly likely to lead to adverse outcomes.

Guidance

For those people who choose to consume alcoholic drinks, the Panel endorses the advice of other authoritative bodies. These generally advise an upper limit of around two drinks per day for men and one for women.

RECOMMENDATION 7

PRESERVATION, PROCESSING, PREPARATION

Limit consumption of salt[1]
Avoid mouldy cereals (grains) or pulses (legumes)

PUBLIC HEALTH GOALS

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

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)

PERSONAL RECOMMENDATIONS

Avoid salt-preserved, salted, or salty foods; preserve foods without using salt[1]

Limit consumption of processed foods with added salt to ensure an intake of less than 6 g (2.4 g sodium) a day

Do not eat mouldy cereals (grains) or pulses (legumes)

[1] Methods of preservation that do not or need not use salt include refrigeration, freezing, drying, bottling, canning, and fermentation

Evidence

Some methods of food preservation, processing, and preparation affect the risk of cancer. The strongest evidence concerns processed meats, preserved by salting, smoking, pickling, addition of chemicals, and other methods (see recommendation 5, above); salt from all sources; and salt-preserved foods.

Salt and salt-preserved foods are probably a cause of stomach cancer: see chapter 4.6.

The Panel judges that refrigeration, while not likely to have any direct effect on the risk of cancer, indirectly protects against some cancers because it affects consumption of foods which themselves influence the risk of cancer. For instance, it may increase the availability and nutrient content of fresh, perishable foods (vegetables and fruits; meat; milk; see chapters 4.2, 4.3, and 4.4); and decrease the need for processed foods (preserved by salting, smoking, curing, and pickling; see chapters 4.3 and 4.9). Also see recommendations 4 and 5, and box 4.6.4 in chapter 4.6.

Some plant foods, notably cereals (grains) and pulses (legumes), may be contaminated with aflatoxins, produced by moulds (fungi) during storage in hot and humid condi-

tions. The evidence that aflatoxins are a cause of liver cancer is convincing. Also see chapter 4.1.

Justification

The strongest evidence on methods of food preservation, processing, and preparation shows that salt and salt-preserved foods are probably a cause of stomach cancer, and that foods contaminated with aflatoxins are a cause of liver cancer.

Salt is necessary for human health and life itself, but at levels very much lower than those typically consumed in most parts of the world. At the levels found not only in high-income countries but also in those where traditional diets are high in salt, consumption of salty foods, salted foods, and salt itself, is too high. The critical factor is the overall amount of salt.

Microbial contamination of foods and drinks and of water supplies, remains a major public health problem worldwide. Specifically, the contamination of cereals (grains) and pulses (legumes) with aflatoxins, produced by some moulds when such foods are stored for too long in warm temperatures is an important public health problem, and not only in tropical countries.

Salt and salt-preserved foods are a probable cause of some cancers. Aflatoxins are a convincing cause of liver cancer. Further details of evidence and judgements can be found in Chapter 4.

Public health goals

The points here are additional to those made in the footnotes to the goal above.

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

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

The reason for these linked goals, which like the others specified above are designed as a guide for national and other population policies, is the very high consumption of salt in most countries. Again as above, one of the goals proposes a time-frame. This time-frame implies a continuing effort into the future to achieve levels that might seem difficult within a single decade. Its achievement implies support from regulatory authorities and from the manufacturers of salty and salted foods. Policy-makers are encouraged to frame goals according to their specific circumstances.

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

Personal recommendations

The points here are additional to those made in the footnotes to the recommendations above.

Avoid salt-preserved, salted, or salty foods; preserve foods without using salt

Limit consumption of processed foods with added salt to ensure an intake of less than 6 g (2.4 g sodium) a day

For most people, these two linked recommendations are designed to reduce salt consumption substantially. Usually most salt in diets is contained in processed foods. Some such foods are obviously salty. Others, bread for example, usually do not taste salty, but bread and other cereal products are a major source of salt in high-income countries, together with many other industrially processed foods that may not appear 'salty'. When preserving foods at home, methods that minimise use of salt are recommended. Avoid the use of salt at table.

Do not eat mouldy cereals (grains) or pulses (legumes)

The prudent approach is to avoid consumption of any cereals (grains) or pulses (legumes) that may have been stored

Other methods of preservation and preparation

Most methods of food preservation, processing, and preparation are not the subject of goals or recommendations. Some of these are of public interest and some are mentioned here.

