manual of dietetic practice

FOURTH EDITION

edited by

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JACKI BISHOP

Foreword by Dame Barbara Clayton

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It once again gives me great pleasure to have been invited to write the Foreword for the Fourth Edition of the Manual of Dietetic Practice. Previous editions are recognised as an invaluable resource for dietitians, appreciating the input from colleagues who are experts in their field. The Manual is also an excellent source of information for other health professionals and demonstrates the expertise of the dietitian.

The solid contribution of Dr Briony Thomas ably assisted by Dr Jacki Bishop, with their time and diligence in managing the collation and editing of this very comprehensive Manual, is not to be underestimated. There must also be an acknowledgement of all who have contributed to this vast resource.

The Manual has been consistently and meticulously updated and expanded in line with changing healthcare and advances in nutrition to ensure the information remains relevant. Indeed in some cases, new areas, ranging from clinical to professional developments, have been addressed to ensure the practising dietitian has the resources to meet the complex challenges they face.

With the ever-evolving health agenda, dietitians have an important role to play in health promotion and disease management. This edition once again supports dietitians in the delivery of a professional, evidence based approach to the population and its well-being.

Dame Barbara Clayton DBE
Honorary Research Professor in Metabolism,
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Honorary President, The British Dietetic Association
First published in 1988, the *Manual of Dietetic Practice* is a comprehensive guide to the principles and practice of dietetics across its entire spectrum – from health promotion to disease management. This is the fourth edition. The book aims to equip the student or novice dietitian with the solid foundations on which skills and expertise can be built, to provide dietitians moving into a new area of practice with the basic knowledge from which specialist skills can be developed, to update those returning to the profession after a career break with changes in practice and to act as a point of reference for all dietitians.

Unlike other multi-author textbooks, the *Manual of Dietetic Practice* is not just a collection of isolated chapters but a cohesive whole, with considerable interlinking between different subject areas. The text is divided into six main parts:

- Section 1: General dietetic principles and practice
- Section 2: Foods and nutrients
- Section 3: Nutritional needs of population subgroups
- Section 4: Dietetic management of disease
- Section 5: Dietetic management of acute trauma
- Section 6: Appendices.

The *Manual of Dietetic Practice* has evolved considerably since its inception to reflect the many changes in dietetic practice that have occurred in recent years. Healthcare is increasingly required to be patient-centred, multidisciplinary in nature, evidence-based, compatible with national standards, clinically effective and subject to audit and evaluation. While principles of care can be standardised, the way in which they are applied has to vary to take account of individual needs, problems, habits, lifestyle, associated health risks and readiness to change. In order to provide effective care, the dietitian has to exercise considerable clinical judgement in deciding how a specific set of circumstances may most appropriately be managed. This requires more than just nutritional knowledge. The modern-day dietitian has to be able to assess individual nutritional priorities, have an understanding of human behaviour in order to achieve dietary change, acquire the interviewing and counselling skills necessary for meaningful dialogue between patient and professional and have the ability to evaluate whether objectives have been achieved.

This edition of the *Manual of Dietetic Practice* continues to reflect these changes and also recent advances in nutritional knowledge. All the chapters in the last edition have been updated and new chapters have been added on adult nutrition, freelance dietetics, complementary and alternative therapies and chronic fatigue syndrome. Other topics, such as malnutrition, obesity management, motor neurone disease and Parkinson’s disease, have been expanded to become stand-alone chapters. I am indebted to the time and effort people have put into the revision or creation of these chapters. I know many have given up precious evenings, weekends and even annual leave in order to do so.

Many other people have played a part in the creation of this book. Some have had a major role in the revision of chapters in previous editions and parts of their work remain. Others have played a smaller but no less vital part by providing information, advice or comments during the various stages of manuscript preparation. All have been crucial to the creation of the final product and I am enormously grateful to everyone who has provided assistance.

I wish to thank the British Dietetic Association for its continued support for this project and for the assistance of Andy Burman, Ruth Redman and other members of staff. I also wish to thank the staff at Blackwell Publishing for their friendliness and efficiency and in particular to pay tribute to the late Richard Miles, who was closely involved with this and previous editions of the *Manual*. I shall greatly miss his advice, encouragement and sense of humour.

It is now over 20 years since I first began the task of creating a comprehensive textbook on dietetic practice. It is gratifying to know that the book has become so popular and that, although primarily written from a British perspective, it now has a worldwide readership. For the last three editions, the responsibility for revising and editing the *Manual of Dietetic Practice* has largely been mine alone. For this edition, it has been an enormous help to have Jacki Bishop working with me and being a constant source of support. Producing a book of this nature is a huge undertaking and, without her input, my task would have been much harder. We hope that people find our endeavours useful.

*Briony Thomas*  
February 2007
SECTION 1
General dietetic principles and practice
1.1 Diet, health and disease

Key points

- Much of the world’s disease burden results from a few largely preventable risk factors, most of which are related to diet and lifestyle.
- It is an oversimplification to assume that developing countries only have problems associated with undernutrition while developed countries only have those associated with overnutrition. Globally, there is a rapidly increasing prevalence of obesity, type 2 diabetes and cardiovascular disease, much of which is occurring in the world’s poorer nations.
- Within all societies, there are inequalities in health related to socioeconomic circumstances. Developing countries have pockets of affluence; developed nations (including the UK) have pockets of poverty.
- Nutrition, along with strategies to combat inactivity, tobacco use and excessive alcohol consumption, should be at the forefront of public health policies.
- Health promotion needs to start early in life and continue throughout the life-span.

Food is essential for health and survival. Without sufficient energy and nutrients, the body’s ability to function normally is impaired. If the body is starved completely, life can only be sustained for a matter of weeks.

Over the last century, much has been learnt about the role of nutrients in maintaining health and the requirements for them to prevent deficiency diseases such as scurvy, pellagra and anaemia. In more recent decades, the focus of research has shifted to the role of diet in preventing disease. There has been increasing recognition that nutrition is a major, and modifiable, determinant of many chronic diseases, and that diet has both positive and negative influences on health throughout life.

