Addressing the problem of overweight and obesity

8. Principles of prevention and management of overweight and obesity

8.1 Introduction

Although there is still much to be learned about the complex and diverse factors involved in the etiology of weight gain and obesity, it is now clear that powerful societal and environmental forces influence energy intake and expenditure, and may overwhelm the physiological regulatory mechanisms that operate to keep weight stable. The susceptibility of individuals to these forces is affected by genetic and other biological factors, such as sex, age and hormonal activity, over which they have little or no control. Dietary factors and physical activity patterns are considered to be the major modifiable factors underlying excessive weight gain that, if corrected, can serve to prevent obesity.

The effective prevention and management of obesity should therefore focus on:

— elements of the social, cultural, political, physical and structural environment that affect the weight status of the community or population at large;
— processes and programmes to deal with those individuals and groups who are at particularly high risk of obesity and its comorbidities;
— management protocols for those individuals with existing obesity.

It is also important to recognize that, in many societies, an undue emphasis on thinness has been accompanied by an increased prevalence of eating disorders such as anorexia nervosa and bulimia. Interventions aimed at obesity prevention or management should therefore be carefully designed to avoid precipitating the development of eating disorders associated with undue fear of fatness, especially in young adolescent girls. Such interventions should also discourage other unhealthy behaviours, e.g. cigarette smoking, that may be adopted in the belief that they will prevent weight gain.

This section is concerned with the principles underlying prevention and management strategies for overweight and obesity, the different levels of preventive action, and the need to deal with individuals with existing obesity. It highlights the need for coordinated action in a variety of settings and shared responsibility on the part of key stakeholders. It is emphasized that:

• Coherent and comprehensive strategies for the effective prevention and management of obesity should focus on:

— elements of the environment that affect the weight status of the community or population at large;
— individuals and groups who are at particularly high risk of obesity and its comorbidities;
— management protocols for those individuals with existing obesity.

- Obesity management encompasses the following four key strategies:

  — prevention of weight gain;
  — promotion of weight maintenance;
  — management of obesity comorbidities;
  — promotion of weight loss.

- Indirect evidence from a variety of sources indicates that obesity is preventable and that the prevention of weight gain is easier, less expensive and more effective than treating obesity after it has fully developed. However, only limited research has been done in this area.

- Obesity prevention is not simply a matter of preventing individuals of normal weight from becoming obese. It also involves the prevention of overweight in such individuals, obesity in those who are already overweight, and weight regain in those who have been overweight or obese in the past but who have since lost weight.

- The traditional classification of disease prevention can be confusing when applied to a complex, multifactorial condition such as obesity, and can usefully be replaced by the following three levels (see also section 8.3.3):

  — universal/public health prevention (directed at everyone in a community);
  — selective prevention (directed at high-risk individuals and groups);
  — targeted prevention (directed at those with existing weight problems and those at high risk of diseases associated with overweight).

- A preliminary analysis of obesity management approaches adopted by existing national health care services in a range of countries has revealed wide variation between countries, and indicated that very few have a coherent and comprehensive range of services capable of providing the level of care required to manage obese patients effectively.

- The attitudes of health professionals towards obesity and its management are often negative, and knowledge and skills in managing

obesity are seldom adequate. Training opportunities for family doctors and other health professionals are extremely limited in most countries.

- National commitment to obesity control should be a shared responsibility — consumers, governments, food industry/trade, and the media all have important roles to play in promoting effective changes in diet and everyday levels of physical activity. In national food and nutrition policies and public health policies obesity management and prevention should form part of NCD control programmes.

8.2 Strategies for addressing the problem of overweight and obesity

Until recently, obesity prevention and obesity management were perceived as two distinct processes, the former being aimed at preventing weight gain and the latter concerned with weight loss. Management was seen as the role of the clinician, whereas prevention was considered to be the domain of health promotion or public health departments. However, it is now realized that obesity management covers a whole range of long-term strategies ranging from prevention, through weight maintenance and the management of obesity comorbidities, to weight loss (1; see Fig. 8.1). The individual strategies are interdependent, so that truly effective obesity management must address all of them in a coordinated manner and in a variety of settings.
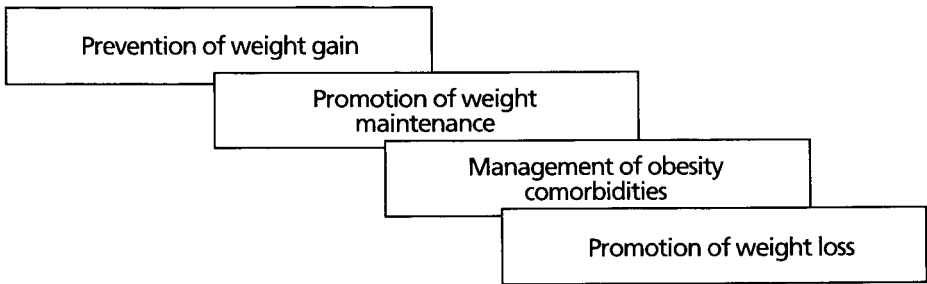
Strategies to deal with the immediate and existing health problems of those who are already obese often take precedence in discussions on obesity management. However, as Fig. 8.1 shows, considerably more attention needs to be given to prevention activities than is the case at present, as these are likely to have a much greater impact on the effective long-term control of obesity.

8.3 Prevention strategies

There are a number of reasons why strategies aimed at the prevention of weight gain and obesity should be easier, less expensive and potentially more effective than those aimed at treating obesity after it has fully developed:

- Obesity develops over time and, once it has developed, is difficult to treat. Indeed, a number of studies have shown that many obesity treatments fail to achieve long-term success (2–10).

- The health consequences of obesity are the result of the cumulative metabolic and physical stress of excess weight over a long period and may not be fully reversible by weight loss (11, 12).

Figure 8.1
Obesity management[a]


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┌──────────────────────────────────────┐
│  Prevention of weight gain            │
│        ┌──────────────────────────────┴───┐
└────────┤  Promotion of weight              │
         │        maintenance                │
         │     ┌─────────────────────────────┴─────┐
         └─────┤  Management of obesity            │
               │        comorbidities              │
               │     ┌─────────────────────────────┴─────┐
               └─────┤  Promotion of weight loss         │
                     │                                   │
                     └───────────────────────────────────┘
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The diagram shows the broad range of overlapping activities that are an integral part of obesity management. The size of each element indicates its relative contribution to the effective control of obesity.

[a] Adapted from reference 1 with the permission of the publisher Churchill Livingstone.

- The proportion of the population that is either overweight or obese in many developed countries is now so large that there are no longer sufficient health care resources to offer treatment to all (*13*).

- In developing countries, limited resources will quickly be exhausted by the need for expensive and technologically advanced treatment for obesity and other NCDs.

8.3.1 *Effectiveness*

Despite the strong justification for prevention strategies outlined above, there has been little comprehensive research on the effectiveness of such strategies. Indeed, only two studies have so far been specifically concerned with preventing weight gain in adults, and the short-term results achieved are not such as to inspire confidence in the ability to prevent obesity (*14, 15*). Furthermore, the fact that obesity rates are rising rapidly and unchecked in almost all parts of the world casts doubt on whether it is even possible to prevent excessive gains in body weight in the long term.

Indirect evidence that obesity-prevention strategies can play a positive role in combating the escalating problem of obesity is therefore of particular importance, and comes from a variety of sources.

Obesity rates are still low in a number of populations around the world, and many people are able to control their weight successfully over long periods. Furthermore, although there has been a consistent secular increase in obesity rates in most countries, such increases in body weight often vary in magnitude between sexes and social classes. This suggests that there are environmental conditions as well as

genetic factors that can protect populations, and individuals within populations, from excessive weight gain. For instance, analysis of the NHANES II data from the USA showed that men and people in higher social classes exhibited much smaller increases in body weight between 1976 and 1980 than women and people in lower social classes (*16*). A similar analysis in Finland also found lower rates of increase in mean BMI over the period 1972–1992 in the most highly educated groups (*17*). In fact, in some areas of Finland, the mean BMI actually fell after 1987 in men in the groups of highest and lowest education, and the rates of increase in mean BMI in women in the high and medium education groups appear to be levelling off. In women of the lowest education group, however, mean BMI continues to rise steeply (see Fig. 8.2). These data suggest that it may be possible to prevent further increases in the average weight of the Finnish population if the success achieved with the better educated groups can be extended to the rest of the population.

It is also of interest that the dramatic increase in obesity rates has followed the pattern of similar epidemics of NCDs such as CHD, which are now abating in countries where preventive strategies have been adopted to deal with these conditions. Comprehensive obesity-prevention programmes have been introduced very recently in Singapore and a few other countries, but insufficient time has elapsed for it to be possible to evaluate their long-term success.

Finally, a number of researchers (*18–21*) have shown that the effective management and support of overweight and obese children can significantly reduce the number who continue to have a weight problem in adulthood. The long-term prevention of weight gain in these studies was achieved during the difficult transition periods of childhood and adolescence when weight gain can be a major problem. Furthermore, in a study in which children were treated together with their parents, the children were successful in reducing and maintaining their weight loss while over time the adults returned to their previous body weight (*21*).

8.3.2 *Aims*

It is important to recognize that the concept of obesity prevention does not simply mean preventing normal-weight individuals from becoming obese, but also encompasses a range of strategies that aim to prevent:

— the development of overweight in normal-weight individuals;
— the progression of overweight to obesity in those who are already overweight;

Figure 8.2
**Mean BMI by educational level in men and women from 1972 to 1992 in the
North Karelia and Kuopio areas of Finland[a]**
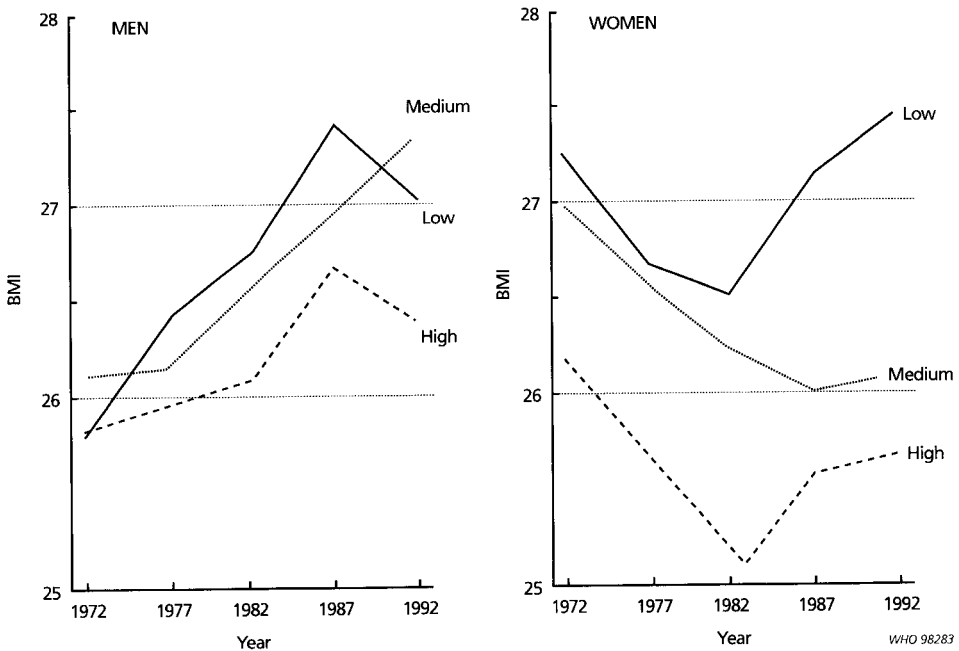
The data show that the mean BMI of Finnish men from low- and high-education groups has actually declined from a peak in 1987. In Finnish women, the mean BMI declined until 1982 but increased afterwards. Although it appears to be levelling off in women from high- and medium-education groups, it continues to increase rapidly in low-education groups. These data suggest that it may be possible to prevent further increases in the average weight of the Finnish population if the success achieved with the better-educated groups can be extended to the rest of the population.

[a] Adapted from reference *17* with the permission of the publisher and authors.

— weight regain in those who have been overweight or obese in the past but who have since lost weight.

8.3.3 *Levels of preventive action*

The use of the traditional subdivision of prevention into primary, secondary and tertiary interventions often results in a great deal of ambiguity and confusion, especially among clinicians. In this scheme, the objective of primary prevention is to decrease the number of new cases (incidence), that of secondary prevention is to lower the rate of established cases in the community (prevalence), and that of tertiary prevention is to stabilize or reduce the amount of disability associated with the disorder. It was originally developed for application to acute

conditions with a single identifiable cause but is more difficult to apply to the prevention of a complex, multifactorial condition such as CHD. As a result, attention has usually been focused on individual risk factors, e.g. the primary prevention of CHD has involved national programmes to control blood cholesterol levels, secondary prevention has aimed at reducing further risks in those with existing CHD and elevated blood cholesterol levels, and tertiary prevention has been associated with preventing reinfarction in those who have already had a heart attack.

Similar problems arise when attempting to apply the traditional scheme to obesity prevention. For example, it is not clear whether primary obesity prevention refers to preventing overweight people from becoming obese or whether this is secondary prevention, nor is it clear whether tertiary prevention is concerned with preventing established obesity from becoming more severe or with the control of comorbid conditions such as hypertension.

More recently, an alternative way of classifying preventive interventions has emerged which is more appropriate to chronic multifactorial conditions such as obesity (1, 22) and is based on the level of intervention rather than on the target outcome. In the modified version of this concept previously mentioned on p. 155, three levels of prevention (Fig. 8.3) are defined, as follows:

- *Universal/public health prevention* (directed at all members of a community).