Drying, fermenting, canning, bottling. There is no good evidence that these methods of food preservation in themselves have any effect on the risk of cancer. When they do not involve the use of salt, they are preferable to methods that do add salt. See chapter 4.9.

Refrigeration. The epidemiological evidence associating use of refrigeration with reduction of the risk of stomach cancer is substantial. The previous report judged this evidence to be convincing. The Panel responsible for this Report judged that the effect of refrigeration as such on cancer risk was not likely to be directly causative. Nevertheless, the benefits of industrial and domestic freezing, refrigeration, and chilling include availability of perishable foods, including vegetables and fruits, all year round, protection against microbial contamination, and reduced need to preserve food by salting. In these respects, refrigeration is beneficial. Also see box 4.6.4 in chapter 4.6.

Additives, contaminants. There is little epidemiological evidence on any relationship between food additives and contaminants, whose use is subject to regulation, and the risk of cancer. Also see chapter 4.9.

Steaming, boiling, stewing, baking, roasting, frying, grilling (broiling), barbecuing (charbroiling). While evidence suggesting that grilled (broiled) and barbecued (charbroiled) animal foods are a cause of stomach cancer is limited, there is evidence from experimental settings showing that carcinogens are formed when meats, animal foods, and some other foods are cooked at very high temperatures, and most of all when they are exposed to direct flame. While the epidemiological evidence that these are causes of cancer is limited, it is a wise precaution to avoid foods cooked in this way. This effect is not found when foods are cooked by use of boiling water. Also see chapter 4.9.

for a relatively long time in warm, ambient temperatures, even if they show no visible signs of mould.

Guidance

At all stages in the food chain, from production to purchase and storage ready for food preparation, prefer methods of food preservation, processing, and preparation that keep perishable foods relatively fresh, and that do not involve the use of salt.

Salt is just one way to add savour to foods. Many herbs and spices can be used instead. After a period of time of limiting the use of salt, taste sensitivity to it increases, preference decreases, and the natural savour of food becomes apparent. Food labels give some guidance. Products advertised as 'reduced salt' may still be high in salt.

Keep food fresh by use of refrigeration. Discard food showing signs of mould (other than those such as some cheeses manufactured by use of benign moulds).

RECOMMENDATION 8

DIETARY SUPPLEMENTS

Aim to meet nutritional needs through diet alone[1]

PUBLIC HEALTH GOAL

Maximise the proportion of the population achieving nutritional adequacy without dietary supplements

PERSONAL RECOMMENDATION

Dietary supplements are not recommended for cancer prevention

[1] This may not always be feasible. In some situations of illness or dietary inadequacy, supplements may be valuable

Evidence

Randomised controlled trials have produced strong evidence that high-dose supplements of some nutrients modify the risk of some cancers.

The evidence that high-dose beta-carotene supplements are a cause of lung cancer in smokers is convincing. Calcium probably protects against cancers of the colorectum. Selenium in high doses probably protects against prostate cancer. It is unlikely that beta-carotene, or foods fortified with this constituent, have a substantial effect on the risk of cancers of the prostate or skin (non-melanoma). Also see chapters 4.2 and 4.10.

Justification

The evidence shows that high-dose nutrient supplements can be protective or can cause cancer. The studies that demonstrate such effects do not relate to widespread use among the general population, in whom the balance of risks and benefits cannot confidently be predicted. A general recommendation to consume supplements for cancer prevention might have unexpected adverse effects. Increasing the consumption of the relevant nutrients through the usual diet is preferred.

The recommendations of this Report, in common with its general approach, are food based. Vitamins, minerals, and other nutrients are assessed in the context of the foods and drinks that contain them. *The Panel judges* that the best source of nourishment is foods and drinks, not dietary supplements. There is evidence that high-dose dietary supplements can modify the risk of some cancers. Although some studies in specific, usually high-risk, groups have shown evidence of cancer prevention from some supplements, this finding may not apply to the general population. Their level

of benefit may be different, and there may be unexpected and uncommon adverse effects. Therefore it is unwise to recommend widespread supplement use as a means of cancer prevention. Further details of evidence and judgements can be found in Chapter 4.