It is also being increasingly acknowledged that ‘health’ is more than just the absence of disease. Good health requires both physical and mental well-being and hence encompasses quality of life. Improving health requires consideration of issues such as education, employment, housing, poverty and social isolation, in addition to dietary objectives and healthcare provision.

1.1.1 Diet and health

A healthy diet has to fulfil two objectives:

1. It must provide sufficient energy and nutrients to maintain normal physiological functions and permit growth and replacement of body tissues.
2. It must offer the best protection against the risk of disease.

Meeting the needs for energy and nutrients

A healthy diet needs to provide the following.

Energy

The fundamental need of the human body is for a supply of energy. Without this, death will occur within weeks. Most of this energy is derived from the metabolism of carbohydrate, fat and protein, the amount of energy released being measured in kilocalories (kcal) or kilojoules (kJ). Fat is the most energy-dense nutrient, providing 9 kcal (39 kJ) per gram. Protein [4 kcal (17 kJ) per gram] and carbohydrate [3.75 kcal (16 kJ) per gram] each provide less than half of this amount of energy. Other dietary constituents such as alcohol [7 kcal (29 kJ) per gram] can also be a source of energy.

Because the body’s priority for energy is so high, if insufficient energy is obtained from the diet it will start to ‘cannibalise’ its own tissues in order to meet energy needs. Initially it will make use of its fat stores but, as the energy deficit increases, muscle and other tissues will be broken down and used as a fuel supply.

Carbohydrate, protein and fat

Enzymatically digestible carbohydrate (sugars and starches) is rapidly broken down to glucose and is the most readily available source of energy to the body. Dietary fat is a concentrated form of energy and also provides essential fatty acids necessary for the construction of cell membranes and many other functions. Protein provides amino acids, which are essential for the growth and continuous replacement of body tissues and enzymes. However, in conditions of energy shortage, the body’s need for a source of energy will take precedence and protein will be used as a fuel supply rather than for anabolic purposes.

Vitamins, minerals and trace elements

Many different substances are required by the body for the operation of enzyme systems, transport mechanisms, structural synthesis and regulatory processes. Most are only required in very small or even trace amounts. None provide energy and so cannot sustain life alone, but without them metabolism will be impaired, body systems will malfunction, disease may result and life can be threatened.
1.1 Diet, health and disease

Dietary fibre (‘non-starch polysaccharide’)

These terms refer to the undigested residues of plant foods, their value being in the fact that they are not absorbed (although components of them can be fermented to short-chain fatty acids in the colon and used as a source of energy). Dietary fibre is not a uniform substance but a mixture of plant materials, the effects of some of which have yet to be evaluated. Dietary fibre helps maintain normal bowel function, increases satiety value of a diet and may influence the absorption of nutrients and, indirectly, their metabolic effect.

Fluid

Fluid is also a vital component of a healthy diet and, without fluid, survival time is limited to a matter of a few days, or even hours. Chronic dehydration can result in a number of ill-effects such as constipation, increased risk of renal stone formation and mental confusion. Acute dehydration (e.g. due to severe vomiting or diarrhoea) is life-threatening.

The requirements and function of each of these dietary constituents are discussed in more detail in Section 2. Dietary requirements for health and disease prevention are set out in Dietary Reference Values for the UK (DH 1991) (see Section 1.3, Dietary reference values).

Offering the best protection against disease

What people eat affects not only their current health but also their risk of future disease. The consequences of diet in terms of obesity, hypertension and dyslipidaemia have a major influence on the development of cardiovascular disease (CVD). Obesity also increases the risk of type 2 diabetes and exacerbates other health problems such as arthritis and respiratory disease. As many as one-third of cancers may be associated with diet. Other conditions, such as osteoporosis, constipation and dental caries, can also be diet-related.

There is now broad consensus (WHO/FAO 2003; DH 1991, 1994) that the type of diet which minimises the risk of chronic disease is one which:

- Has an energy content which maintains normal body weight. Both underweight and overweight increase the risk of morbidity and mortality.
- Provides a relatively low proportion of energy in the form of saturated fat. Most dietary fat should be comprised of monounsaturates, together with sufficient n-6 and n-3 polyunsaturates.
- Provides a relatively high proportion of energy in the form of starchy, fibre-containing carbohydrate and a low proportion as refined sugars.
- Is low in sodium.
- Is rich in fruit and vegetables.
- Is balanced in overall terms. The impact of diet on all aspects of health, not just one or two, must be borne in mind. For example, people with coeliac disease require a gluten-free diet but, like the rest of the population, they also require a diet which provides protection against cardiovascular disease, cancer and other diseases.

- Does not inadvertently cause harm. Advice to increase or decrease the intake of one type of nutrient or food should not create another health risk. For example, advice to increase consumption of oily fish to reduce the risk of heart disease should not create other health risks from environmental contaminants such as dioxins or mercury.

In addition, diet should not be considered in isolation. Lifestyle factors such as physical activity are increasingly being recognised as having an important role alongside diet in the maintenance of health and prevention of disease.

1.1.2 Diet and health: the global perspective

There are still many differences in the health problems of the poorer parts of the world and those of more affluent areas. In many less developed regions, famine and chronic undernutrition remain a constant threat, mortality from infectious diseases (particularly AIDS and tuberculosis) is high and childbirth still poses considerable risks to mother and child. Nearly 30% of the world’s population is affected by one or more forms of malnutrition. Some 60% of the 10.9 million deaths each year among children under 5 years old in the developing world are associated with malnutrition, and many more suffer disability and stunted mental and physical growth as a result of deficiencies of nutrients such as iodine, vitamin A and iron (WHO/FAO 2003). There are major differences in child mortality and life expectancy between rich and poor nations.

In contrast, in more affluent areas of the world the health problems associated with overnutrition are the primary concern. The consumption of energy-dense diets, high in saturated fat and low in unrefined carbohydrate and micronutrients, coupled with a sedentary lifestyle and use of tobacco, impact on many aspects of the process of atherogenesis, thrombogenesis or carcinogenesis, either directly or via their influence on other risk factors such as obesity, hypertension, hyperlipidaemia and type 2 diabetes.