- *Selective prevention* (directed at high-risk individuals and groups).

- *Targeted prevention* (directed at those with existing weight problems and those at high risk of diseases associated with overweight).

In this new scheme, only those actions that are carried out before the condition has fully developed are defined as prevention. Many actions aimed at reducing the disability associated with obesity, previously classified as tertiary prevention, are redefined as maintenance interventions.

Universal/public health prevention
Universal/public health prevention programmes are directed at the population or community as a whole, regardless of their current level of risk. The aim is to stabilize the level of obesity in the population, to reduce the incidence of new cases and, eventually, to reduce the prevalence of obesity. However, the most important objective in dealing with a problem of extremes in weight is to reduce the mean weight of the population. The association between the mean level of BMI

Figure 8.3
Levels of prevention measures[a]
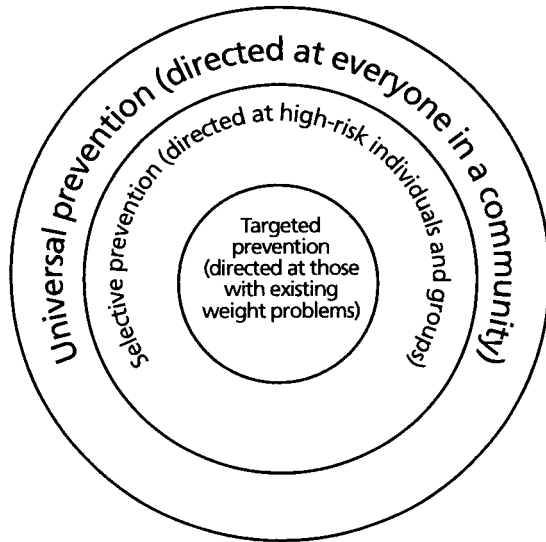
WHO 98270

The diagram shows the three different, but complementary, levels of preventive action for dealing with weight gain and obesity. The very specific targeted-prevention approach is represented by the central circle, the selective preventive approach directed at high-risk individuals and groups is represented by the middle ring, and the broader universal or populationwide prevention approach is represented by the outer ring.

[a] Adapted from reference 1 with the permission of the publisher Churchill Livingstone.

and the prevalence of obesity is discussed in section 9. Other objectives of universal prevention include a reduction in weight-related ill-health, improvements in general diet and PALs, and a reduction in the level of the population risk of obesity.

Such a mass approach to the control and prevention of lifestyle diseases is not always appropriate, and has been criticized for requiring everyone, whether at high or low risk, to make the same changes (23). In the prevention of overweight and obesity, however, where the prevalence of the condition is already extremely high and a large proportion of the population is at high risk, universal approaches have the potential to be the most cost-effective form of prevention (24).

Selective prevention
Selective prevention measures are aimed at subgroups of the population who are at high risk of developing obesity. High-risk subgroups (identified in section 7) are characterized by genetic, biological or

other factors associated with an increased risk of obesity. This risk may be limited in time, as in certain vulnerable life stages, or it may be a lifelong concern, e.g. a genetic predisposition to weight gain.

Selective prevention strategies may be initiated through schools, colleges, workplaces, community centres, shopping outlets and primary care, or through any appropriate setting that allows access to high-risk groups. The aim is to improve the knowledge and skills of groups of people so as to allow them to deal more effectively with the factors that place them at high risk of developing obesity.

Targeted prevention

Targeted prevention is aimed at individuals who are already overweight and those who are not yet obese but in whom biological markers associated with excessive fat stores have been identified. These are high-risk individuals, and failure to intervene at this stage will result in many of them becoming obese and suffering the resulting ill-health in the future.

The primary objectives of the targeted prevention of obesity are limited to the prevention of further weight gain and to the reduction of the number of people who develop obesity-related comorbidities. Patients recruited to targeted prevention programmes will already have some weight-related problems and require intensive individual or small-group preventive intervention. Individuals at high risk of developing obesity comorbidities such as CVD, NIDDM and arthritis are a key target for this prevention strategy. Preventing overweight children from becoming obese adults is a form of targeted prevention.

8.3.4 Integrating obesity prevention into efforts to prevent other noncommunicable diseases

There is much to be gained from incorporating the objectives of obesity prevention into the strategies and programmes for controlling other NCDs. Thus overweight and obesity are important contributors to the risk of several NCDs, the risk increasing with the increase in excess body weight. When obesity and overweight coexist with other NCD risks, the effect is multiplicative (section 4). In addition, dietary modification and PALs are key factors in preventive programmes for both obesity and NCDs, while a number of countries already have NCD prevention programmes that deal with matters relevant to obesity prevention.

WHO has repeatedly emphasized the global importance of obesity and other NCDs during periods of economic transition. Over the past decade, WHO programmes such as the INTERHEALTH project

(Integrated Programme for the Prevention and Control of Noncommunicable Diseases), the CINDI programme (Community Interventions in Noncommunicable DIseases) and the MONICA project for CVD risk-factor monitoring have been important examples of an integrated (horizontal) approach to the NCD epidemic. They are all based on the recognition that all NCDs have a number of common risk factors, necessitating an integrated approach to their prevention, particularly in view of the problem of funding priorities resulting from the emergence of devastating communicable diseases, such as AIDS and Ebola virus disease, and the re-emergence of tuberculosis.

In developed countries, overweight and obesity are seen predominantly in the socioeconomically disadvantaged segments of the population. Public health measures to control NCDs are still inadequate and equity considerations make the introduction of such measures a high priority. The prevention of obesity, in parallel with existing efforts to control other risk factors for NCDs, should provide better control of these diseases. However, such strategies should focus more on obesity *per se* rather than treating it as just another risk factor for NCDs.

In developing countries, where nutritional deficiency disorders and the emerging epidemic of NCDs require attention at the same time, integrated activities designed to meet multiple demands are likely to be of greatest benefit. The prevention of NCDs, including overweight and obesity, should be a public health priority since limited resources will quickly be exhausted by the demand for expensive and technologically advanced curative care, especially in countries in transition. Furthermore, the expected reversal of the social gradient associated with the NCD epidemic will pose insurmountable problems of equity and access to health in these countries.

8.4 Dealing with individuals with existing overweight and obesity

Although prevention potentially offers the most effective long-term approach to the management of obesity, more intensive interventions are also required to deal with the immediate weight and health problems of individuals who are currently obese (see also section 10). As indicated in Chapter 3, such people are alarmingly numerous in most developed and many developing countries. Effective management strategies to deal with them require coordinated and programmed care offered throughout the community and health care services, with the emphasis on weight maintenance, the management of obesity comorbidities and weight loss.

8.4.1 *The current situation*

Given the high prevalence rates of obesity and the well developed national health care systems in many countries, it would seem reasonable to assume that well coordinated and systematic management services exist to deal with obesity. However, the current situation is far removed from this ideal.

In a preliminary survey, Deslypere examined obesity-management approaches in existing national health care services in Australia and in a number of countries in South America, South-East Asia and Europe.[1] A wide variation in obesity care services was found; very few countries had a coherent and comprehensive range of services capable of providing the level of care required to manage obese patients effectively. This is in stark contrast to the situation with regard to other chronic diseases such as NIDDM and CHD, where integrated care is frequently provided through primary health care services.

The Czech Republic, where a five-year plan for the prevention and management of obesity has been established, provides a welcome exception to the rule (V. Hainer, personal communication). A wide range of therapies including diet, exercise, behaviour modification, drug therapy and surgery are currently employed for the treatment of obese patients. Mild-to-moderate obesity is dealt with through weight-reduction clubs, while moderate obesity with comorbidities is treated in obesity outpatient clinics. Severely obese patients are referred to specialist university obesity clinics. Internists receive postregistration training in the care of obese patients, and an obesity-management handbook has been prepared for nurses and another is being prepared for family doctors. Obesity specialists are also involved in the training of counsellors for weight-loss clubs.

8.4.2 *Knowledge and attitudes of health professionals*

Several studies have shown that family doctors and other primary health care professionals have incomplete, confused and occasionally incorrect knowledge of obesity and nutrition (*25–27*). Often the basic facts about weight control are understood, but confusion abounds in relation to how best to manage and advise patients or the public (*28*). Certain genetic and metabolic disorders that lead to the development of obesity are often given undue prominence in discussions in medical textbooks about weight gain and

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[1] Deslypere JP, ed. *The primary health care–specialist interface*, 1996. Background paper prepared by Primary Health Care–Specialist Interface subgroup of the International Obesity Task Force.

obesity. However, in practice these conditions are very rare and only a tiny proportion of overweight and obesity in patients can be attributed to such causes. This is a major problem, as family doctors are considered by the general public to be the most reliable and credible source of health information (29) and are consulted about weight loss more often than any other health professional (30). Obesity is not a common subject in the prequalification training of health care workers (31–33) and opportunities for postregistration training are usually limited. National obesity societies have generally not taken an active role in the training of health professionals.

Although there has been only a limited assessment in the medical literature of the current attitudes of health professionals, a number of studies in industrialized countries indicate that the current situation is far from satisfactory. The majority of health professionals are pessimistic about their ability to help patients to lose weight by persuading them to change their lifestyles, and many consider obesity management to be frustrating, time-consuming and pointless (34, 35). Although health professionals appear to be well informed about the causes of obesity, many have negative and even derogatory stereotypes of the obese, and especially of the morbidly obese (36–39). Obesity is not generally regarded as a serious medical condition, so that many doctors fail to advise and treat the majority of their obese patients. Obesity tends to be treated only when a comorbidity is present, rather than before it develops or is exacerbated by the obese state (34). Recently, a study was carried out in Germany of the frequency with which the diagnosis "overweight" or "obesity" was entered in outpatient medical records; despite the high prevalence of overweight and obesity in Germany, they were mentioned in the records of only a very small percentage of patients and usually only when accompanied by another chronic condition (40). Even when doctors are aware of the importance of obesity management and monitoring, they often have limited time and resources to devote to such activities (29).

Other health professionals actively involved in the management of obesity include nurses and, in some countries, dietitians. However, although they provide more comprehensive weight management advice than medical doctors (41), the advice does not appear to be any better or more effective than the advice provided by doctors. Confidence in their ability to assist people to lose weight and to maintain weight loss is low among nurses (42), and even dietitians doubt that their current efforts to deal with obesity (43) are effective. Negative attitudes towards obesity and the obese also appear to exist

among both nurses (44) and dietitians (39). Furthermore, in many countries (particularly in eastern Europe) the profession of dietitian is not well established and there are no opportunities for tertiary education in dietetics. Dietary advice is often provided by "dietary assistants" or "diet nurses" who have received no formal training at all. In Sweden, however, nurses can receive further training to become "dietetically competent" and their efficacy in weight management has been demonstrated (45).

8.4.3 *Improving the situation*

There is an urgent need to improve the training of all health care workers involved in the management of obese patients. This is important not only to raise the level of knowledge and skills in obesity-management strategies but also to help to overcome the negative attitude that many health professionals have towards obesity and the obese.

It is clear that the rational development of coordinated health care services for the management of overweight and obese patients is needed in all areas of the world. Primary health care services should play the dominant role, but hospital and specialist services are also required for dealing with the more severe cases and the major associated life-threatening complications. Good communications between the different types of health care service are essential.

The concept of "shared care", which involves the formal integration of general medical and specialist services to provide comprehensive services for patients, is finding favour for the management of many other chronic conditions, particularly NIDDM (46, 47). Richman et al. evaluated a shared-care obesity management programme involving both general practitioners and a hospital-based specialist obesity service, and found that obese patients managed in such a setting achieved better weight loss in the short term and had lower drop-out rates than similar patients attending a specialist service based at a hospital (48).

It is recognized that improvements in obesity-management services will make large demands on resources from all areas of health care, not least because of the widespread nature of the obesity problem. However, if sufficient resources are allocated to the prevention and effective management of weight gain, it should be possible to make significant savings in other areas where obesity is an important underlying cause of morbidity. It has also been shown that an increase in BMI is associated with a concomitant rise in the length of patient hospital stays, medical consultations and demand for medication (40,

49, 50). Thus, preventing weight gain and obesity is likely to be more effective in the long term than treating its consequences once it has developed.

8.5 Partnerships for action on obesity

Whether strategies for controlling overweight and obesity are based on the promotion of healthy diets, on increasing levels of physical activity, or on both, they cannot be seen as the sole responsibility of any one sector. To be effective, strategies must be multisectoral and involve the active participation of governments, the food industry/ trade, the media and consumers. Furthermore, they provide an excellent opportunity for the synergistic interaction between government policies on nutrition and NCD control.