In general, for otherwise healthy people, inadequacy of intake of nutrients is best resolved by nutrient-dense diets and not by supplements, as these do not increase consumption of other potentially beneficial food constituents. *The Panel recognises* that there are situations when supplements are advisable. See box 12.4.

Public health goal

The points here are additional to that in the footnote above.

Maximise the proportion of the population achieving nutritional adequacy without dietary supplements

In many parts of the world, nutritional inadequacy is endemic. In cases of crisis, it is necessary to supply supplements of nutrients to such populations or to fortify food to ensure at least minimum adequacy of nutritional status. The best approach is to protect or improve local food systems so that they are nutritionally adequate. The same applies in high-income countries, where impoverished communities and families, vulnerable people including those living alone, the elderly, and the chronically ill or infirm, are also liable to be consuming nutritionally inadequate diets. In such cases of immediate need, supplementation is necessary. See box 12.4.

Personal recommendation

The points here are additional to that in the footnote above.

Dietary supplements are not recommended for cancer prevention

This recommendation applies to self-administration of low (physiological) as well as high (pharmacological) doses of supplements, unless on the advice of a qualified health professional who can assess potential risks and benefits.

Guidance

Choose nutrient-rich foods and drinks instead of dietary supplements.

This can be done by following all the recommendations made here, in the context of appropriate general recommendations on food, nutrition, physical activity, and body composition, designed to protect against disease and to promote health and well-being.

Box 12.4 When supplements are advisable

The Panel judges that the use of supplements as possible protection against colorectal and prostate cancer should not be routinely recommended.

In general, as already stated, with secure food supplies and access to a variety of foods and drinks, when people follow the recommendations here in the context of general dietary recommendations, supplements are normally unnecessary. Furthermore, in diets, nutrients are present in combinations often not found in 'multi'-supplements, and with other bioactive substances.

The Panel recognises, however, that dietary supplements, in addition to varied diets, may at times be beneficial for specific population groups. Examples include vitamin B12 for people over the age of 50 who have difficulty absorbing naturally occurring vitamin B12, folic acid supplements for women who may become or are pregnant, and vitamin D supplements for people who are not exposed to sufficient sunlight or some people (such as the elderly or people with dark skin) who do not synthesise adequate vitamin D from sunlight.

The Panel advises against self-administration of supplements as protection against specific cancers. The findings on calcium and selenium apply in specific settings and specific doses. A recommendation for routine consumption in the general population might show a different balance of risks and benefits. Advice for individuals whose particular circumstances have been assessed is best given in a clinical setting in consultation with an appropriately qualified professional.

SPECIAL RECOMMENDATION 1

BREASTFEEDING

Mothers to breastfeed; children to be breastfed[1]

PUBLIC HEALTH GOAL

The majority of mothers to breastfeed exclusively, for six months[2] [3]

PERSONAL RECOMMENDATION

Aim to breastfeed infants exclusively[2] up to six months and continue with complementary feeding thereafter[3]

[1] Breastfeeding protects both mother and child
[2] 'Exclusively' means human milk only, with no other food or drink, including water
[3] In accordance with the UN Global Strategy on Infant and Young Child Feeding

Evidence

The evidence on cancer supports the evidence on well-being, positive health, and prevention of other diseases: at the beginning of life, human milk is best.

The evidence that lactation protects the mother against breast cancer at all ages is convincing. There is limited evidence suggesting that lactation protects the mother against cancer of the ovary. Having been breastfed probably protects children against overweight and obesity, and therefore those cancers for which weight gain, overweight, and obesity are a cause. Overweight and obesity in children tend to track into adult life. Also see recommendation 1 and chapters 6.3, 7.10, and 8.

Justification

The evidence on cancer as well as other diseases shows that sustained, exclusive breastfeeding is protective for the mother as well as the child.

This is the first major report concerned with the prevention of cancer to make a recommendation specifically on breastfeeding, to prevent breast cancer in mothers, and to prevent overweight and obesity in children. Further details of evidence and judgements can be found in Chapters 6 and 8.

Other benefits of breastfeeding for mothers and their children are well known. Breastfeeding protects against infections in infancy, protects the development of the immature immune system, protects against other childhood diseases, and is vital for the development of the bond between mother and child. It has many other benefits. Breastfeeding is especially vital in parts of the world where water supplies are not safe and where impoverished families do not readily have the money to buy infant formula and other infant and young child foods.