However, the nutritional differences between rich and poor nations are by no means clear-cut as rapid changes in diets and lifestyle due to industrialisation and urbanisation have also occurred in developing countries. Although this has led to improved standards of living, greater food availability and wider food choice, there have also been significant negative consequences in terms of inappropriate dietary patterns (due to the increasing availability of energy-dense high-fat, high-sugar foods), decreased physical activity (due to increasing availability of motorised transport and heavy manual work being replaced by machinery) and increased tobacco use. As a result, there is a rapidly increasing incidence of obesity, type 2 diabetes and diet-related chronic diseases, particularly CVD, in the developing world (WHO/FAO 2003). It has been projected that by 2025, three-quarters of all deaths from CVD will occur in developing countries (WHO 2004).

It is therefore no longer appropriate to assume that countries either have problems of ‘undernutrition’ or ‘diseases of affluence’. Within all societies, there are major inequalities in health (and in healthcare provision).
Developing countries have pockets of affluence; developed nations (including the UK) have pockets of poverty. Public health nutrition policies therefore need to address the nutritional needs of all sectors of a society, not just those at one extreme of the undernutrition/overnutrition spectrum. In many developing countries, food policies remain focused only on malnutrition and are not addressing the growing problem of chronic disease (WHO 2004).

1.1.3 Diet and health: the UK perspective

In Britain, life expectancy has doubled over the last 150 years as a result of improvements in hygiene, safety and infection control. In 1841, 25% children died before the age of 5 years, often from diseases such as scarlet fever, typhoid and whooping cough; in the population as a whole, one-third of deaths resulted from tuberculosis (ONS 1997). By the end of the 20th century, these problems had drastically reduced in scale but new ones had emerged to take their place. Coronary heart disease (CHD) and cancer had become the major causes of death, with the UK having one of the highest CHD mortality rates in the world, many of the deaths occurring at a relatively young age. Stroke also accounted for significant mortality and morbidity. There was also growing realisation that much of this mortality and morbidity was attributable to diet and lifestyle factors and hence preventable. At the beginning of the 21st century, CVD remains the most common cause of death in the UK, about half of which results from CHD and one-quarter from stroke (Peterson et al. 2005). CHD by itself is the principal cause of premature death. Although CHD mortality has fallen in the UK over the last two decades, it is still relatively high compared to other Western nations, much of the recent fall being attributable to smoking cessation and better CHD treatment rather than to dietary change (Unal et al. 2004).

The current major health concern in the UK is the rapidly rising prevalence of obesity in both adults and children. Obesity has many negative influences on health and, on average, reduces life expectancy by 9 years (Wanless 2004). More than half of the population in England (66% of men and 53% of women) is currently either overweight or obese (Ruston et al. 2004). Levels of obesity in England have almost trebled in the past 20 years and this trend shows little sign of abating (Wanless 2004). Of particular concern is the rapid rise in childhood obesity. Over one in five boys (22%) and one in four girls (28%) aged 2–15 years are now either overweight or obese (Sproston and Primatesa 2003). The prevalence and severity of the problem increase throughout childhood; 8% of 6-year olds are clinically obese, a figure which increases to 15% in 15-years olds (Jotangia et al. 2005). Many of these children are likely to become overweight or obese adults. The cost, both in human terms and to the NHS, of treating the direct and indirect consequences of obesity is already considerable. The rising prevalence of childhood obesity has been described as a ‘public health time bomb’, which, if unchecked, will create enormous problems in terms of both human health and the economic health of the country (CMO 2003).

Within the UK, health and life expectancy are still linked to social circumstances and childhood poverty. Mortality and morbidity from chronic diseases are greatest in those who are least advantaged, much of it attributable to adverse diet and lifestyle influences (Acheson 1998; DH 2003a). Despite improvements, the gap in health outcomes between those at the top and bottom ends of the socio-economic scale remains large and some parts of the country have the same life expectancy as the national average for the 1950s (DH 2003a). There is increasing recognition that, in order to improve the health of the nation as a whole, the needs and problems of its most vulnerable sectors have to be addressed (DH 2005a).

1.1.4 UK Dietary targets for health

Numerical dietary targets for the UK population were first set out in the 1980s by the Committee on Medical Aspects of Food Policy (COMA) and the National Advisory Committee on Nutrition Education (NACNE) (NACNE 1983; DHSS 1984). The 1991 COMA report on Dietary Reference Values (DH 1991) forms the basis of current guidelines, together with some additional recommendations from the COMA report *Diet and Cardiovascular Disease* (DH 1994). More recently, the Scientific Advisory Committee on Nutrition (SACN), which replaced COMA in 2003, has issued additional targets on salt intake for both adults and children (SACN 2003). UK dietary targets are summarised in Table 1.1.1.

The figures are population targets and are not necessarily what each person should consume. They simply represent changes in dietary composition which, if achieved on a population basis, would result in a significant improvement in the nation’s health. Individuals within the population have varying needs, and a diet of this composition is not necessarily suitable for those who are old, young or ill. Nevertheless, most people would benefit if the composition of their diet moved in the direction of these targets.

Although useful for governments and health professionals to assess and monitor the nation’s health and plan health strategies, numerical compositional targets are of limited value to the individual wishing to eat a healthy diet. People eat ‘food’ rather than ‘nutrients’ and hence there has been increasing emphasis on food-based guidelines such as *The Balance of Good Health* and promotion of the ‘Five a Day’ message to increase consumption of fruit and vegetables. Guidance on the consumption of alcohol (DH 1995), oily fish (SACN/COT 2004) and physical activity level (DH 2004a) has also been issued (Table 1.1.1.; see also Section 1.2, Healthy eating, healthy lifestyle).

Dietary targets are extrapolated from the observed relationships between diet, risk factors and the development of disease, and the effect of dietary modification on primary or secondary disease prevention. However, the relationships between diet and disease are complex and hard evidence from randomised controlled intervention trials on large populations is limited. Unequivocal proof of benefit from dietary intervention is therefore often lacking and dietary guidelines simply reflect the best available evidence and scientific knowledge available at the time.
More work is needed to identify better biomarkers of health and disease. For example, human observational and interventional studies consistently show health benefits from a diet rich in fruit and vegetables, but as yet little is known about which nutrients or bioactive substances are responsible for the protective effect. For the time being, public health advice can only advocate increased fruit and vegetable consumption.