8.5.1 *Shared responsibility*

The concept of shared responsibility for the prevention and management of obesity is illustrated in Fig. 8.4, which shows how strategies to promote an appropriate diet and physical activity involve coordinated action by all the sectors concerned.
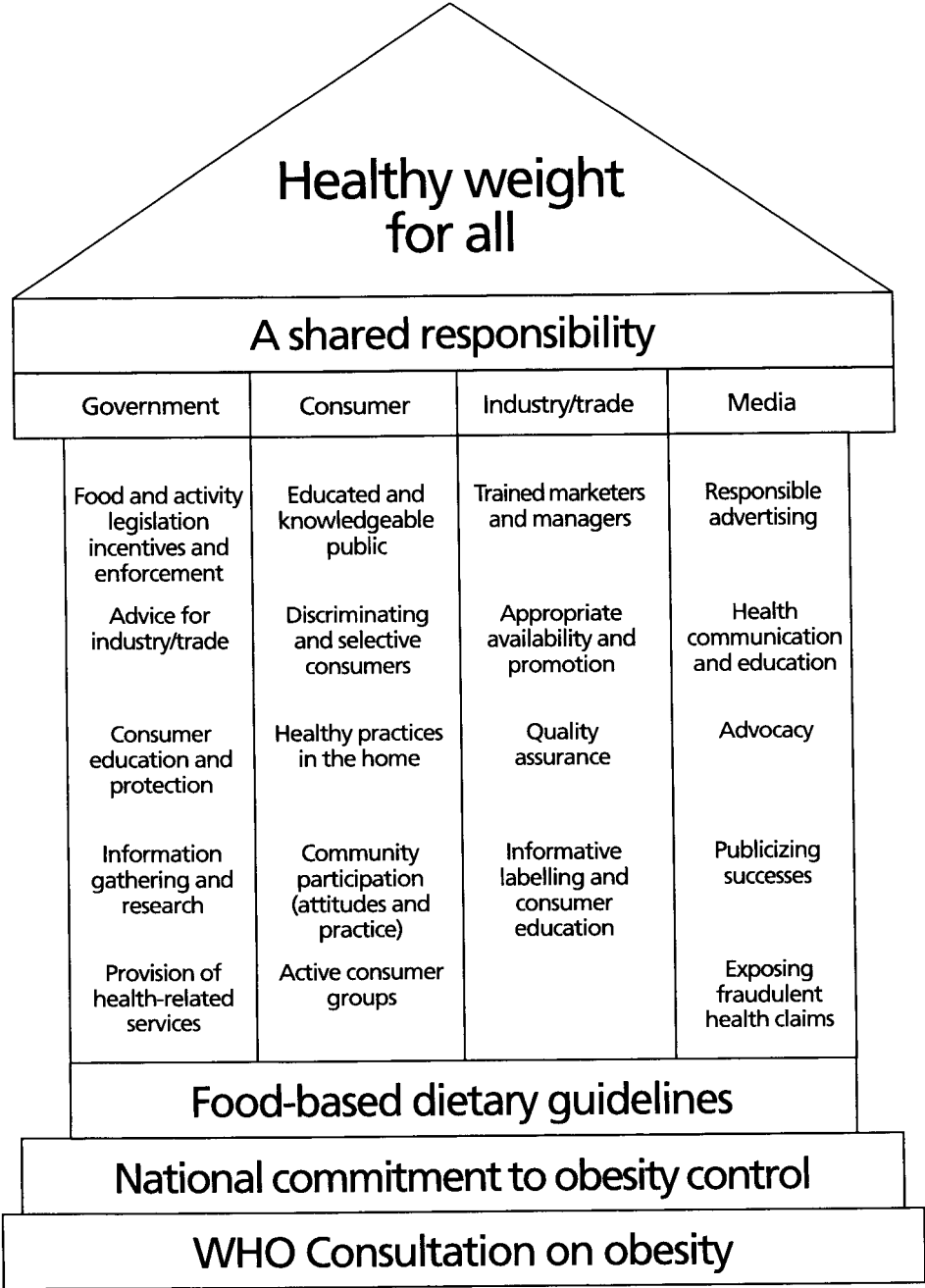
Promoting healthy diets

The promotion of healthy diets that are low in fat, high in complex carbohydrates and contain large amounts of fresh fruit and vegetables should be a priority in obesity prevention. Although it is consumers who ultimately choose which foods to consume, their choices are influenced by a number of factors such as experience, custom, availability and cost. These factors, in turn, are affected by the actions of government, the food industry and the media. Food availability, for example, depends on the capacity of industry to produce and deliver products to the consumer at affordable prices, and to promote them appropriately, as well as on government policy on food standards, and on subsidies and taxes on food products.

Consumption of a high-fat diet may reflect government policies on the control of food quality, the advertising of high-fat products by the food industry and the media, ready access to processed high-fat fast foods, lifestyles that favour the convenience of preprepared meals, and excessive consumption driven by the pleasant mouth-feel of fat when eaten.

The shared responsibilities of governments, the food industry, the media and consumers, outlined above, offer multiple sites for intervention. Appropriate targets for nutrition strategies identified by FAO and WHO (*51–53*) include consumer education and protection,

Figure 8.4
Healthy weight for all — a shared responsibility[a]

Healthy weight
for all

A shared responsibility

Government	Consumer	Industry/trade	Media
Food and activity legislation incentives and enforcement	Educated and knowledgeable public	Trained marketers and managers	Responsible advertising
Advice for industry/trade	Discriminating and selective consumers	Appropriate availability and promotion	Health communication and education
Consumer education and protection	Healthy practices in the home	Quality assurance	Advocacy
Information gathering and research	Community participation (attitudes and practice)	Informative labelling and consumer education	Publicizing successes
Provision of health-related services	Active consumer groups		Exposing fraudulent health claims

Food-based dietary guidelines

National commitment to obesity control

WHO Consultation on obesity

WHO 98271

[a] Adapted from Figure 1 in reference *52*

the development and implementation of dietary guidelines, food labelling, nutrition education in schools and efforts to ensure truth in advertising. The food industry plays an important role in the development and promotion of affordable healthy products, while the media are crucial in advocating change, publicizing successes and exposing fraudulent health claims. Governments are responsible for supporting research and collecting information on dietary intake and the nutritional status of the population through epidemiological investigations and surveillance. Programmes aimed at improving the nutritional well-being of people, in particular that of the groups at greatest risk, should be supported through the allocation of adequate resources by both the public and private sectors so as to ensure their sustainability.

Promoting increased physical activity

Greater emphasis on improved opportunities for physical activity is clearly needed, especially in view of the conditions associated with increased urbanization and the parallel increase in time devoted to sedentary pursuits. The provision of convenient and safe exercise facilities, the allocation of time for exercise, a media focus on the role of physical activity in health promotion, workplace interventions aimed at increasing such activity, and consumer education are all methods of increasing energy expenditure.

As with diet quality, PALs depend on the interaction of the influences of many factors that can either promote or restrict activity. However, current environmental conditions in modern societies invariably favour sedentary lifestyles. Opportunities for children to walk/cycle to school or to play outside the home are profoundly affected by factors such as traffic policy and public safety, but schools also need to actively promote physical activity by incorporating a variety of recreational activities into their curricula. Community facilities and town planning policies should facilitate everyday walking and exercise by adults and children, and traffic policies and workplace practices should help to promote sustained physical activity throughout life.

8.5.2 Coordination of government policies

Strategies to improve the prevention and management of overweight and obesity, as well as their comorbidities, provide an opportunity, as previously mentioned, for the synergistic interaction between national policies on nutrition and NCD control. Goals and strategies recommended for obesity control, such as the monitoring of weight status and the promotion of healthy diets and active lifestyles, should

be an integral and important part of policies on nutrition and NCD control. The development and effective implementation of such policies require the active participation of the government agencies responsible for education and agriculture.

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9. Prevention and management of overweight and obesity in populations: a public health approach

9.1 Introduction

Obesity is a public health problem and must therefore be seen from a population or community perspective. Health problems that affect the well-being of a major proportion of the population are unlikely to be effectively controlled by strategies in which the emphasis is on individuals. Public health action is based on the principle that promoting and protecting the health of the population requires an integrated approach encompassing environmental, educational, economic, technical and legislative measures, together with a health care system oriented towards the early detection and management of disease.

A public health approach to obesity concentrates on the weight status of the population as a whole, in contrast to interventions that deal exclusively with factors influencing the body fatness of individuals. In many developed and developing countries, underprivileged minority groups have to bear a disproportionally heavy burden of higher than average levels of obesity. Thus, in efforts to remove inequalities in health status as one of the main aims of public health, it is necessary to consider the causes that make particular groups more vulnerable to weight gain.

This section deals with the need to develop population-based strategies that tackle the environmental and societal factors identified in section 7 as being implicated in the development of obesity. This is a major area for action in the effective prevention of the global epidemic of obesity. The key issues include the following:

- Obesity is a major global public health problem, and must therefore be approached from a public health standpoint.

- As already mentioned, a public health approach to obesity concentrates on the weight status of the population as a whole in contrast to other interventions that deal exclusively with factors influencing body fatness.

- As the average BMI of a population increases above 23, the prevalence of obesity in that population increases at an even faster rate (see p. 178). A population median BMI range of 21–23 is thought to be the optimum from the point of view of minimizing the level of obesity; adult populations in developing countries are likely to gain greater benefit from a median BMI of 23, whereas those in affluent societies with more sedentary lifestyles are likely to gain greater benefit from a median BMI of 21.
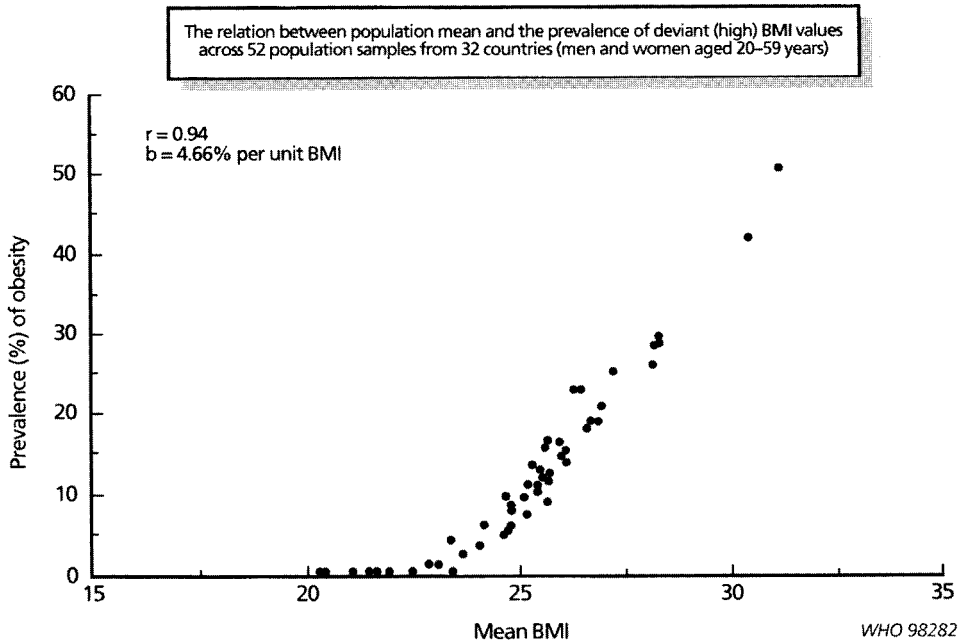
- Appropriate public health strategies to deal with obesity should be aimed both at improving the population's knowledge about obesity and its management and at reducing the exposure of the community to an obesity-promoting environment.

- The two priorities in public health interventions aimed at preventing the development of obesity should be: (1) increasing levels of physical activity; and (2) improving the quality of the diet available within the community. The approaches adopted will depend on the population, and especially its economic circumstances.

- In the past, public health intervention programmes have had limited success in dealing with rising obesity rates, although the results of some countrywide "lifestyle programmes" are encouraging. However, few programmes have concentrated on obesity as a major outcome or have attempted to address environmental influences.

- Current obesity-prevention initiatives need to be evaluated, their limitations recognized, and their designs improved. Lessons learned from public health campaigns on other issues can be used to improve public health campaigns on obesity.

- The prevention and management of obesity are not solely the responsibility of individuals, their families, health professionals or health service organizations; a commitment by all sectors of society is required.

- Public health strategies intended to improve the prevention and management of obesity should aim to produce an environment that supports improved and appropriate eating habits and greater physical activity throughout the entire community. Appropriate action needs to be taken to change urban design, transportation policies, laws and regulations, and school curricula accordingly, provide the necessary economic incentives, introduce catering standards, provide health promotion and education, and promote family food production. Priority should be given to public health action in developing and newly industrialized countries to improve the living conditions of all sectors of society, especially within often neglected aboriginal or native populations.

9.2 Intervening at the population level

The important role of public health action in the control of infectious disease is widely accepted but there is still some scepticism concerning the applicability of this approach to the management of NCDs such as CHD and obesity. The merit of population-level interventions has

Figure 9.1
Relationship between mean BMI and prevalence of obesity in a population[a]

The relation between population mean and the prevalence of deviant (high) BMI values across 52 population samples from 32 countries (men and women aged 20–59 years)

r = 0.94
b = 4.66% per unit BMI

Prevalence (%) of obesity

Mean BMI

WHO 98282

Population mean body weight data from 52 communities in the International Cooperative Study on the Relation of Blood Pressure to Electrolyte Excretion in Populations (INTERSALT) are plotted against the prevalence (%) of obesity; the curve shows the clear relationship between them.