This recommendation has a special significance. While derived from the evidence on being breastfed, it also indicates that policies and actions designed to prevent cancer need to be directed throughout the whole life course, from the beginning of life.

Public health goal

The points here are additional to those made in the footnotes to the goal above.

The majority of mothers to breastfeed exclusively, for six months

Sustained, exclusive breastfeeding was the norm until the development and marketing of infant formulas, which largely replaced breastfeeding in high-income and then in most countries by the second half of the 20th century.

While the practice of breastfeeding and exclusive breastfeeding has been increasing in many countries in recent decades, in most countries now only a minority of mothers exclusively breastfeed their babies until four months, and an even smaller number until six months.

This is the context for this goal, which like the others specified here, is designed as a guide for national and other population policies. It does not imply that in any population where over half of all mothers breastfeed exclusively for six months that the ultimate goal has been reached: the greater the proportion, the better. Its achievement will require increased support from regulatory authorities and from the manufacturers of infant formulas. Policy-makers are encouraged to frame goals according to their specific circumstances.

The Panel emphasises the importance of exclusive breastfeeding (other than vitamin drops where locally recommended), with no other sustenance, including water.

There are special situations where breastfeeding is recommended with caution or is not advised. The main special situation is when mothers have HIV/AIDS. On this, the UN Global Strategy as revised in late 2006 states: 'Exclusive breastfeeding is recommended for HIV-infected women for the first six months of life unless replacement feeding is acceptable, feasible, affordable, sustainable, and safe for them and their infants before that time.'

Personal recommendation

The points here are additional to those made in the footnotes to the recommendations above.

Aim to breastfeed infants exclusively up to six months and continue with complementary feeding thereafter

This and the population goal are references to the UN Global Strategy on Infant and Young Child Feeding, which is endorsed by the Panel. None of the phrasing of the goals and recommendations here is designed to modify the Strategy, which allows for special circumstances, including those in which mothers are not able to breastfeed their babies or may otherwise be well advised not to do so.

Guidance

On breastfeeding, the Panel endorses the UN Global Strategy on Infant and Young Child Feeding.

It is universally agreed, by UN agencies, national governments, health professionals, civil society organisations, and the infant formula and milk industries, that human milk is the best food for infants and young children. Therefore, this Report recommends that mothers breastfeed exclusively, for six months, as recommended in the Strategy.

SPECIAL RECOMMENDATION 2

CANCER SURVIVORS[1]

Follow the recommendations for cancer prevention[2]

RECOMMENDATIONS

All cancer survivors[3] to receive nutritional care from an appropriately trained professional

If able to do so, and unless otherwise advised, aim to follow the recommendations for diet, healthy weight, and physical activity[2]

[1] Cancer survivors are people who are living with a diagnosis of cancer, including those who have recovered from the disease
[2] This recommendation does not apply to those who are undergoing active treatment, subject to the qualifications in the text
[3] This includes all cancer survivors, before, during, and after active treatment

Evidence

The available evidence on cancer survivors has limitations. It is of variable quality; it is difficult to interpret; and it has not yet produced impressive results. The evidence for this review does not include the active treatment period.

The term 'cancer survivor' denotes people in a very wide range of circumstances. It is unlikely that specific recommendations based on evidence applying to any one group of people would apply to all cancer survivors.

In no case is the evidence specifically on cancer survivors clear enough to make any firm judgements or recommendations that apply to cancer survivors as a whole, or to those who are survivors of any specific cancer.

Justification

Subject to the qualifications made here, *the Panel has agreed* that its recommendations apply also to cancer survivors. There may be specific situations where this advice may not apply, for instance, where treatment has compromised gastrointestinal function.

If possible, when appropriate, and unless advised otherwise by a qualified professional, the recommendations of this Report also apply to cancer survivors. The Panel has made this judgement based on its examination of the evidence, including that specifically on cancer survivors, and also on its collective knowledge of the pathology of cancer and its interactions with food, nutrition, physical activity, and body composition. In no case is the evidence specifically on cancer survivors clear enough to make any firm judgements or recommendations to cancer survivors. Further details of evidence and judgements can be found in Chapter 9.

Treatment for many cancers is increasingly successful, and so cancer survivors increasingly are living long enough to develop new primary cancers or other chronic diseases. The

recommendations in this Report would also be expected to reduce risk of those conditions, and so can also be recommended on that account.