Much also remains to be learnt about the genetic basis of chronic disease and how nutritional and other environmental factors influence gene expression in individual cells and tissues. At present, research into ‘nutritional genomics’ is still in its infancy but in time it may become possible to identify gene polymorphisms that predispose individuals to specific diseases and to define the optimal nutritional measures that may help prevent them (Elliott and Ong 2002). In the future, rather than devising blanket dietary targets for a population, it may be possible to construct optimal nutritional targets for particular individuals based on their genotype.

1.1.5 Monitoring the diet and health of the UK population

Sources on information on the UK diet

There are three main sources of information on the diet of the UK population.

The National Diet and Nutrition Survey (NDNS) Programme

This is a rolling programme of surveys carried out on behalf of the Food Standards Agency and Department of Health. The surveys provide comprehensive nutritional information on a representative group of about 2000 subjects drawn from a particular age band of the British population. Each survey includes weighed and other assessments of dietary intake in conjunction with anthropometric, biochemical and physiological measures of nutritional status together with socioeconomic and demographic data. Reports which have been published to date are summarised in Table 1.1.2. The most recent reports can be downloaded from the Food Standards Agency website.

The Expenditure and Food Survey (formerly the National Food Survey)

The Expenditure and Food Survey (EFS) is an annual survey of household expenditure, food consumption and income commissioned by the Office of National Statistics (ONS) and the Department of Environment, Food and Rural Affairs (DEFRA). Since 2001, this has replaced the former National Food Survey (NFS) and the Family Expenditure Survey, which had been carried out on an annual basis since 1950.

Information is collected from a sample of about 8000 households in the UK using self-reported diaries of all food purchases, including food eaten out, over a 2-week period. Where possible, quantities are recorded in the diaries but otherwise estimated. Energy and nutrient intakes are calculated using standard profiles for about 500 types of food.

Estimates of food consumption from the EFS are likely to be higher than in the former NFS as the new survey includes all food eaten outside the home. In addition, all members of a household over 7 years old now complete a food diary.

<table>
<thead>
<tr>
<th>Dietary component</th>
<th>Target intake</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fat</td>
<td>&lt;35% energy*</td>
<td>1</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>&lt;11% energy</td>
<td>1</td>
</tr>
<tr>
<td>Monounsaturated fatty acids</td>
<td>13% energy†</td>
<td>2</td>
</tr>
<tr>
<td>n-6 polyunsaturated fatty acids</td>
<td>6.5% energy (individual intake &lt;10%)</td>
<td>1</td>
</tr>
<tr>
<td>n-3 polyunsaturated fatty acids</td>
<td>0.2 g/day (minimum)</td>
<td>1</td>
</tr>
<tr>
<td>Trans fatty acids</td>
<td>&lt;2% energy</td>
<td>1</td>
</tr>
<tr>
<td>Total carbohydrate</td>
<td>50% energy</td>
<td>1</td>
</tr>
<tr>
<td>Non-milk extrinsic sugars</td>
<td>&lt;11% energy</td>
<td>1</td>
</tr>
<tr>
<td>Fibre (non-starch polysaccharide)</td>
<td>18 g/day‡</td>
<td>1</td>
</tr>
<tr>
<td>Salt</td>
<td>6 g/day</td>
<td>2</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>400 g/day (5 portions/day)</td>
<td>3</td>
</tr>
<tr>
<td>Oily fish</td>
<td>2 portions fish/week, one of which should be oily fish</td>
<td>4</td>
</tr>
<tr>
<td>Alcohol</td>
<td>&lt;3–4 units/day in men; &lt;2–3 units/day in women</td>
<td>5</td>
</tr>
<tr>
<td>Physical activity</td>
<td>≥30 min of moderate intensity activities on ≥5 days/week</td>
<td>6</td>
</tr>
</tbody>
</table>

* % food energy intake (i.e. excluding alcohol).
† Monounsaturates can comprise a higher proportion of dietary energy provided that intake of saturates remains low and total energy intake does not exceed requirement (RCP 2000).
‡ Figures expressed as NSP (DH 1991). The recommended daily intake has been estimated to be equivalent to 24 g when estimated by the AOAC method that is now used on most food labelling (see Section 2.5, Dietary fibre).
Results of the food and nutrition component of the EFS are published annually as *Family Food*, a National Statistics publication by DEFRA. In terms of individual nutritional intake, the EFS is less accurate than the nutrition information obtained from the NDNS Programme. Its strength is that it is conducted every year and so provides a valuable guide to trends in food purchases and expenditure.

**The Total Diet Study**

The Total Diet Study (TDS) provides additional government information on the level of some micronutrients, natural toxicants and contaminants such as heavy metals, dioxins and pesticide residues in the average UK diet. The TDS has been run on a continuous annual basis since the early 1960s and hence is a valuable source of information on trends over time. Based on consumption data from the EFS and from trade statistics, samples of food which are representative of the UK diet are purchased from a variety of retail outlets in 24 towns in the UK and analysed for constituents considered to be of current interest or concern. The findings are published as Food Survey Information Sheets on the Food Standards Agency website.

**Sources of information on UK health**

*Health Survey for England*

In the UK, data on mortality and morbidity are collected by the ONS and health trends are monitored and published in a series of annual reports from the Chief Medical Officer. Since 1991, these have also been accompanied by an annual *Health Survey for England* (HSE), produced under the auspices of the Department of Health, which assesses a number of health parameters in a nationally representative sample of the population. In the early surveys, the sample size was confined to about 3000 people, but from 1993 this was expanded to about 16 000 so that socioeconomic and regional variations could be included in the analysis. Each Health Survey has a ‘core’ component to obtain information on e.g. body weight, blood pressure, prescribed medications, tobacco use and alcohol consumption plus one or more additional modules on a subject of special interest such as CVD, the health of minority ethnic groups or obesity in children.