[a] Adapted from reference 3. This figure was first published in: Intersalt: an international study of electrolyte excretion and blood pressure. Results for 24 hour urinary sodium and potassium excretion. *British Medical Journal*, 1988, 297:319–328. Reproduced with the permission of the *British Medical Journal*.

been questioned by some observers because all the members of the community may be urged or obliged to make changes to deal with a problem that currently affects only some of them (*1, 2*). However, if the link between the average and extreme levels of body fatness within a population (Fig. 9.1) is understood, the importance of population-level interventions in obesity can be appreciated, especially as the majority of the adult population in industrialized societies are affected by excess weight gain.
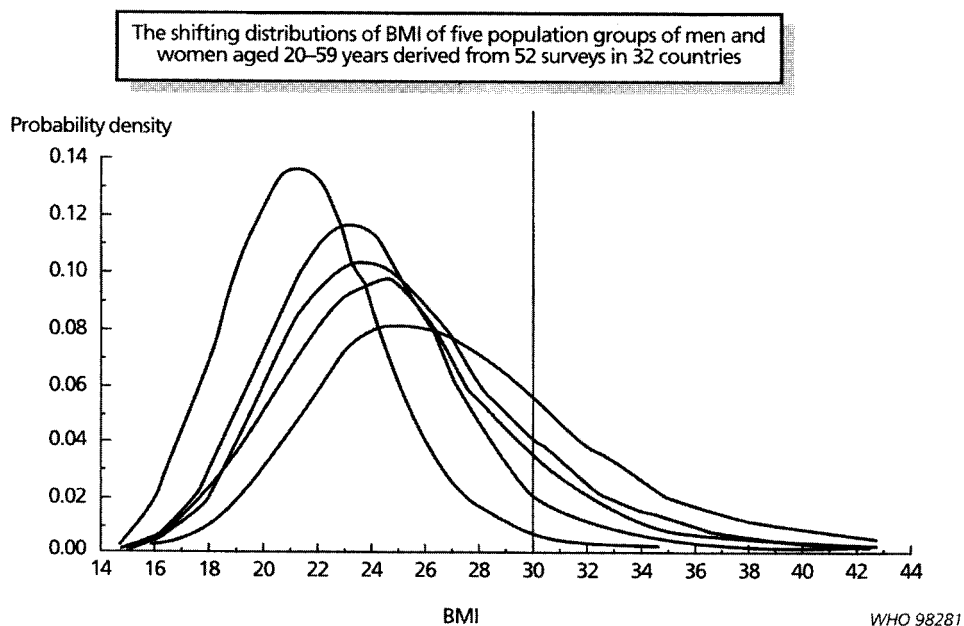
9.2.1 *Relationship between average population BMI and the level of obesity*

The classification of obesity as a BMI ≥30 (section 2) is purely arbitrary. It indicates that health risks are greatly increased above this level of body fatness but not that BMIs below this level are free from such risks. In reality, the population does not consist of two distinct

Figure 9.2
Skewed BMI distribution with increasing population mean BMI[a]

The shifting distributions of BMI of five population groups of men and
women aged 20–59 years derived from 52 surveys in 32 countries

The data from the INTERSALT study show that, as the mean population BMI increases, the
level of obesity increases at an even faster rate because of the skewing of the distribution to
higher BMIs. Public health interventions seek to prevent this upward shift in mean population
BMI.

[a] Adapted from reference 3. This figure was first published in: Intersalt: an international study of
electrolyte excretion and blood pressure. Result for 24 hour urinary sodium and potassium
excretion. *British Medical Journal*, 1988, **297**:319–328. Reproduced with the permission of the
British Medical Journal.

groups, the obese and the non-obese. The distribution of body fatness
within a population ranges from underweight through normal to very
obese, and the risks of associated morbidity and mortality begin at
relatively low levels of BMI.

The analysis by Rose (*3*) of the multicountry International Coopera-
tive Study on the Relation of Blood Pressure to Electrolyte Excretion
in Populations (INTERSALT) provides a useful evaluation of body
weight data from 52 communities. In this study, variations in the
distribution of BMI in different adult populations were found that
could be predicted from the population mean BMI. When the mean
BMI of a population is 23 or below there are few, if any, individuals
with a BMI >30. As the BMI distribution of the community shifts to
the right (i.e. as mean BMI increases), there is an increased skewing of
the data and a flattening of the curve (Fig. 9.2). The result is a greater
number of individuals in the population whose BMI exceeds 30.

Perhaps of greatest significance, however, is the accompanying increase in the proportion of adults classified as obese, which takes place at an even faster rate than the increase in average BMI. Rose found a 4.66% increase in the prevalence of obesity for every single unit increase in the population's average BMI above 23, resulting in a strong correlation between the average adult BMI of a population and the proportion of adults with obesity (Fig. 9.1). In the United Kingdom between 1980 and 1993, the mean BMI increased from 24.3 to 25.9 for men and from 23.9 to 25.7 for women. Over this same period, the rates of overweight increased by one-third, whereas those of obesity doubled. This implies that further increases in mean BMI are likely to result in even more dramatic rises in the rates of obesity.

It is believed that, for the effective prevention of obesity, the emphasis should be on preventing a rise in the mean community BMI. Concentrating efforts to prevent and manage obesity on people with existing weight problems (individuals in the right-hand tail of the distribution in Fig. 9.2) will do little to prevent the occurrence of new cases of obesity.

9.2.2 *Optimum population BMIs*

The optimum mean BMI for a population is likely to vary with environmental conditions, e.g. the state of the labour market and the possibility of famine, which differ between developing and developed countries, as well as between urban and rural areas. For example, there are substantial differences in the nutritional status and mean BMI of urban and rural Chinese and Indian communities that reflect vastly different economic and environmental circumstances.

Hazards are associated with both underweight (i.e. BMI <18.5) and overweight (i.e. BMI ≥25). Underweight is a major concern in developing countries and rural areas because work capacity is reduced at BMIs below 18.5 (4). Thus, epidemiological studies of national data sets suggest that developing an optimum population BMI will require a trade-off between the two extremes. If the aim is to minimize both the number of adults in a community with a BMI ≥30 (Fig. 9.2) and that of underweight adults with a BMI <18.5, the optimum BMI is about 23. Indeed, the probability of an increasing prevalence of obesity rises markedly above a mean BMI of 23. However, if the aim is to limit the extent of overweight by minimizing the proportion of the population with a BMI ≥25, and there is less concern about limiting the number of adults with a BMI <18.5, a median BMI of 21 is the optimum (5).

In industrialized countries there is evidence that a BMI in the lower part of the normal range is associated with the best health outcomes

(6). However, in developing countries, a BMI < 18.5 is not conducive to sustaining prolonged and intensive agricultural work (4).

A median BMI range of 21–23 seems reasonable; adults in developing countries gain greater benefit from a median BMI of 23, and those in affluent societies with more sedentary lifestyles may be better off with a median BMI of 21. National strategies may need to aim at improving the weight status of underweight children and adults in rural communities (target mean BMI 23) and simultaneously at limiting the onset of excessive weight gain in urban communities (whose true optimum target mean BMI may be only 21).

9.2.3 Will population-based approaches to preventing weight gain lead to increased levels of underweight and eating disorders?

There has been some concern that strategies aimed at maintaining or reducing the mean BMI of the entire population may result in an increase in the levels of underweight and eating disorders in the community (7, 8). The Rose analysis (3) tends to suggest that those populations with the lowest mean BMI have higher rates of underweight, and that shifting the population distribution of BMI downwards may result in an increase in the numbers of underweight individuals. However, it should be remembered that the data from the INTERSALT study used in Rose's analysis included some from countries where undernutrition remains a significant problem. This is especially relevant for the lowest quintile in Fig. 9.2. Reducing the population mean BMI will not necessarily result in an increase in the proportion of the population classified as underweight or in an increased incidence of eating disorders. Countries that currently exhibit the highest incidence of eating disorders also have the highest population mean BMIs. There is some indication that dieting is associated with an increased risk of eating disorders (9), so that community-level strategies aimed at preventing weight gain in the entire population should be careful to avoid causing the development of eating disorders associated with weight-loss programmes for individuals (10).

9.3 Public health intervention strategies

Two types of public health intervention strategies can generally be used to tackle obesity, namely those that aim to improve the knowledge and skills of individuals in a community, and those that aim to reduce the exposure of populations to the underlying environmental causes of obesity.

9.3.1 Improving the knowledge and skills of the community

To date, virtually all public health interventions aimed at the control of obesity in a population have been based on an individual approach.

They have generally relied on the mass media, workplace interventions, school-based programmes and curricula, skills training in a network of clubs and community centres, and community projects to reach a wide audience so as to provide information and promote behaviour change.

While strategies aimed at improving the knowledge and skills of the community have produced impressive results in dealing with many public health problems, this is not true, however, of obesity. This may be because manipulating the diet to prevent public health problems does not induce the same fundamental adaptive responses in eating that are seen when children and adults are underfed in terms of energy. Communities are already generally well aware of the problems associated with obesity, and many individuals are actively attempting to control their weight. Participation rates in this type of obesity control programme are usually high, and many succeed in reducing their weight in the short term. Nevertheless, there is generally little impact on the overall average BMI of the community and a negligible effect on obesity prevalence, so that preventive strategies are obviously of great importance.

9.3.2 *Reducing population exposure to an obesity-promoting environment*

A more effective strategy for dealing with the public health problem of obesity would appear to be one that goes beyond education and deals with those environmental and societal factors that induce the obesity-promoting behaviour of individuals within a population in the first place (see Fig. 7.1). In this way, it may be possible to reduce the exposure of the whole population to social factors that promote obesity, such as the persistent temptation to consume high-fat foods and the convenience of a sedentary lifestyle. Unfortunately, however, such strategies remain relatively unexplored.

9.4 Priority interventions

Regardless of the type of intervention strategy employed to tackle obesity at the population level, two priority interventions important in preventing the development of obesity have been identified in this report, namely increasing levels of physical activity and improving the quality of the diet. The approaches adopted to achieve these aims will depend on the circumstances of the population, and in particular the economic situation. Thus, in developing countries, the main aim of intervention to promote physical activity should be to prevent the reduction in such activity that usually accompanies economic development. In affluent countries, however, the main aim will be to dis-

courage already existing patterns of sedentary behaviour. Likewise, where dietary improvement is concerned, the introduction of new energy-dense foods as a replacement for nutritionally adequate traditional diets should be discouraged in developing countries, whereas the already high consumption of high-fat/energy-dense diets should be reduced in developed ones. Evaluation of interventions is crucial.

9.4.1 *Increasing physical activity*

Interventions aimed at increasing community-wide levels of physical activity (see pp 187–188) are an important means of preventing further increases in the average BMI of a population. Such interventions need to take the following into account:

- Increasing community-wide levels of physical activity has numerous potential benefits for population health in addition to preventing further increases in average BMI, e.g. a reduced risk of NIDDM, CHD and certain cancers.

- Long-term increases in physical activity are more likely to be achieved through environmental changes that increase or maintain incidental daily activity and low-intensity leisure pursuits rather than by encouraging occasional vigorous exercise. The emphasis should be on promoting relatively low-intensity, long-duration physical activity that can be conveniently incorporated into daily life (see also Box 7.2 and pp 117–118). Popular examples of physical activity of this type include walking a dog, gardening, dancing, cycling, home improvement and swimming. Walking in pedestrian precincts rather than depending on car travel and ensuring that some work is done when standing rather than sitting will help to increase daily activity.

- Exercise should also be encouraged, but it should not be presented as requiring excessive physical effort involving boring routines and/or requiring expensive equipment.

- Activity should be enjoyable in order to encourage regular participation and to discourage sedentary behaviour.

- There is some evidence that physically active children remain active in adult life, so that encouraging young children to take part in a variety of general activities may be especially important.

9.4.2 *Improving the quality of the diet*

Interventions aimed at improving the quality of the diet need to take into account the following important issues relating to dietary energy density and nutrient/energy ratios:

- A major concern associated with the feeding of infants and young children is ensuring that they consume adequate energy. The energy density of traditional diets is often increased by the addition of vegetable oil (taking care not to distort the protein/energy ratio), and children under the age of 2 years should be excluded from any interventions designed to reduce national fat intakes in industrialized countries.

- It is also important to ensure that the nutrient/energy ratio of the diet is adequate, especially in children who may be at risk of micronutrient deficiency. Low nutrient/energy ratios can become a particular problem when the energy content of diets is increased by the addition of fat and refined carbohydrate.

- It is unusual for energy deficiency to arise in adults simply because the bulkiness of their food is such that they are unable to eat enough of it. A more serious problem is the overconsumption of energy-dense diets rich in fat and highly refined products and low in fibre that promote overconsumption and weight gain, especially when eaten by relatively inactive individuals.

Care is therefore needed when both the energy density and the nutrient/energy ratio of diets are examined. The age group targeted in health promotion strategies as well as the normal dietary constituents available to them should be taken into account. When diets are based essentially on unrefined indigenous local foods, and contain a suitable proportion of cereals, pulses, vegetables and affordable animal proteins, there is less likelihood that either their energy density or their nutrient/energy ratios will be inappropriate. Identifying the optimum ranges of both nutrient/energy ratios and energy densities for young children and the corresponding ratios and densities for older children and adults is still difficult.

9.4.3 *Measures for use in evaluating obesity-prevention programmes*

The aim of obesity prevention is to stop the increase in obesity or reduce the number of new cases of this disease in a population. This can be achieved only if rises in the average BMI of the population are prevented.

From a purely scientific viewpoint, the most accurate measures for use in evaluating obesity-prevention programmes are changes in the mean population BMI or in obesity incidence. However, in practical terms, incidence is rarely assessed, and public health authorities are

unlikely to accept very small percentage shifts in mean BMI as a significant indicator of public health improvement.

At present, prevalence rates of obesity and its comorbidities are the most commonly used measures of the success or failure of interventions aimed at controlling obesity. However, these have a number of serious limitations when used in isolation. First, the prevalence of obesity within a population is unlikely to decline in the short term; losing weight is not easy and it is unrealistic to expect a large number of obese people to lose sufficient weight to cease to be classified as obese. Second, a long time often elapses before appropriate environmental, societal and behavioural changes are reflected in the population's weight status. Third, estimates of the prevalence of, and trends in, obesity are often unreliable because small sample sizes reduce their accuracy. Finally, the multifactorial etiology of obesity comorbidities limits the use of their prevalence rates as outcome measures for evaluating obesity-prevention programmes because changes in the prevalence of these conditions can occur independently of the population's weight status, e.g. reductions in CHD rates have been achieved as a result of reductions in hypertension and smoking.