Recommendations

In the special circumstances of cancer survivors, who until they have recovered from the disease are in a clinical setting, *the Panel decided* not to separate public health goals and personal recommendations. The points here are additional to those made in the footnotes above.

All cancer survivors to receive nutritional care from an appropriately trained professional

The circumstances of cancer survivors vary greatly. Given the increased importance of food, nutrition, physical activity, and body composition in cancer survival, people who have received a diagnosis of cancer should consult an appropriately trained health professional as soon as possible. The advice received will be designed to take their personal situation and circumstances into account.

People who are undergoing surgical, chemical, or radiotherapy for cancer are likely to have special nutritional requirements; as are people after treatment whose ability to consume or metabolise food has been altered by treatment; and people in the later stages of cancer whose immediate need is to arrest or slow down weight loss. These are all clinical situations where the advice of an appropriately trained health professional is essential.

The evidence does not support the use of high-dose supplements of microconstituents as a means of improving outcome. Cancer survivors should consult their physician and/or a qualified nutrition professional, who can evaluate the safety and efficacy of specific dietary supplements, and counsel appropriate action based on current research relevant to their particular clinical situation.

All cancer survivors to aim to follow the recommendations for diet, healthy weight, and physical activity

This general approach is for cancer survivors who are able, and have not been advised otherwise, to follow the recommendations of this Report.

There is growing evidence that physical activity and other measures that control weight may help to prevent cancer recurrence, particularly breast cancer. These findings are in line with the recommendations of this Report. Cancer survivors are also likely to gain health benefit, and a sense of control, from regular physical activity at levels that they can sustain.

Guidance

The general purpose of the recommendations made in this Report is to 'stop cancer before it starts'. Crucial support will be given to cancer survivors who decide to follow the overall recommendations made in this chapter, when the people living closest to them also make this choice. As well as giving crucial support and improving the quality of life of the cancer survivor, they will also be reducing their own risk of cancer.

12.3 Patterns of food, nutrition, and physical activity

Those responsible for reports such as this are faced with a number of challenges. Information, even from high-income countries where most research is carried out, is incomplete and often patchy, and that from many countries is fragmentary. Most modern research in the nutritional and other biological sciences is highly focused. Many researchers address not just what foods affect the risk of disease, but what specific agent or agents in the food are responsible, or the exact biological pathway involved. The amount of data produced by such studies is multiplying and its sheer volume can obscure the general view needed as a basis for public health goals and personal recommendations.

As a result, until relatively recently, expert reports concerned with the prevention of disease tended to frame their conclusions and recommendations in terms of specific dietary constituents being the most relevant factors modifying the risk of disease. Thus, since the 1960s, reports concerned with prevention of coronary heart disease have recommended cuts in consumption of saturated fats and of dietary cholesterol. Such recommendations, while staying closer to the science as usually carried out, and of value to planners of food supplies and in the formulation of manufactured food, are less effective as ways of encouraging healthy choices of foods and drinks. People consume foods and drinks, rather than nutrients.

Also, what people eat and drink and how they behave are only partly a matter of choice. Many other factors are involved including income, climate, and culture. Although food supplies are now becoming increasingly globalised, the people of South India are not likely to move to meat-based diets, nor will most people in the USA adopt lentils as staple foods.

More recently, some reports have adopted a food-based approach to the prevention of disease and the promotion of well-being. This has presented the expert panels responsible for reports such as this one with another challenge. This is to review, assess, and judge the evidence in ways that respect its nature, yet at the same time also seek to discern 'the bigger picture'. A further challenge is to identify healthy patterns of food, nutrition, and physical activity that allow for — indeed encourage — the diversity both of traditional and modern food systems and cuisines.

12.3.1 The integrated approach

Since its work began, five years before publication of this Report, the Panel has used a broad, integrative approach. This, while largely derived from conventional 'reductionist' research, has sought to find patterns of consumption of foods and drinks, degrees of physical activity, and scale of body composition that lead to recommendations designed to prevent cancer at personal and population levels.

This approach has proved to work. As recommendation 2 indicates, meticulous examination of the many studies on physical activity and the risk of cancer shows that all types of activity — occupational, transport, domestic, recreational — do or may protect against some cancers. The type of activity is evidently unimportant. Given the general tendency of populations living in industrialised and urbanised societies to become increasingly sedentary, this enables clear recommendations designed to encourage increased levels of physical activity.