The HSE reports can be downloaded from the Department of Health website. Summaries of findings from recent surveys relating to the prevalence of health risk factors can be found in Section 3.7, *Adults*, and elsewhere in the Manual.

### 1.1.6 Public health policy and health promotion

Much of the world’s disease burden results from a few largely preventable risk factors, most of which are related to diet and lifestyle. In its *Global Strategy on Diet, Physical Activity and Health*, the World Health Organization therefore emphasised that nutrition, along with inactivity, tobacco use and alcohol consumption, should be at the forefront of public health policies and programmes (WHO 2004).

In the short term, health promotion often needs to target those at highest risk (e.g. secondary prevention of cardiovascular disease) but in the long term, primary prevention is the ultimate aim. The aim of primary prevention intervention is to move the risk profile of the whole population in a healthier direction. Small changes in risk factors in large numbers of people at moderate risk can have a considerable impact in terms of the risk of premature mortality and morbidity within a population. Prevention of avoidable disease can also dramatically reduce health costs. Improved lifestyle (eating healthily, maintaining normal weight and exercising throughout life) could prevent the majority of cases of CHD and type 2 diabetes and about one-third of cancers (WHO/FAO 2003).
In order to achieve this, health promotion needs to start early in life and continue throughout the life-span. The development of chronic disease in an adult reflects cumulative exposure to damaging physical and social environments and there is increasing evidence that chronic disease risks begin in fetal life and continue into old age (WHO/FAO 2003). Health promotion in childhood is particularly important because this is when health behaviours begin to be established. Currently in the UK, dietary patterns in this age group leave much to be desired, for example the National Diet and Nutrition Survey of young people found that 20% of 4–18 year olds consumed no fruit or vegetables during the survey week, and that intakes of salt and saturated fat were well above recommended levels (Gregory et al. 2000).

The need to halt, and reverse, the rising prevalence of obesity in all sectors of the population is essential for reducing the burden of chronic disease, but how this can be achieved in practice is less certain. Although the co-morbidities associated with obesity are increasingly well documented, little is known about the effective long-term management of obesity and how best to change the behaviours and environmental factors which create and maintain the problem.

In the UK, past strategies to improve the nation’s health have had limited success. The 1992 Health of the Nation initiative achieved progress in only 11 of its 27 target areas and in three areas – the prevalence of obesity, alcohol consumption in women and tobacco use by teenagers – the desired trend moved in the opposite direction. Reasons for this were considered to include unrealistic targets, an over-ambitious timescale, lack of resources, inability to influence socioeconomic factors linked to health, difficulties in persuading people to change their eating habits and lack of effectiveness of national health campaigns (Cheung et al. 1997).

Its successor, Saving Lives: Our Healthier Nation (OHN) (DH 1999) stressed the need for initiatives at a local level and developing interactive partnerships between care providers, support services and communities. It also aimed to improve health by tackling the issues which impact on health such as poor housing, poverty, unemployment, crime, poor education and family breakdown.

A more recent Government White Paper, Choosing Health: Making Health Choices Easier (DH 2004b), develops this further. In addition to addressing issues such as smoking, sensible alcohol drinking and sexual and mental health, it also includes a raft of measures to tackle obesity and to facilitate choosing a balanced diet. A number of Action Plans such as Choosing a Better Diet (DH 2005b) have been published to help implement these objectives (see Section 3.7.3 in Adults).

Persuading the nation to change its diet and lifestyle is not easy. Comparison between the 1986/7 and 2001/2 National Diet and Nutrition Surveys showed that while some progress has been achieved in terms of total fat and carbohydrate intake, consumption of saturated fat and sugars remains undesirably high and fruit and vegetable consumption low. Intakes of alcohol and salt have increased in the last 15 years and are well above the desired targets (Gregory et al. 1990; Henderson et al. 2003a, b). The prevalence of obesity continues to rise. Simply telling people what changes they need to make is not on its own sufficient. Most people know that they should not smoke, should exercise more and should eat five portions of fruit and vegetables every day. The challenge of health promotion is how to turn that knowledge into action.

There is debate over the extent to which a government should intervene with legislation to impose measures which improve the nation’s health. Mandatory measures create questions about individual freedom of choice (Oakley and Johnston 2004) and too much intervention could be regarded as over-interference with people’s lives and provoke a counterproductive backlash. Public health policy has to find the right balance between mandatory measures and an individual’s right to choose. However, responsibility for public health does not rest with Government alone; individuals also have to take responsibility for their own health and that of their families. The role of Government is to help create an environment which makes it easier for people to adopt a healthy lifestyle, e.g. by improving food labelling or the quality of school meals. This has been acknowledged in Choosing Health: Making Health Choices Easier (DH 2004b), with its emphasis on facilitating rather than trying to impose change.

To be effective, health promotion must consider a number of aspects:

• **It must be based on sound scientific evidence and the long-term safety of an intervention must be considered.** Mandatory measures such as water fluoridation and folate fortification must be safe for the whole population, not just most of it.

• **Targets must be sensible, achievable and realistic.** It is now acknowledged that the previous national target of reducing obesity levels from 16% to 8% by 2010 was never realistic. In contrast, targets such as stopping smoking for 4 weeks may be achievable but pointless in terms of health benefit (Wanless 2004).

• **It must take account of public opinion.** Occasionally, time may need to be allowed for public opinion to catch up with proposed health measures, e.g. legislation to make seatbelts compulsory or banning smoking in public places.

• **Action must be multifaceted and co-ordinated.** Improving the nation’s health will require assistance from many sectors of society, including government, the food and farming industry, schools, the advertising sector, the media and the leisure industry. Co-ordinated action to harness appropriate interventions is essential.

• **Messages must be evidence-based, understandable and consistent.** The general public has a considerable interest in diet and health, but is also exposed to a large amount of misinformation. It is important that people are given consistent, correct and up-to-date advice. It is also vital that dietitians and other health professionals take a lead in providing information on nutrition-related issues because, if they do not, others far less qualified to do so will soon fill the gap.