A more practical and useful outcome indicator for evaluating obesity prevention would be to combine the assessment of changes in the prevalence of overweight (BMI ≥25) with short-term indicators such as standardized measures of dietary change and of PALs. In fact, prevalence estimates of overweight reflect weight distribution in the population better than estimates of obesity prevalence and are easier to estimate accurately, especially in developing countries with very low rates of obesity. They also account for a significant proportion of the health risks associated with excess weight and body fat. The assessment of mean population BMI and changes in obesity prevalence is also desirable.

9.5 Results of public health programmes for the control of obesity

To date, there have not been any well evaluated and properly organized public health programmes aimed at the population-level management or prevention of obesity. A number of countries have recently developed lifestyle strategies in which the emphasis is on weight control but, except in Singapore, these have not taken the form of controlled trials and so are unlikely to provide any definitive evidence of their impact. The best examples of such trials are community-wide CHD prevention programmes that have included a reduction in BMI as one of the measurable outcomes.

Alternatively, some programmes have targeted those factors identified as important in the development of obesity, namely physical activity and the quality of the diet. However, it is debatable how much can be deduced from the results of such programmes as far as the potential of public health strategies to manage weight is concerned.

9.5.1 *Countrywide public health programmes*

At present, very few countries have a comprehensive populationwide national policy or strategy to deal specifically with the problem of overweight and obesity, in spite of the reports produced in a number of countries, such as Australia (*11*), Canada (*12*) and the United Kingdom (*13*), which have all indicated that this is precisely what is required to tackle obesity effectively. Singapore is one country that has been able to achieve a degree of success in tackling obesity through a system of coordinated healthy lifestyle programmes aimed at specific target groups in the population. The Government of Singapore has an overall strategy that is translated into programmes covering all the stages of life, and including preschool children, schoolchildren, young people and adults. Such programmes rely heavily on community input in their establishment and management (*14*). Recent results of the Trim and Fit programmes (see below) are promising, obesity rates dropping among primary, secondary and junior college students (*15*).

The Trim and Fit programme was launched in 1992 and is aimed at all schoolchildren in Singapore. It combines progressive nutrition changes in school catering, and nutrition education together with regular physical activity in schools. The programme is supported by specialized training for school principals, teachers and canteen workers, as well as by the provision of equipment for improved catering and physical activity. A national monitoring programme to assess fitness and weight status also forms part of this initiative (*16*). Recent results indicate that the number of children successfully completing the fitness tests is increasing annually, and that obesity rates fell from 14.3% in 1992 to 10.9% in 1995 for primary students, from 14.1% to 10.9% for secondary students, and from 10.8% to 6.1% for junior college students (*15*). However, it should be noted that this decline in obesity rates may have been somewhat exaggerated because of the new weight-for-height norms introduced by the Ministry of Health in 1993.

9.5.2 *Communitywide CHD prevention programmes*

Over the last 20 years a handful of well funded, large-scale, communitywide intervention programmes intended to prevent CHD have

been conducted, aimed at reducing the level of a number of risk factors, including smoking, high blood pressure, high blood cholesterol and obesity. In-depth evaluation of these programmes and their results has consistently shown that obesity is harder to control than any other risk factor, as indicated for the following five programmes:

- *The Stanford Three Community Project (17) and the Stanford Five City Study (18).* In both of these studies, the mass media and communitywide health education were used to increase awareness and knowledge of CHD and to teach the skills required for appropriate behaviour change to reduce CHD risk (*19*). In both projects, weight reduction and increased physical activity were viewed as methods of facilitating risk factor reduction rather than as outcomes in their own right. The original Three Community Project was successful in preventing weight gain in the treatment groups. In the Five City Study, weight gain in the intervention communities was significantly less than in the control communities (0.57 kg compared with 1.25 kg) over the 6 years. However, the results of repeated surveys of the intervention and control cohort groups showed no differences in the rate of weight gain. Nevertheless, both studies showed significant improvements in blood pressure, cholesterol and smoking rates.

- *The Minnesota Heart Health Program.* This was a relatively unsuccessful CHD intervention programme conducted over 7 years in six matched communities (rural, urban and suburban). The strategies used were similar to those employed in the Stanford studies but the Program was unable to reproduce the improvements in CHD risk factors. However, this intervention was conducted at a time when there were marked secular downward trends in CHD risks in these communities. The 7-year intervention had little impact on obesity. Indeed, BMI showed a strong secular increase despite such innovative weight-control programmes as adult education classes, a workplace weight-control programme, weight loss by correspondence course and a weight-gain-prevention programme (*20*).

- *The North Karelia Project.* Initiated in 1972 in North Karelia, a province in eastern Finland (*21*), this intervention was delivered through the usual mass-media educational, workplace and school-based programmes but included wider community participation in the development and implementation of projects. It set out to integrate the programme into existing, or newly created, services and community infrastructure. In addition, various public health, environmental and structural and legislative measures made healthy behaviours easier to adopt. Despite remarkable reductions

in CHD risk factors, which were still declining in 1992 (*22*), the average BMI and the level of obesity remained similar throughout the project, and similar trends have been observed since its conclusion (*23*).

- *Mauritius*. In 1987, an NCD intervention project was started by the Government of the developing island country of Mauritius after a population survey revealed high levels of NIDDM and hypertension, and moderately high levels of CHD. An intensive communitywide prevention programme was initiated that made extensive use of the mass media, community, school and workplace health education activities, as well as fiscal and legislative measures designed to encourage a healthy diet, increased exercise, smoking cessation and reduced alcohol intake. After 5 years there had been significant decreases in the prevalence of hypertension, cigarette smoking and heavy alcohol consumption, an appreciable reduction in mean population cholesterol levels, and an improvement in moderate leisure physical activity. However, the levels of overweight (BMI 25–30) and obesity (BMI ≥30) increased by 33% and 56%, respectively, in men and by 19% and 46%, respectively, in women (*24*).

The following possible reasons for communitywide CHD intervention programmes being disappointing in terms of obesity and weight control have been suggested by Jeffery (*20*):

- The main emphasis of the programmes was on CHD risk and not obesity. Weight reduction was generally viewed as a method of facilitating risk factor reduction rather than as an outcome in its own right.

- Rapidly rising secular trends in weight may have overwhelmed any effects of interventions aimed at curbing the rise.

- Powerful societal and environmental obesity-promoting factors have developed rapidly in many societies over the last few decades, and the intervention programmes may not have been strong enough or sufficiently well coordinated to overcome them.

- The interventions may not have reached a sufficiently large proportion of the community to have an impact on the weight status of the population as a whole. In many communities, a large percentage are already concerned about weight and are trying to control it, so that even intensive interventions may not increase the number of people actively participating in weight-control programmes.

- The interventions may have been aimed at making too many changes at once (e.g. reducing cholesterol levels, controlling blood

pressure, increasing physical activity, stopping smoking, etc.). Health promotion research has shown that campaigns with a more limited objective are often more effective in encouraging behaviour change than those that seek to bring about simultaneous change in several behaviours (25, 26).

9.5.3 Programmes targeting factors important in the development of obesity

Countrywide programmes aimed at increasing physical activity

Physical inactivity and sedentary behaviour have been identified as two important contributory factors in the development of overweight and obesity (section 7). Increasing communitywide levels of physical activity would therefore appear to be important in preventing further increases in the average BMI of the whole population, in addition to having numerous other potential beneficial effects on its health.

A review by King (27) was able to identify only a few well evaluated and truly comprehensive communitywide programmes aimed at increasing levels of physical activity. Such programmes have usually involved a series of interventions targeted at different segments of the population (e.g. health care providers, the elderly, adults in general), have used a variety of channels (print and broadcast media, face-to-face instruction), and have been based in a number of different settings (neighbourhoods, workplaces, schools). However, the degree of integration of these different interventions in reaching the whole population has varied greatly between programmes. Evaluating the success of any such interventions has been hampered by problems associated with the objective assessment of physical activity, by the failure to define the components of physical activity clearly, and by the lack of precise goals in terms of the expected increase in activity.

Evidence from a number of communitywide CHD prevention programmes suggests that intensive intervention can increase participation in physical activity, at least in the short term. This conclusion is supported by the results of a recent nationwide campaign to increase physical activity in Australia. The campaign, called "Exercise — make it a part of your day" was able to demonstrate a significant increase in the level of walking among a sample of the community and increased readiness to undertake further exercise (28). These improvements occurred across all social classes and were most marked in the elderly. However, a second campaign, "Exercise — take another step", introduced 1 year later in an attempt to build on the success of the first, was not able to demonstrate any further improvements in levels of activity or willingness to participate (29).

Although the improvements achieved by communitywide program-
mes for increasing physical activity tended to be only short-lived, they
do suggest that participation in physical activity can be increased by
such programmes. Some of the limitations of communitywide CHD
prevention programmes discussed earlier are equally applicable to
programmes intended to increase physical activity. With very few
exceptions, most of the intervention strategies were aimed at improv-
ing the awareness of, and motivation to, exercise without tackling the
environmental obstacles to increased participation. The Minnesota
Heart Program did attempt to improve exercise facilities in the com-
munity and to involve community groups in establishing their own
committees to review other methods of increasing activity, but most
other programmes relied on interventions based on personal educa-
tion and behaviour change. In all the programmes, the interventions
were aimed at improving the levels of leisure-time exercise, and did
not attempt to influence factors such as transportation and urban
design that have an impact on occupational and leisure-time daily
activity patterns.

The feasibility of long-term maintenance of increased physical activ-
ity and its benefits for obesity prevention remain to be demonstrated
(*27, 29*).

National nutrition programmes

The energy density and fat content of the food supply have been
identified as the major dietary factors implicated in the development of
obesity (section 7). In many countries, national nutrition programmes
have succeeded in dramatically altering the fatty-acid composition of
diets, and some have also been successful in achieving a small reduc-
tion in the intake of total fats. However, very few countries have been
able to reduce total fat intake to the level that would appear to be
necessary to influence the average BMI of the whole population. This
is not surprising, as very few countries have a comprehensive and
integrated national nutrition policy that can direct the actions at all
levels necessary to achieve such a dramatic dietary change.

Two countries that have instituted far-reaching national nutrition
programmes are Finland and Norway. These countries have been able
to reduce national fat intake from 42% to around 34% of total dietary
energy over the last 20 years. It is therefore encouraging to see that
the increase in obesity prevalence is slowing in Finland and that the
mean BMI is stabilizing or even falling in some areas despite simulta-
neous decreases in levels of physical activity (*23*) (Fig. 9.3). In Nor-
way, data for all 40–42-year-old men and women recruited to a
countrywide CHD prevention programme (except Oslo) were

Figure 9.3
Changes in mean BMI in men and women in four areas of Finland between 1972 and 1992[a]

MEN   WOMEN

| N. KARELIA | KUOPIO PROVINCE | S.W. FINLAND | HELSINKI AREA |
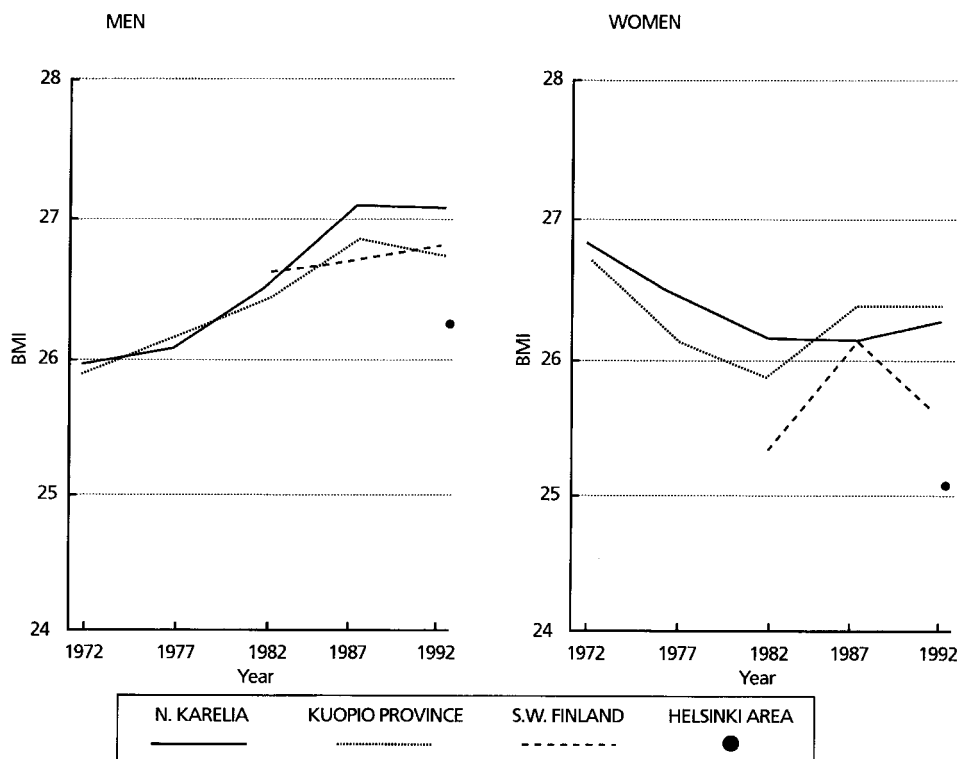
The curves show that mean BMI for men in North Karelia and Kuopio has stabilized or even fallen since 1987 after rapid rises in the preceding 15 years. The rise in mean BMI for women in the same provinces observed after 1982 also appears to be levelling out. This suggests that the communitywide changes in diet that have occurred in these provinces over the past 25 years may be contributing to a stabilization of population mean BMI.