At a more detailed level, the same point applies to alcoholic drinks, as indicated in recommendation 6. Many studies have been undertaken to examine the relationship of beer, wine, and spirits (liquor) to the risk of cancer — and to other diseases. Taken all together, these show that it is alcoholic drinks in general — which is to say, the amount of ethanol consumed — that are or may be a cause of some cancers. Again, this enables the framing of clear recommendations that take into account the effect of modest amounts of alcoholic drinks on the risk of coronary heart disease.

Recommendations 3, 4, and 5 also show how the integrated approach stays with the science and, by looking for patterns, can create broad public and personal health messages. After particularly careful discussions, *the Panel agreed* that a key factor determining vulnerability to weight gain, overweight, and obesity, and thus to those cancers whose risk is increased in these ways, is not so much specific foods, drinks, or nutrients, but the relative energy density of diets. This is not an obvious conclusion from the studies whose results form the basis for this judgement. Up to now, epidemiologists have rarely used energy density as a concept in the design of their studies.

Comparably, the vast amount of evidence on specific foods and drinks does indeed show a more general pattern with vegetables and fruits, and with red and processed meat. In framing recommendations 4 and 5, *the Panel agreed* that recommendations on these types of food should be seen in the broader context of plant and animal foods. This is not a new conclusion. Plant-based diets, which is to say diets within which foods of plant origin are more central than is typical in industrialised and urbanised settings, are now commonly recognised as protective against some cancers. Again, the judgement requires qualification, as has been done in the footnotes and text. Many foods of animal origin are nour-

ishing, and only the evidence on red meat and on processed meat is strong enough to justify specific recommendations. Nevertheless, with such precautions, *the Panel has agreed* that dietary patterns in which foods of plant origin are more central, with red meat less so, are protective.

12.3.2 Nutritional patterns

The recommendations made in this Report do not specify every major type of food and drink. In this sense they do not, taken together, amount to whole diets. Nevertheless, combined with the text that accompanies them, they are likely to promote the nutritional adequacy of diets and healthy body composition. For this and other reasons, they will also be expected to help prevent nutritional deficiencies and related infectious diseases.

Thus, a diet based on these recommendations is likely to have modest fat content (through limiting energy-dense foods), especially in saturated fatty acids (limiting red and processed meat); to be relatively high in starch and fibre (from emphasis on relatively unprocessed plant foods including cereals (grains)), while being low in sugar (due to limiting energy-dense foods and sugary drinks). Overall, the macronutrient profile is likely to be similar to that recommended in authoritative reports concerned more generally with prevention of other chronic diseases.

A number of the positive recommendations derive from evidence on foods that contribute various micronutrients to the diet. These, including relatively unprocessed cereals (grains), vegetables and fruits, and pulses (legumes), as well as various foods of animal origin, would be expected to supply ample vitamin A (mostly in the form of carotenoids), folate, other B vitamins including vitamin B12, vitamin C, vitamin E, selenium, iron, zinc, potassium, and indeed sodium.

12.3.3 Integration with national recommendations

In national settings, the recommendations of this Report will be best used in combination with recommendations issued by governments or on behalf of nations, designed to prevent chronic and other diseases. Also see box 12.5.

In the Panel's judgement, based on its collective knowledge of food, nutrition, physical activity, and disease prevention, and also experience of national contexts, the recommendations here are likely to be harmonious with those designed to prevent disease in specific countries, which take local and national dietary patterns, food cultures, and social and other circumstances into account.

Box 12.5 Regional and special circumstances

The goals and recommendations specified in 12.2 are generally relevant worldwide.

In three cases, evidence that is strong enough to be the basis for goals and recommendations is of importance only in discrete geographical regions. That is not to say that if the same foods or drinks were consumed elsewhere they would not have the same effect, but rather that currently, people in the rest of the world do not consume them. These are the herbal drink maté, probably a cause of oesophageal cancer; Cantonese-style salted fish, probably a cause of nasopharyngeal cancer; and contamination of water supplies with arsenic, a cause of lung cancer and (probably) skin cancer. *The Panel considers* that detailed goals and recommendations in these cases are most appropriately set by local and/or regional regulatory authorities, other policy-makers, and health professionals in the countries affected.