*Text written by:* Briony Thomas
Useful contacts
Department for Environment, Food and Rural Affairs (DEFRA)
Website: www.defra.gov.uk

Department of Health (DH)
Website: www.dh.gov.uk

Food Standards Agency (FSA)
Website: www.food.gov.uk

National Statistics Online (Office for National Statistics)
Website: www.statistics.gov.uk

National Institute for Health and Clinical Excellence (NICE)
Website: www.nice.org.uk

Scientific Advisory Committee on Nutrition (SACN)
Website: www.sacn.gov.uk

World Health Organization (WHO)
Website: www.who.int

References

Section 1: General dietetic principles and practice
1.1 Diet, health and disease


A healthy diet is one that provides sufficient energy and nutrients to prevent deficiency but which also helps to optimise health and reduce the risk of disease. The composition of a diet which helps best achieve these objectives is discussed in Section 1.1, *Diet, health and disease*. This section discusses how these compositional targets can be realised in practice.

### 1.2.1 Translating dietary targets into food intake

Dietary targets for the population are usually set in numerical terms such as a desirable proportion of dietary energy intake (e.g. <35% fat energy) or a quantitative target to be either achieved or not exceeded (e.g. >18 g non-starch polysaccharide or <6 g salt/day (see Section 1.1.4 in *Diet, health and disease*). Although quantitative targets are invaluable for health professionals and people who plan food supplies, they are of only limited value to the general public who eat ‘foods’ rather than ‘nutrients’.

Following publication of the first quantitative UK dietary targets in the 1980s (NACNE 1983; DHSS 1984), attempts to interpret what these meant in terms of food consumption led to many different messages from the media, advertising industry and health professionals. Undue emphasis was often placed on foods which were either ‘good’ or ‘bad’ and little attention was paid to overall dietary balance. Healthy eating came to be regarded as something worthy but joyless – a form of penance to be observed from time to time, before resuming a pleasurable diet.

In an attempt to redress the misinformation and negativity, the Ministry of Agriculture, Fisheries and Food (MAFF, which has since been disbanded) issued general guidelines on healthy eating for the general public (*Eight Guidelines for a Healthy Diet*, MAFF 1991; revised 1997). These are now updated as the Food Standards Agency’s Eight Tips for Healthier Choices (FSA 2005) (Table 1.2.1). The Nutrition Task Force set up as part of the *Health of the Nation* initiative concluded that more specific guidance on food choice was also needed. Their focus group studies showed that people had no real visual concept of what a balanced diet involved and found it difficult to perceive what eating ‘less saturated fat’ or ‘more fibre’ meant in terms of food choice. In order to eat a healthy diet, food information was needed, presented in a more contextual and highly visual way.

As a result, a National Food Guide was developed (Gatenby *et al.* 1995; Hunt *et al.* 1995a, b) as a joint initiative between MAFF, the Department of Health and the Health Education Authority (HEA) on behalf of the Nutrition Task Force. The aim was to provide a model which would help people better understand what healthy eating involved and could also be used as a nationwide teaching model so that healthy eating messages would always be consistent. The end-result called *The Balance of Good Health* was launched in 1994 (HEA 1994).

### 1.2.2 The national food guide: *The Balance of Good Health*

In different countries around the world, various shapes and schematic models have been used to convey the healthy eating messages (Hunt *et al.* 1995a). Following consumer trials, the UK opted for a pictorial model of a tilted plate with divisions of varying sizes, each representing one of five food groups to show the types and proportions of foods in a well-balanced and healthy diet (Figure 1.2.1). Broad guidance is given on the approximate amount from each food group which should be consumed each day.
Table 1.2.1 Eight tips for healthier choices. FSA (2005)

1. Base your meals on starchy foods such as wholegrain bread, potatoes, rice or pasta
2. Eat lots of fruit and vegetables
3. Have at least two portions of fish a week and include one of oily fish
4. Cut down on saturated fat and sugar
5. Try to eat less salt. Adults should have less than 6 g salt a day
6. Drink plenty of water and other fluids
7. Get active and try to be a healthy weight
8. Don’t skip breakfast

And remember to enjoy your food!

Figure 1.2.1 The Balance of Good Health. © The Food Standards Agency 2001. Reproduced by kind permission of the Food Standards Agency.

As with all food group-based models, there are some limitations with The Balance of Good Health because not all foods ‘as bought’ or ‘as eaten’ fit neatly into one group. Composite foods such as casseroles, pies, pizza and pasta dishes may contain elements from most or all of the groups. As cooking from raw ingredients is becoming less common, people are not always aware of the component ingredients of processed composite dishes if they are shop bought. People also find it confusing that potatoes are, for nutritional reasons, grouped with bread and cereals when they consider them to be a ‘vegetable’.

However, evaluation studies showed that the general concept is easy to understand and implement (Hunt et al. 1995b).
### Guidance on food choices in *The Balance of Good Health*

Points which may be relevant to guidance on food choice are summarised below.

**Bread, cereals and potatoes group**

Many people still perceive these starchy foods to be ‘fattening’ and need to be reassured that the opposite is true – they provide a lot of bulk without too many calories. However, their energy content increases considerably when fat is added to them (e.g. when potatoes become chips or if fat is thickly spread on bread). In most cases, addition of fat to foods in this group should be discouraged (e.g. minimal amounts spread on bread or avoidance of butter/margarine on pasta/rice/potatoes when cooking or serving).

Wholegrain bread, brown rice, whole-wheat pasta and wholegrain cereals can be encouraged to increase fibre intake, increase dietary satiety value or alleviate constipation.