[a] Adapted from reference 23 with the permission of the publisher and authors.

analysed in a recent study and it was found that obesity rates had decreased slightly in women since the 1960s (30). In Norwegian men, obesity rates remain lower than in other European countries but, in contrast to the Norwegian women, have increased substantially since the 1960s.

9.5.4 Implications for future public health programmes to control obesity

What has been demonstrated by these and other lifestyle intervention programmes is that approaches firmly based on the principle of personal education and behaviour change are unlikely to succeed in an environment in which there are plentiful inducements to engage in behaviours that lead to a chronic positive energy imbalance (31).

It would therefore seem appropriate to devote resources to programmes designed to reduce the exposure of the population to obesity-promoting agents by concentrating on environmental factors such as transportation, urban design, advertising and food pricing that promote the availability of high-fat, energy-dense diets and physical inactivity.

9.6 Lessons to be learned from successful public health campaigns

Campaigns that have been relatively successful in dealing with public health problems in the past include those on smoking, wearing seatbelts, drink-driving and immunization. Analyses of these campaigns have helped to identify features that may provide valuable guidance for public health interventions to control obesity. For example, it appears that programmes that involve government, the food industry, the media and the community, and that are of long duration, lead to positive and sustainable change.

Public health programmes on obesity are unlikely to achieve the same spectacular rates of success as those associated with the control of infectious disease; unlike pathogens, it is not feasible to eliminate all the causes of obesity, nor is it a simple matter to isolate and manage the exposure to major disease-promoting factors in the way that the control of smoking and hypertension have contributed to the successful reduction in rates of CHD. Obesity, the consequence of energy imbalance, is more tightly controlled physiologically than other risk factors.

The main features of successful public health campaigns aimed at behaviour change that should be considered in developing public health interventions to control obesity are outlined in Table 9.1 (*32*).

9.7 Public health strategies to improve the prevention and management of obesity

As highlighted in section 7, many features of the modern environment are conducive to a positive energy balance. Traditional foodstuffs are being replaced by high-fat, energy-dense food that is appetizing, packaged attractively, preprocessed for convenience, widely advertised and relatively inexpensive. There is good evidence to suggest that exposure to television food advertising influences food selection among children and adolescents (*37–39*), and in particularly susceptible subgroups (*40*), and convenience foods now account for a substantial proportion of food expenditure in most developed countries. Consumption of convenience foods is also increasing rapidly in devel-

Table 9.1
Main features of successful public health campaigns

Feature of campaign	Example
Adequate duration and persistency	In Finland, even if changes were not spectacular in the first 10 years of the campaign (*22*), recent years have seen marked improvements in CHD risk factors.
A slow and staged approach	Campaigns to change single behaviours, e.g. cigarette smoking, have required a series of strategies over time in order to support the transition from awareness, through motivation to change; experimenting and adopting a change; and maintaining that changed behaviour. This suggests that it is unrealistic to expect rapid changes in complex behaviours such as eating and exercise (*33*).
Legislative action	In some instances, e.g. seat-belt use and drink-driving, legislative action has been necessary to support education campaigns aimed at changing behaviour and attitudes (*34*).
Education	Improved immunization rates for many childhood diseases have required a systematic coordinated approach including both education and regulation. Education can encourage and support a change in behaviour while avoiding the feeling that change is being imposed without reason (*35*).
Advocacy	Strong advocacy from respected elements within all sectors of society has been a key feature of the decrease in smoking rates and in passive smoking (*21*).
Shared responsibility by consumers, communities, food industry and governments	In Portugal, concern for the high prevalences of hypertension and stomach cancer led to a national campaign to reduce the salt content of the diet. This involved an education campaign to reduce salt use in cooking, consumption of salted codfish and salted sausage and, with local bakers, the salt content of bread. Strong local support was obtained from village leaders, doctors and nurses. After 1 year, salt consumption had fallen markedly (by 50%) with a 5-mmHg (0.667-kPa) reduction in average blood pressure (*36*).

oping countries. The Massachusetts Medical Society Committee on Nutrition suggested that fast-food dining has become so well accepted that recommendations that it should be reduced or eliminated are likely to have little or no success (*41*). An effective approach would therefore be to improve both the nutritional quality of the convenience foods available and the eating habits of consumers.

Although recent surveys indicate that involvement in leisure-time physical activity may be increasing, the intensity and duration of such activity is decreasing (42) and participation is often limited by the availability and cost of using facilities. Instead, television viewing has become the major leisure pursuit of children and adults. Furthermore, while road networks expand, there has been little investment in cycle paths or public parks and playing fields. Buildings are designed on the assumption that lifts are preferable to stairs, and there is a common perception that it is unsafe to walk or play in the streets because of the risk of traffic accidents or crime (43). The level of occupational activity has also been declining in recent years because an increasing proportion of the labour force is employed in more sedentary occupations.

9.7.1 Developed countries

Since developed countries are characterized by the easy availability of high-fat, energy-dense diets and physical inactivity, it is not surprising that interventions based on education for behaviour change have had limited success in controlling obesity. There is a desperate need for interventions aimed at producing an environment that supports improved eating and physical activity habits throughout the community. This will require a comprehensive and integrated range of strategies in line with the examples shown in Table 9.2. The adoption of such an approach will require general acceptance of the principle that the prevention and management of obesity are not only the responsibility of individuals, their families or health professionals but also require a commitment from all sectors of society. Until this is achieved, strategies for the prevention and management of obesity will remain ineffective.

9.7.2 Developing and newly industrialized countries

A number of the possible environmental strategies for obesity control suggested in Table 9.2 are highly sophisticated and assume a certain level of infrastructure that may not exist in developing countries. However, the underlying targets, namely to improve dietary quality and ensure appropriate levels of physical activity, are obviously still relevant and should be incorporated into strategies to prevent the situation from worsening.

As in developed countries, obesity in the developing and newly industrialized countries will not be prevented simply by telling individuals and communities to change their diet and exercise behaviours. What is needed is a radical improvement in the social, cultural and economic environment through the combined efforts of government, the

Table 9.2
Possible environmental strategies for obesity control[a]

Area for action	Example of possible strategies
Urban design and transportation policies	Create pedestrian zones in city centres
	Construct safe walkways and cycle paths
	Introduce incentive schemes to encourage use of car parks on the outskirts of cities in conjunction with city public transport (e.g. park and ride)
	Provide affordable facilities for securing bicycles in cities and public areas
	Improve public transport (e.g. frequency and reliability of services)
	Increase safety by improving street lighting
	Install traffic-calming measures to increase safety of children walking and playing in streets
	Allocate resources to build and manage community recreation centres
	Modify building design to encourage use of stairs
Laws and regulations	Improve labelling of food products
	Limit and regulate advertising to children
Economic incentives	Introduce subsidies for producers of low-energy-dense foods (especially fruits and vegetables)
	Reduce car tax for those who take public transport to work during the week
	Provide tax breaks for companies that provide exercise and changing facilities for employees
School curricula	Provide adequate sport and activity areas and facilities, including changing and showering areas
	Ensure allocation of sufficient curriculum time to physical activity
	Ensure training in practical food skills for all children
Food and catering	Develop nutrition standards and guidelines for institutional food services and catering (e.g. school meals and workplace catering)
Promotion and education	Promote from an early age a knowledge of food and nutrition, food preparation, and healthy diets and lifestyles through curricula for schoolchildren, teachers, health professionals, and agricultural extension personnel
	Limit television viewing by children
	Use the media to promote positive behaviour change (e.g. through television series)
	Educate the public, especially in areas where food is purchased, on appropriate behaviour change to reduce risk of weight gain
	Educate the public on the need for collective action to change the environment into one that promotes rather than inhibits exercise and healthy dietary habits
	Educate the public about important factors in the development of obesity so that victimization of the obese is reduced

Table 9.2
(**Continued**)

Area for action	Example of possible strategies
Family food production	Encourage use of land in towns and cities for "family" growing of vegetables, legumes and other nutrient-rich crops

^a Adapted from reference *32* with the permission of the publisher Churchill Livingstone.

food industry, the media, communities and individuals. Wider issues, such as the development of national dietary guidelines and the importation, pricing and availability of food, also call for public health action. Improving the standard of living of all sectors of society, and especially of often neglected native or minority populations, should be a priority. The support of international agencies and bodies, such as FAO, UNDP, UNICEF, WHO and the World Bank, as well as nongovernmental organizations is essential.

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10. Prevention and management of overweight and obesity in at-risk individuals: an integrated health-care services approach in community settings

10.1 Introduction

This section deals with programmes intended for individuals and groups already overweight or obese, or at particularly high risk of obesity and its comorbidities. Particular emphasis is placed on an integrated health care services approach in community settings. It should be noted that:

- Effective weight management for individuals and groups at risk of developing obesity involves the whole range of long-term strategies mentioned in section 8.2, namely prevention, weight maintenance, management of comorbidities and weight loss.

- No long-term trials have been conducted on the effectiveness of obesity prevention *per se* through health-care services or in community settings. Preliminary evidence suggests that low-intensity educational and incentive programmes aimed directly at preventing weight gain in adults can have a positive impact on body weight.

- An effective weight-management protocol consists of the following five main stages: recruitment and referral; comprehensive health assessment; goal-setting; selection and implementation of an appropriate management scheme; and monitoring and evaluation.

- A personal support scheme for the overweight and obese patient, including family involvement and trained personnel, can considerably improve the outcome in terms of weight loss and weight maintenance. Well run self-help groups also offer a useful and inexpensive form of continuing support. Commercial weight-loss organizations can be of use in weight management provided that they follow a code of practice covering fees, the training of counsellors and the promotion of services.

- A number of well established and properly evaluated treatments are available for obesity, including dietary management, physical activity, behaviour modification, drug therapy and gastric surgery.

- Modest energy-deficit diets appear to be more effective and acceptable than severe energy deficits in achieving and maintaining weight loss. The effectiveness of dietary therapy is greatly improved if exercise and behaviour modification are included in an individually tailored plan. Further evaluation of current lifestyle

strategies and the combined therapies is required to determine their usefulness in achieving long-term weight loss.

- Drug treatment may be appropriate for high-risk obese patients for whom changes in lifestyle alone have been unsuccessful in reducing weight. Weight-management drugs should be used only under medical supervision so that the risks associated with drug treatment can be balanced against those of persisting obesity. Long-term administration, as part of a management strategy tailored to the individual, would appear to be the most logical and effective way of using weight-management drugs. However, data on the risk–benefit ratio of the long-term use of these drugs are still lacking.

- Gastric surgery is considered to be the most effective way of reducing weight and maintaining weight loss in severely obese patients.

- The objectives of weight-management strategies for children differ from those for adults because consideration needs to be given to the physical and intellectual development of the child. In contrast to adult treatment, which may be aimed at weight loss, child treatment is aimed at preventing weight gain.

- Three strategies for the treatment of obese children are available: reduction of energy intake, increased physical activity and reduction of inactivity. Primary health-care services, families and schools are all useful and appropriate settings for the prevention and treatment of obesity in children.

10.2 Management strategies for at-risk individuals and groups

The effective management of individuals and groups who are obese, or who are at particular risk of becoming so, demands health professionals with expertise in obesity management. Such professionals require knowledge, skills and attitudes appropriate to obesity management, and need to use the whole range of approaches shown in Fig. 8.1, p. 157, namely: prevention of weight gain, promotion of weight maintenance, management of obesity comorbidities and promotion of weight loss.

10.2.1 Prevention of weight gain

Prevention is probably the most effective, but currently underutilized, approach to weight management. It was suggested in section 8 that prevention can be divided into three levels, two of which are concerned with those who are at high risk of weight gain and its consequences, namely:

- *Selective prevention* — directed at high-risk individuals and groups.

- *Targeted prevention* — directed at those with existing weight problems and those at high risk of diseases associated with overweight.

Weight-management programmes can therefore be initiated to target those high-risk individuals and subgroups of the population identified in section 7.

As pointed out in section 8, there is an urgent need for intervention studies specifically aimed at preventing weight gain in adults. So far, the results of only two such studies have been reported. The first was a small-scale trial in a relatively select group[1] of normal-weight individuals to determine whether a low-impact intervention involving an educational programme (four nutrition education sessions and a monthly weight-control information newsletter) and a financial incentive could reduce weight gain. After 1 year, those in the treated group had lost about 1 kg in weight, while the weights of those in the control group remained unchanged (*1*). Analysis of the results showed that the greatest impact was among men, individuals over the age of 50, non-smokers and those with little prior experience of formal weight-loss services. The second report describes the first-year results of the Pound of Prevention (POP) study, an ongoing continuation of the first study that adopts a similar approach but applies it to a larger population (more than 1000 participants) over a longer period (*2*). Among men and high-income women, early trends in combating weight gain were encouraging and, if sustained over 3 years, should produce a positive outcome. However, trends in the low-income group were negative at 1 year. Further follow-up will reveal whether the low-intensity educational strategy being tested is effective in reducing the rate of weight gain in the groups being studied, and the study may help to identify behavioural correlates of weight gain that could provide guidance for further research on this important topic.

Prevention at the workplace

In recent years, health education interventions at workplaces have been a popular method of targeting high-risk individuals and groups, but most studies have been of short duration. Longer-term interventions aimed at high-risk individuals, such as the 6-year WHO European Collaborative Trial of Multifactorial Prevention of Coronary Heart Disease (*3*), in which some workers in factories underwent risk-factor screening (serum cholesterol, blood pressure, smoking) and medical follow-up, proved to be ineffective in lowering BMI. In the

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[1] Recruited among individuals who had participated in a risk-factor screening programme.

USA, a 2-year study of cigarette smoking and obesity found no differences in the mean BMI or any change in BMI at workplaces that offered weight-loss classes (on four occasions) compared with those that did not (4).