Maté

As stated in chapter 4.7 and elsewhere, maté is a herbal infusion originally cultivated and drunk by the original inhabitants in Argentina, Uruguay, and Rio Grande do Sul in Brazil, where it is now adopted as a staple drink. Reports on the prevention of cancer have identified maté as a cause or possible cause of cancers of the oral cavity and oesophagus. The product is commonly available in supermarkets in many countries, but the evidence shows that the causal factor is maté drunk very hot through a metal straw often left resting on the lip, the form traditional within Latin America. It is probable that the cause of cancer is not the herb but the thermic effect.

RECOMMENDATION

Avoid consumption of maté as drunk in parts of Latin America, very hot and through a metal straw.

Cantonese-style salted fish

Cantonese-style salted fish, as stated in chapter 4.3 and elsewhere, is part of the traditional diet consumed by people living around the Pearl River Delta region in southern China, and has been given to children, even as part of a weaning diet. This style of fish is prepared with less salt than used on the northern Chinese littoral, is allowed to ferment, and so is eaten in a decomposed state. While it is also consumed by communities of emigrants from the Pearl River Delta in other countries, this particular preparation of fish is not otherwise an issue, and there is no good evidence that other forms of preserved fish affect the risk of cancer.

RECOMMENDATIONS

Avoid consumption of Cantonese-style salted fish.

Children not to eat this type of fish.

Arsenic in water

Contamination of water supplies with arsenic is a different type of special case. This may happen as a result of release of industrial effluents, and also because of geological and other environmental circumstances. High concentrations of arsenic in drinking water have been found in areas of Bangladesh, China, and West Bengal (India); and also in more localised areas of Argentina, Australia, Chile, Mexico, Taiwan, China, the USA, and Vietnam. Arsenic is classed as a carcinogen by the International Agency for Research on Cancer.

RECOMMENDATIONS

Avoid use of any source of water that may be contaminated with arsenic.

Authorities to ensure that safe water supplies are available where such contamination occurs.

12.3.4 General patterns

The Panel has not been able to base its recommendations on general patterns of food and nutrition, as stated above, on evidence specifically directed towards that question. Reasons for this, as summarised in chapter 4.9, are that relatively few epidemiological studies examine diets in an integrated form; and of these, most do not define the nature of such diets in a way that can be compared with other studies. Those that do, such as studies of Seventh-day Adventists, often examine the effects of whole ways of life, including factors that may confound findings specifically on food, nutrition, and physical activity.

For the future, *the Panel recommends* that protocols be agreed to enable well conducted epidemiological studies to be carried out on patterns of food, nutrition, and of physical activity, using agreed definitions and methods that allow comparisons and detailed analyses.

A number of traditional and more modern food systems generate a variety of climatically and culturally appropriate, delicious, and nourishing cuisines that are harmonious with the recommendations made here. These include the many traditional cuisines of the Mediterranean littoral, and of South-East and East Asia, and some diets devised since the industrialisation and internationalisation of food systems. The latter are often adaptations of traditional diets, enjoyed by people in higher income countries as part of generally healthy ways of life.

12.3.5 Health, well-being, and ways of life

Throughout our work we, the members of this Panel, have been aware that prevention of cancer through changes to food and nutrition, physical activity, and body composition is a major global, regional, and national task; and also that this work is one part of a greater task, to prevent disease and to promote well-being throughout the world, sustainably and equitably.

As part of this task, integrated and comprehensive programmes should be developed on cancer prevention, together with prevention of other chronic diseases, such as type 2 diabetes, cardiovascular diseases, osteoporosis, other chronic diseases, and also nutrient deficiencies and relevant infectious diseases, especially of early childhood. This approach, broader than any now undertaken within the UN system, would need to be coordinated by relevant international and national organisations.

All reports on the prevention of cancer must emphasise the fundamental importance of tobacco control, as we do here. The one habit that most unequivocally is a cause of cancer is smoking, and other use of and exposure to tobacco. Partly because of its addictive nature, and for other reasons, tobacco smoking is not a simple matter of personal choice. Its reduction requires vigilant commitment from governments and civil society at all levels.

In general, ways of life — patterns of behaviour within societies — are never just personal matters. In this Report, we have concentrated our attention on nutritional and associated factors that affect the risk of cancer, and our goals and recommendations here for populations and for people are framed accordingly. An associated report to be published in late 2008 will deal with the social and environmental factors that influence the risk of cancer, with appropriate recommendations.