### Table 1.2.2 Suggested proportions of different food groups in *The Balance of Good Health*. HEA (1994); FSA (2001)

<table>
<thead>
<tr>
<th>Food group</th>
<th>Foods included</th>
<th>Amount to be consumed</th>
<th>Principal nutrients provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread, cereals and potatoes</td>
<td>Bread, rolls, crispbread, muffins, scones, pikelets, chapattis, pitta bread</td>
<td>• About one-third of the total volume of food eaten</td>
<td>Carbohydrate</td>
</tr>
<tr>
<td></td>
<td>Breakfast cereals, Pasta, Rice, Potatoes</td>
<td>• For most people about 4–6 servings per day</td>
<td>Fibre (particularly insoluble fibre)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• This is probably more than people currently consume</td>
<td>B vitamins</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Some calcium and iron</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>All types of fruit and vegetables (except potatoes – see above), e.g. fresh,</td>
<td>• About one-third of the total volume of food eaten</td>
<td>Vitamin C</td>
</tr>
<tr>
<td></td>
<td>frozen, canned, dried, juices</td>
<td>• A minimum of 5 portions per day</td>
<td>Carotenes and other antioxidants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• This is more than most people usually eat</td>
<td>Folates</td>
</tr>
<tr>
<td>Milk and dairy products</td>
<td>Milk, Cheese, Yogurt, Fromage frais, Crème fraiche</td>
<td>• About one-sixth of the total volume of food intake</td>
<td>Fibre (especially soluble fibre)</td>
</tr>
<tr>
<td>Meat, fish and alternatives</td>
<td>Meat, Poultry, Offal, Fish, Meat and fish products, Eggs, Liver and kidney,</td>
<td>• 2–3 servings per day [of e.g. one-third pint of milk, one carton yogurt, small piece</td>
<td>Calcium</td>
</tr>
<tr>
<td></td>
<td>Pulses (beans and lentils), Nuts</td>
<td>(40 g) hard cheese]</td>
<td>Protein</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Riboflavin</td>
</tr>
<tr>
<td>Fatty and sugary foods</td>
<td><strong>Fat-rich foods</strong> - Butter, margarines and fat spreads, Cooking fats and oils</td>
<td>• These foods should form only a small part of total food intake</td>
<td>Vitamins A and D (full-fat produce only)</td>
</tr>
<tr>
<td></td>
<td>Rich sauces; fatty gravy, Mayonnaise and salad dressings, Pastry, e.g. in pies</td>
<td>• This is less than most people usually consume</td>
<td></td>
</tr>
<tr>
<td></td>
<td>, flans, sausage rolls, Savoury snacks, e.g. crisps, Cream</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Sugar-rich foods</strong> - Cakes, Biscuits, Puddings, Ice cream, Chocolate and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>confectionery, Fizzy drinks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Many breakfast cereals are fortified with micronutrients and can be a valuable dietary source of folate, other B vitamins and iron. They are also a good choice as a snack food, particularly for hungry teenagers.

Fruit and vegetables group

In practice, most people need to double their intake of fruit and vegetables and consume about 400 g (approximately 1 lb) per day. At least five servings a day (excluding potatoes) are encouraged, often referred to in health promotion campaigns as ‘Five a Day’. A portion of fruit/vegetables equates to an edible weight of 80 g, e.g. a large slice of melon or pineapple, one apple, a small 100 ml glass of fruit juice, a bowl of salad, three heaped tablespoons of cooked vegetables such as carrots, peas or sweetcorn or three heaped tablespoons of canned fruit (DH 2003).

Processed foods with only a small fruit/vegetable content, such as fruit cake, fruit yoghurt, vegetable soups, tomato sauce and fruit-flavour soft drinks, should not count towards the five-a-day total. It is also suggested that only one of the five portions should be in the form of fruit juice because fruit juice has a high content of non-milk extrinsic sugars.

People should be encouraged to consume as wide a variety of fruit and vegetables as possible. Healthy adults should try to avoid consuming them with added fat (e.g. buttered or fried vegetables; cream with fruit). Low-fat yoghurt and fromage frais are good accompaniments to fruit as a dessert. Vegetables should not be over-boiled to avoid destruction of water-soluble vitamins such as vitamin C and folates.

The use of fresh fruit as a snack food should be encouraged. Dried fruit is less suitable for between-meal snacks because of its high cariogenic potential (see Section 4.1, Dental disorders). Caution is advised in relation to the use of highly processed fruit-based snacks and desserts, particularly those targeted at children, as they are often high in added sugars.

Milk and dairy foods group

Healthy adults should choose reduced-fat or low-fat varieties (e.g. skimmed or semi-skimmed milk, low-fat yoghurt) wherever possible. These products contain the same amounts of calcium, protein and riboflavin as their full-fat equivalents, but less fat and energy. Because of their lower energy density, and also lower content of fat-soluble vitamins A and D, reduced-fat products are not suitable for very young children under 2 years old, some elderly people or those who are nutritionally depleted. Children over 2 years old can be given semi-skimmed milk provided that they are eating an adequate diet and thriving well. Fully skimmed milk, which is virtually fat free, is not suitable for children under 5 years of age.

Despite their important contribution to calcium intake, hard and other full-fat cheeses (e.g. Cheddar, Cheshire, Stilton, Brie) have high fat and energy contents and should be used in only small amounts, and infrequently by those who need to reduce their energy intake. Conversely, cheese is a valuable food for those who need to increase their energy intake, such as chronically ill people with small appetites.

Butter and cream are comprised almost exclusively of fat and, although they are strictly ‘dairy products’, for the purposes of The Balance of Good Health they are classified as Fat-rich foods and not included in the Milk and dairy products group.

Meat, fish and alternatives group

These foods should be eaten in moderate amounts and lower fat options selected wherever possible. Fish twice a week is encouraged, one portion of which should be oily fish for the beneficial n-3 fatty acids that they contain.

Meat

Lean meat itself (i.e. the muscle tissue) is relatively low in fat, and about half of it is monounsaturated in composition. Lean meat is also a concentrated source of protein and micronutrients, particularly haem iron. It is the consumption of the storage fat surrounding the muscle fibres (visible fat or marbling) which significantly increases fat intake and needs to be avoided. Mixtures of lean meat and fat (e.g. minced beef) and many meat products such as sausages, burgers and meat pies also have a high fat content, particularly saturated fat. Such choices from this group therefore ought to be reduced wherever possible.

Poultry

This is commonly assumed to contain less fat than red meat, but over recent years the fat content of chicken has increased considerably. The white meat (e.g. breast meat) eaten without any skin or visible fat deposits is the lowest in fat. Darker meat (e.g. leg muscle) has a higher fat content and a chicken joint eaten with its skin can provide considerable quantities of fat and energy.

Offal

Liver and kidney are relatively low in fat and very rich sources of haem iron. They are also relatively cheap foods, but not always popular.