Prevention through health care services
To date, there have been no long-term trials on the effectiveness of obesity prevention *per se* through health-care services (see section 8). However, in one practice in the United Kingdom, the provision of healthy eating advice to pregnant women and their children restricted the prevalence of obesity to only 2% compared with levels closer to 8% in subjects who were not offered advice (5). On a larger scale, two controlled screening and intervention programmes aimed at reducing CHD risk factors through instruction and support from nurses in general practice have been evaluated recently. Both the OXCHECK Study (6) and the Family Heart Study (7) were able to demonstrate small but significant differences in weight of 0.5–1.5% between intervention and control groups after only 1 year. The intervention was aimed at altering diet quality rather than serving as a specific obesity-management scheme.

10.2.2 Weight maintenance

Long-term weight maintenance is not only relevant to those who have recently lost weight, but is also an important element of all weight-management programmes. Rössner (8) has highlighted this issue by recognizing that the natural trend of BMI in most developed countries is to increase with age. A body weight kept constant over a decade as a result of a weight-management programme therefore represents a successful outcome, and is a particularly valuable achievement in those patients who have family histories of obesity and/or its medical complications, and who are particularly prone to weight gain and obesity. Weight maintenance is shown in Fig. 10.1 as one of a range of indicators of success in obesity-management programmes. Weight maintenance and minor or modest weight loss are more likely to be achieved than weight normalization.
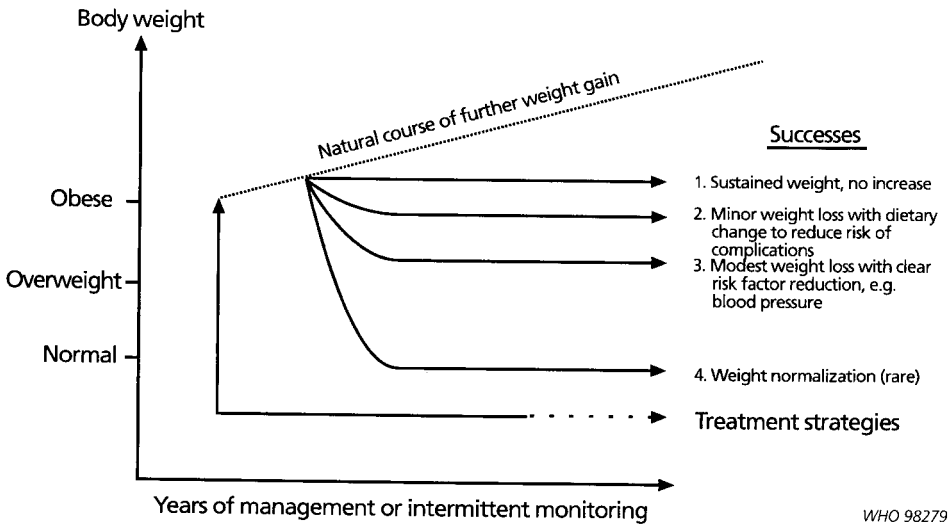
10.2.3 Management of obesity comorbidities

The management of obesity comorbidities can improve health outcomes regardless of whether or not substantial weight loss is achieved (9, 10). As highlighted in section 4, such comorbidities range from chronic debilitating, though not life-threatening, conditions to severe health risks associated with hyperlipidaemia and hypertension. Appropriate targets relating to the management of obesity comorbidities are suggested in Table 10.1.

Figure 10.1
Possible indicators of success in obesity-management programmes[a]

Body weight

Natural course of further weight gain

Successes

Obese

Overweight

Normal

1. Sustained weight, no increase
2. Minor weight loss with dietary change to reduce risk of complications
3. Modest weight loss with clear risk factor reduction, e.g. blood pressure

4. Weight normalization (rare)

Treatment strategies

Years of management or intermittent monitoring

WHO 98279

Weight maintenance or minor weight loss are successful outcomes of programmes aimed at controlling obesity when otherwise (without intervention) weight gain would occur.

[a] Adapted from reference 8 with the permission of the publisher and author.

10.2.4 *Weight loss*

The benefits of modest, intentional weight loss have been described in section 5. Doctors and their patients need to recognize that moderate but sustained weight loss in the range 5–15% of initial weight is medically highly advantageous if long-lasting (*9, 11*). Substantial improvements in obesity comorbidities result, particularly in hypertension and in blood glucose and plasma lipid levels.

However, a return to the so-called "ideal body weight" has for too long been considered by the medical profession to be both a possible and a mandatory target for obese people. This misconception has been transmitted to the public, and has been reinforced by the promotion by the mass media of slenderness as the ideal body image. As a result, there is now considerable pressure on the overweight individual to return to his/her ideal, often at the lower end of the normal (18.5–25) BMI range.

Returning to an ideal body weight is not an appropriate goal for the following reasons:

- Weight gain is a health risk, and this risk is independent of the actual level of BMI (*12*).

Table 10.1
Appropriate targets for the management of obesity and comorbidities

Condition	Appropriate target[a]
Fatness	Reduce body weight by 5–15% (smaller weight loss is also acceptable if abdominal fat loss is sufficient to provide metabolic benefit)
Abdominal fat	Reduce waist circumference
NIDDM and glucose intolerance	Improvement in glycaemic control, i.e. fall in fasting blood glucose and glycosylated haemoglobin levels, and reduced use of oral hypoglycaemic agents and/or insulin
Hypertension	Fall in blood pressure and reduction in the need for hypotensive agents
Dyslipidaemia	Defined improvements in LDL, fasting triglycerides, HDL cholesterol
Sleep apnoea	Reduced sleep apnoea, improved lung function
Arthritis and back pain	Pain relief, increased mobility; reduced need for drug therapy
Reproductive dysfunction	Improved reproductive function with regular menstruation
Poor psychosocial functioning	Improved quality of life; reduced anxiety; reduced depression; improved social interaction
Tiredness, sweating, breathlessness etc.	Resolution or reduction of severity
Exercise intolerance	Improved exercise tolerance; reduced breathlessness

[a] Quantitative estimates of magnitude of change in target value may vary for specific populations.

- Substantial benefit, e.g. a 25% decline in mortality, can accrue from weight losses of 5–10 kg in 1 year (*10*).

- Physiological responses limit weight loss, so that it is unusual to return to normal weight unless patients are very persistent and effective in monitoring and controlling their drive to eat. Severe dietary restrictions are unhealthy and may precipitate eating disorders in some circumstances (*13*).

- Repeated failures to achieve and sustain substantial weight loss may increase a patient's depression and lack of self-esteem and may result in further weight gain.

- Long-term health depends on limiting weight gain over time.

- Clinical trials show that most patients are unable to continue losing weight for longer than 12–16 weeks (4–8kg loss) and that weight loss does not continue after 6 months (*14*). Patients are seldom applauded or rewarded for achieving this modest loss, even though it requires prolonged hard work and brings major health benefits.

10.3 A health-care services approach to the new concept of weight management

In response to the failure of current obesity-management practices to deal effectively with the problem of obesity, several expert working groups have recently examined how the management of obesity in health-care services could be improved.

A coordinated approach to obesity management in line with the strategies outlined in section 9 is required. A primary goal of long-term weight maintenance should be combined with appropriate treatment for modest weight loss and the management of comorbidities in overweight patients. Prevention of weight gain in those individuals who are at risk of becoming obese in the future is also crucial (*15–17*).

It is anticipated that each country will need to modify and develop the guidelines according to its own particular needs and health care structures. However, the basic principles of an effective weight-management protocol remain the same and involve the following five main stages:

— recruitment and referral;
— comprehensive health assessment;
— goal-setting;
— selection and implementation of an appropriate management scheme;
— monitoring and evaluation.

10.3.1 *Recruitment and referral*

Recruiting at-risk groups and individuals is the first step in an effective weight-management protocol. The three main methods of recruitment and referral are as follows:

- *Public awareness campaigns* highlighting the dangers of excess weight associated with high BMI and/or waist circumference, e.g. through school health services, insurance agencies and employers.

- *Opportunistic screening* of patients who present for other conditions, e.g. infections, trauma or other intercurrent illness.

- *Public health screening* incorporated into other health service activities and programmes, e.g. immunization, mother and infant

welfare clinics, and screening programmes for tuberculosis, infestations and cancer of breast and cervix.

10.3.2 *Comprehensive health assessment*

The development of an effective weight-management strategy depends on a comprehensive analysis of the individual's degree of obesity, his or her associated risks, coexisting illnesses, social and personal situation, and a history of those problems and precipitating factors that led to weight gain. The components of such an analysis might include those outlined below.

Personal weight history
Patients can be categorized according to a simple scheme by means of a series of standardized questions based on, e.g. current BMI; current state of energy balance (as indicated by actual weight kinetics, i.e. weight gain, loss or stability); weight at specific ages; age of onset of weight gain; peak weight; lowest weight maintained for one or more years; and number of weight-loss attempts.

The environmental circumstances and the life events that have had a temporal relationship to weight gain or regain can be useful in developing behavioural strategies for altering lifestyles.

Physical activity
Simple questionnaires are now available that allow an assessment to be made of levels of occupational and recreational activity (*18*).

Dietary patterns
Information on habitual food intake, meal patterns and reasons for eating can be obtained from a dietary record or brief interview. Patients with eating disorders should be identified by means of questionnaires or interviews, and appropriate strategies should be included in the management plan to deal with them.

Recommended methods of dietary assessment tend to be appropriate only for epidemiological research and not for use in a clinical setting (*19*). Recording bias, particularly under-reporting by obese subjects, is a problem. Generally, food diaries have been adapted to include behavioural questions and quantitative scales for describing patients' feelings, but no single accepted format is widely used (*20*).

Assessment of health indicators and risk factors
The following health indicators and risk factors should be assessed:

- *Fat distribution.* Individuals at high risk due to abdominal fat distribution can be identified by measuring waist circumference or waist: hip ratio (section 2).

- *Smoking.* Smoking is particularly important because some patients use tobacco as a means of limiting weight gain despite the major risks associated with the tobacco use (*21*).

- *Drug use.* Several drugs used to treat medical conditions promote weight gain (Table 7.6).

- *Family history.* A family history of certain diseases (CVD, NIDDM, hyperlipidaemia or hypertension) increases the risk that obese individuals or those gaining weight are likely to develop these complications.

Psychosocial and behavioural assessment

It is important to assess and understand the psychological and social characteristics of the individual (*22, 23*) as these can be important in determining the best weight-management strategy.

A psychosocial assessment might include the determination of occupational circumstances, the structure of the nuclear family and the degree of family support, the reasons why the patient wishes to lose weight, and the presence of mood disturbances. There is a need for validated questionnaires, e.g. on depression, anxiety, eating behaviour, etc., that are appropriate to the culture concerned.

Medical examination

A routine medical examination should include physical examination, measurement of blood pressure, and anthropometry, which usually includes, in addition to BMI, waist circumference, hip circumference and measurement of several skinfold thicknesses as an approximate measure of fat stores. Waist circumference is a good indicator of risk associated with the complications of obesity (e.g. hypertension) and is easy to measure.

Laboratory tests

Where resources are available, the health assessment might include the analysis of blood and urine for metabolites indicative of disease risk, e.g. plasma glucose and blood lipids. Some tests carried out routinely in overweight and obese patients (e.g. hormone levels for rare abnormalities) are considered to be an unwise use of resources.

10.3.3 Setting appropriate targets

The information gained from the comprehensive health assessment should enable doctor and patient to agree on a realistic and appropriate goal. This is essential in developing a suitable management plan for patients and groups, and for assessing progress and success.

The management goal should not be chosen solely on the basis of BMI, but should also take into account the presence of other risk factors and social and personal circumstances. This is illustrated in Fig. 10.2, which presents an algorithm for a systematic approach to obesity management through health care services. Experience has shown that clearly defined practical guidelines for the general public and for health professionals are needed to minimize resistance to, and confusion about, setting appropriate weight goals (24).

The American Obesity Association (17), a Scottish group (16), and a recent report of a subgroup of the International Obesity Task Force[1] all support a strategy for setting appropriate management goals based on the following values of BMI (special values of cut-offs (see Table 2.1) for ethnic subgroups may need to be selected):

- *BMI 25–29.9.* Where there are no risk factors such as increased waist circumference, the emphasis should be on weight stability. Where comorbidities are present, risk management through changes in diet, exercise and lifestyle is necessary. Weight-loss goals should be introduced if the health risks are not substantially reduced within a few months.

- *BMI ≥30.* This is associated with a much higher risk of morbidity, so that long-term weight management with some preliminary weight loss is advisable. When health risks are extremely high (e.g. BMI >40), and conventional treatment has failed to reduce them appropriately, patients should be referred to a specialized service so that the need for surgery can be properly evaluated.