Fish

White fish is low in fat (unless fried), high in protein and a valuable source of the antioxidant selenium.

Oily fish (e.g. herrings, mackerel, pilchards, sardines, salmon, trout). These protein-rich foods are cardioprotective because they contain long-chain n-3 polyunsaturated fatty acids, which have anti-thrombotic properties and are found in very few other foods. Most people should eat these foods once or even twice a week (see Section 2.3.3 in Dietary fat and fatty acids). Oily fish are also one of the few dietary sources of vitamin D. Although tuna is considered an oily fish, it is not especially rich in n-3 polyunsaturated fatty acids. Also, because of concerns about high mercury levels, pregnant women are advised to limit tuna consumption to no more than two tuna steaks (140 g cooked) or four medium-sized cans of tuna a week. For the same reason, pregnant women (or those intending to become pregnant) and children aged under 16 are advised to avoid shark, swordfish and marlin. Other adults should not consume these more than once per week.

Eggs

Although these contain dietary cholesterol, this is not a significant concern unless eggs are consumed in unusually large amounts (several per day) or by people with certain rare lipid disorders. Within the normal range
of intake, dietary cholesterol has little effect on blood cholesterol levels and eggs are relatively low in both total and saturated fat. Provided that people consume a reasonably low fat diet, the Food Standards Agency does not put a limit on the number of eggs that they should consume for healthy eating. Eggs should always be well cooked to minimise the risk of salmonella poisoning.

*Pulses, i.e. beans and lentils*  These have a low glycaemic index, provide soluble fibre and are a good source of many minerals and trace elements. They are also high in protein. They can be useful to help compensate for a smaller quantity of lean meat being used in a casserole or other composite dish. Baked beans and canned kidney beans are a good and convenient form of pulses for many people.

*Non-meat products, e.g. mycoprotein (Quorn™), soya protein, tofu*  These are all relatively low in fat, especially saturated fat, and are suitable nutritional alternatives to meat for people who eat a vegetarian diet. A growing range of main course meal items based on these products is now available in supermarkets. In the UK, the Joint Health Claims Committee has permitted a health claim for soya products, based on the beneficial cholesterol-lowering effect of soya protein. However, some groups of the population, particularly those with, or at risk of, breast cancer, are cautioned against a high intake of soya phytoestrogens (see Section 2.9.3 in *Miscellaneous dietary components*).

*Fat-rich and sugar-rich foods group*  Although these are generally high in energy and not a particularly rich source of vitamins and minerals, they can form part of a balanced healthy diet if used only occasionally and/or in small amounts. It is unrealistic and unnecessary for people to avoid these foods altogether. For a diet to be balanced, fatty and sugary foods therefore need to comprise the smallest proportion of the diet. They add palatability to a diet and, in the case of fats, oils, fat spreads, sauces and dressings, can play a key role in helping to make foods from the other four groups more enjoyable. Sweet and savoury snack foods such as cakes, confectionery, biscuits, crisps and sugary drinks offer relatively little nutritional benefit and are perhaps there mainly for pleasure.

Many fatty and sugary foods are highly processed and so also contribute significant amounts of salt to the diet. Products from this food group which are low or reduced in fat, sugar, energy or salt may be useful alternative choices for some people.

*Spreading fats*  Butter and margarine (both hard and soft margarine) have the same high fat and energy contents (approximately 80% fat by composition). Fat spreads (e.g. sunflower spread) typically contain about 70% fat. Many products (often called ‘light’ or ‘extra light’) have a lower fat content than this (typically about 60% or 40%, respectively). Hard margarine will have a higher content of saturated and *trans* fatty acids than those marketed as high in monounsaturates or polyunsaturates.

For healthy adults, the best choice of a fat to spread on bread is a reduced-or low-fat spread (40–60% fat), and those rich in unsaturates (monounsaturated or polyunsaturated) are preferable to those derived from butter or containing hydrogenated fat. Salt-reduced varieties are also available. Some products have added buttermilk for extra flavour; this does not have any adverse effects on fat content.

*Cooking fats*  Use of these should be kept to a minimum. Vegetable oils should always be used in preference to animal fats such as lard or dripping. Olive oil is a rich source of monounsaturates; sunflower, safflower and corn oils are high in *n*-6 polyunsaturates. Rapeseed and soya oils contain most *n*-3 linolenic acid.

**Additional considerations**

**Supplementary guidance**

To help achieve particular dietary manipulations (e.g. reduction in intake of energy, fat or salt, or an increase in fibre), guidance on food choice can be supplemented with additional advice on food preparation and cooking methods (Table 1.2.3).

**Meal pattern**

Meal pattern is also an important component of healthy eating, and regularly spaced meals rather than ‘feast or famine’ are more likely to result in a diet that is varied and balanced. With the growing consumption of fast/convenience foods, more people are eating ‘on the move’ or while sitting in front of the television. Family dining is on the decline and some households no longer possess a dining table. Consumption of breakfast is particularly important, having benefits in terms of satiety (Wyon et al. 1997), cognitive performance (Dye et al. 2000), nutritional adequacy (Nicklas et al. 1998), nutritional status (Preziosi et al. 1999) and obesity (Ortega et al. 1998). People who consume breakfast, especially fortified breakfast cereals, tend to have higher intakes of micronutrients such as riboflavin, folate, vitamin B₁₂, vitamin D, iron and calcium (Gregory et al. 1990) and cereal fibre (Emmett et al. 1993) and lower intakes of non-milk extrinsic sugars (Gibson 2000).

**1.2.3 Achieving healthy eating**

Governments around the world are recognising the need for tougher policies to help improve public health through good food. In England, the food and health action plan *Choosing a Better Diet* sets out the wide range of action needed by all sectors to improve the nutrition and diet of the population (DH 2005a). Set against the changing food supply where cheap food of relatively poor nutritional quality food is widely available, achieving permanent beneficial change in an individual’s dietary habits is a considerable challenge (see Section 1.1.6 in *Diet, health and disease*). For successful change, the many influences on dietary behaviour have to be considered and the barriers to change explored. The use of behavioural approaches