10.3.4 Selection and implementation of appropriate management strategies
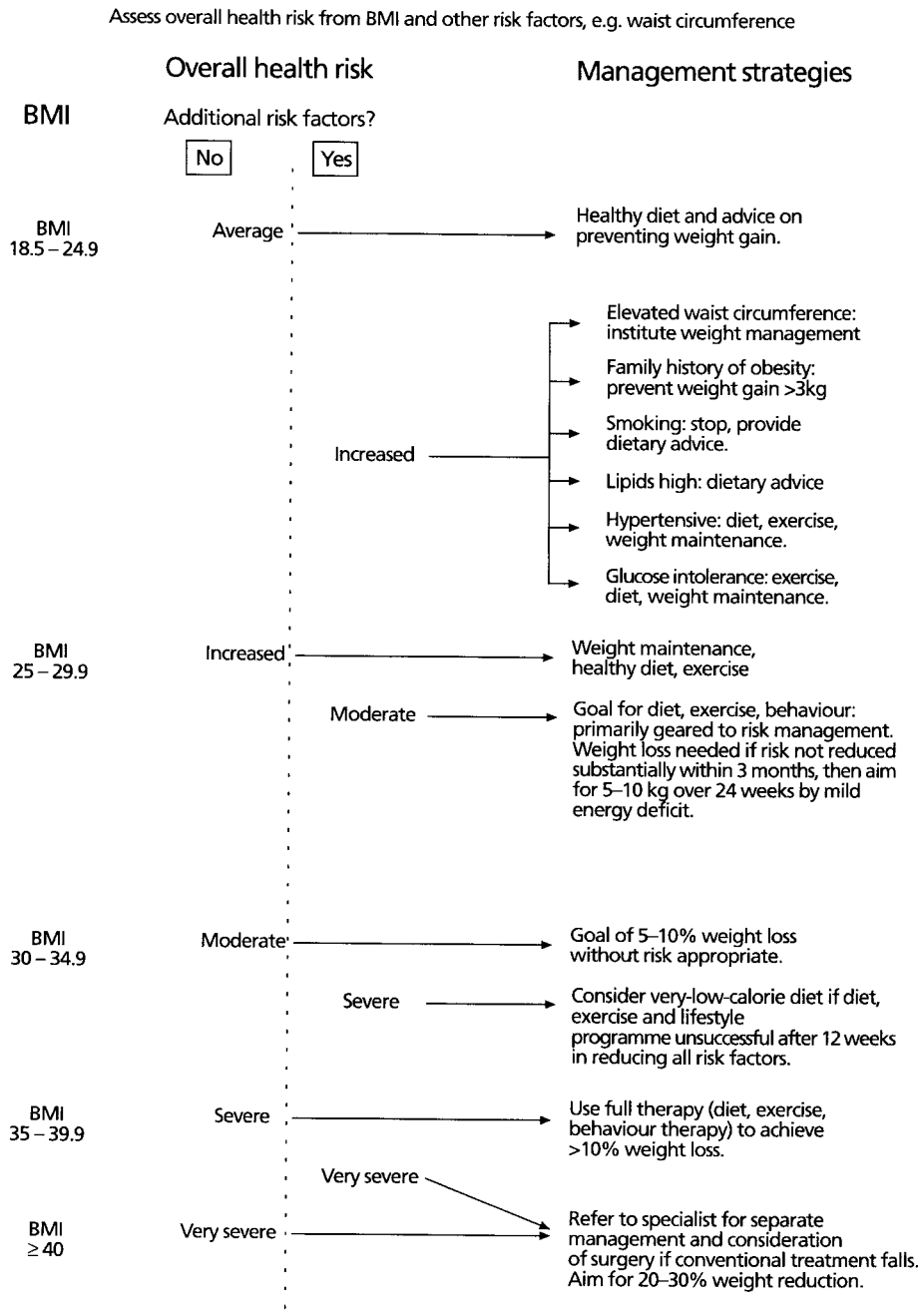
Different strategies will be required to meet the objectives of the different elements of weight management.

For *weight maintenance*, and for *prevention of weight gain* in at-risk individuals, healthier eating and a more active lifestyle are necessary. For *weight loss*, or to decrease body fat, a temporary negative energy (or fat) balance must be created so that fat stores can be used to meet energy demands. This means either reducing intake or increasing energy expenditure or both. *Management of comorbid conditions* may require special attention to be paid to specific dietary features, e.g. salt intake in hypertensive patients.

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[1] Deslypere JP, ed. *The management of obesity through health care services*, 1996. Background paper prepared by Primary Health Care–Specialist Interface subgroup of the International Obesity Task Force.

Figure 10.2

A systematic approach to obesity management based on BMI and other risk factors

Assess overall health risk from BMI and other risk factors, e.g. waist circumference

Overall health risk

BMI

Additional risk factors?

| No | , | Yes |

Management strategies

BMI
18.5 – 24.9

Average ──────────────→ Healthy diet and advice on preventing weight gain.

Increased

→ Elevated waist circumference: institute weight management

→ Family history of obesity: prevent weight gain >3kg

→ Smoking: stop, provide dietary advice.

→ Lipids high: dietary advice

→ Hypertensive: diet, exercise, weight maintenance.

→ Glucose intolerance: exercise, diet, weight maintenance.

BMI
25 – 29.9

Increased ──────────────→ Weight maintenance, healthy diet, exercise

Moderate ──────────────→ Goal for diet, exercise, behaviour: primarily geared to risk management. Weight loss needed if risk not reduced substantially within 3 months, then aim for 5–10 kg over 24 weeks by mild energy deficit.

BMI
30 – 34.9

Moderate ──────────────→ Goal of 5–10% weight loss without risk appropriate.

Severe ──────────────→ Consider very-low-calorie diet if diet, exercise and lifestyle programme unsuccessful after 12 weeks in reducing all risk factors.

BMI
35 – 39.9

Severe ──────────────→ Use full therapy (diet, exercise, behaviour therapy) to achieve >10% weight loss.

Very severe

BMI
≥ 40

Very severe ──────────────→ Refer to specialist for separate management and consideration of surgery if conventional treatment falls. Aim for 20–30% weight reduction.

WHO 98272

The development of successful weight-management schemes requires patient cooperation and motivation and involves five linked components:

— a personal support scheme that includes specially trained personnel and, if possible and appropriate, family involvement;
— dietary assessment followed by individually tailored advice;
— analysis and modification of physical activity patterns;
— behavioural advice that links environmental and psychosocial factors to the changes needed in diet and physical activity;
— additional treatments may also be indicated depending on the degree of overweight and the presence of comorbidities.

The various methods of treatment available for obesity are outlined in section 10.5. The suitability of any particular treatment will depend on BMI, on the targets that have been set, and on the clinical characteristics of the patients as determined in the assessment stage. A combination of several treatments is usually advisable.

10.3.5 *Monitoring, rewards and evaluation*

Regular monitoring of patients' progress is probably one of the most important aspects of the weight-management process; it should not cease when patients have reached agreed goals but should form part of continuing care. Regular review allows weight-management progress to be supported, medical conditions to be monitored, and problems to be dealt with at the earliest possible opportunity. It is important that achievements in weight maintenance or weight loss (no matter how small) are recognized, and a programme of rewards for achieving set goals is often useful. Such rewards should be non-food-based and agreed with a patient at an early stage of management.

An equally important aspect of any obesity-management approach within health care systems is the constant evaluation of the efficacy of different weight-management strategies. Systems for auditing the efficacy of current practices should be integrated into the health care delivery structures. Such an approach requires long-term follow-up of patients and groups recruited into different weight-management schemes. For example, an indication of whether a weight-maintenance strategy is successful or not could be gained by considering whether one or more of the criteria presented in Table 10.2 have been met.

10.4 Patient support in obesity treatment

There is considerable evidence to suggest that patient support by health professionals, peers and family members can notably increase successful weight loss and weight maintenance (25–27).

Table 10.2
Potential criteria for evaluating weight-maintenance strategy

- Maintenance of a stable weight over time (even if BMI is not reduced to within the normal range)
- Reduction in the number of obese people who develop obesity-related comorbidities
- Increase in the number of obese people who are successful in attaining and maintaining modest weight losses
- Reduction in the number of individuals who gain even a small amount of weight over a specified period
- Low withdrawal rates
- Low relapse rates
- Improvement in risk factors and comorbidities

10.4.1 *Support within the health-care service*

Evaluation of weight-management programmes within health-care settings suggests that (*28*):

- Specially trained health personnel (e.g. nurses, dietitians, trained lay persons) produce better results than untrained staff involved in routine medical management.

- Visits at short intervals, rather than monthly or at longer intervals, are of greater value.

- With most patients, better responses are achieved in a group setting.

Thus trained personnel who have frequent contact with patients, preferably as part of a support group, are recommended. In addition, efforts should be made to prevent guilt feelings associated with the obese state.

10.4.2 *Involvement of family*

A number of studies have shown that the body weight and attitudes of a patient's spouse can have a major impact on the amount of weight lost and on success in weight maintenance. Black & Threlfall (*29*) found that overweight patients with normal-weight partners lost significantly more weight than those with overweight partners. They also noted that success was greater in those patients whose partners had also lost weight (even though they were not included in the programme), suggesting that recommended changes were being actively supported by the spouse. Similarly, Pratt found that drop-out rates were reduced when the patient's spouse was included in a weight-control programme (*30*).

Additional evidence for the important role of family support in successful weight management is provided by the work of Epstein and colleagues (*31*) on the treatment of childhood obesity.

10.4.3 *Self-help and support groups*

In recent years there has been a large increase in the number of self-help and support groups. These range from national organizations such as Overeaters Anonymous (OA) in the USA and Anonymous Fighters Against Obesity (ALCO) in Argentina, Chile, Paraguay, Spain and Uruguay, to smaller workplace, neighbourhood and community-organized self-help groups. These groups generally consist of people with weight or eating problems, and operate at little or no cost and without professional intervention. They all offer considerable social support but vary in their philosophy. Unfortunately, although such groups are immensely popular, there has been no objective assessment of their value in weight management. However, well run self-help groups are a useful and inexpensive form of continuing group support; they encourage long-term participation and can be a useful adjunct to professional care.

Advocacy groups for overweight and obese persons, such as the Size Acceptance Network in the USA, serve a different function from self-help groups, aiming to reduce the stigma and social difficulties that obese patients suffer. Recently, a patient support and advocacy group called EUROBESITAS has been established to lobby for the rights of obese patients in Europe.

10.4.4 *Commercial weight-loss organizations*

Numerous commercial organizations offer a mixture of instruction, guidance and support in weight loss. They are usually not run by health professionals, although they may be based on material produced by them and on advice from professional consultants. All such organizations rely on counsellors (who vary in their level of training) to provide services to individual clients for a fee. Regular sessions cover a wide variety of subjects ranging from specific information on dieting, nutrition and physical activity, to techniques for changing behaviour. The cost of such programmes varies enormously, from a nominal fee paid at each session to very large sums paid on joining to purchase special dietary supplements and prepackaged foods that form part of the programme.

There is some concern about the regulation of commercial weight-loss organizations. There is a risk of financial exploitation, and counsellors may be completely untrained. Attempts to evaluate the

effectiveness of commercial programmes have resulted in few objective assessments because of problems of confidentiality, drop-out rates and lack of interest among the organizations themselves (*32*). The US Food and Nutrition Board Committee has suggested that there is a need for guidelines on voluntary accreditation within the commercial weight-loss industry (*15*). The misleading marketing of weight-loss programmes has often been a cause of complaints to consumer organizations.

Nevertheless, many well run programmes provide the support and interest needed for long-term involvement in weight management that cannot be provided by health professionals. Commercial weight-loss organizations should therefore be required to comply with a code of practice in relation to fees, training of counsellors and promotion of their services. They should also report the outcomes of their programmes. Health professionals may consider the judicious use of such organizations in obesity management after assessing their merit, using the criteria suggested by the Scottish Intercollegiate Guidelines Network (Annex 1).

10.5 Treatment of obesity

A wide variety of treatments for obesity are available, including dietary management, physical activity, behaviour modification, pharmacological treatment and surgery. However, there is a need to control the promotion of dangerous and deliberately deceptive approaches to weight loss or control, such as special weight-loss aids, equipment, "miracle cures", and certain drugs and treatments often offered through unlicensed weight-loss centres.

10.5.1 Dietary management

The education of overweight patients about foods and eating habits that facilitate weight control is an essential component of all weight-management strategies. Dietary intake and patterns should be assessed to identify areas requiring special attention such as nutritional adequacy, meal size, meal frequency and meal timing.

Dietary restriction represents the most conventional "treatment" for overweight and obesity. It usually induces weight loss in the short term, but its poor long-term effectiveness, especially when used in isolation, is widely recognized (*33*). Diets based on healthy eating principles, including the individualized modest energy-deficit diet and the *ad libitum* low-fat diet, appear to have a better long-term outcome. Further randomized, controlled, long-term dietary intervention studies are needed to identify the optimal diet for the treatment of

obesity (i.e. weight loss, weight maintenance and management of comorbidities).

Individualized modest energy-deficit diets
This dietary scheme is based on inducing an energy deficit that patients can sustain over the long term. A deficit of 500–600 kcal$_{th}$/day (2092–2510 kJ/day) is usually well tolerated. When used correctly, this approach has resulted in larger weight losses over time than attempting more severe energy restriction (34).

The specific energy intake prescribed to patients is based on an estimate of their initial maintenance requirement minus the agreed deficit. Maintenance estimates should be calculated from the equations of Lean & James (35), based on body weight and age, rather than from self-reported dietary intakes since these are notoriously unreliable when obtained from obese subjects (36). After subtracting the deficit, the energy prescription can be translated into a dietary plan using a food exchange table based on healthy eating principles, i.e. approximately 20–30% or less energy as fat, 15% as protein, and 55–60% or more as carbohydrate (primarily complex carbohydrates). The assessment of current dietary patterns should be used to construct and educate the patient to follow a dietary plan appropriate to his or her circumstances. The prescribed energy level of such plans should generally not be lower than 1200 kcal$_{th}$/day (5021 kJ/day).

Low-fat, high-carbohydrate diets
The main argument in favour of low-fat diets is their beneficial effect on CVD risk factors (37). However, such diets have also been shown to cause weight loss proportional to pretreatment weight, and to the long-term reduction in dietary fat content. Astrup et al. (38), for example, found that a reduction of 10% in fat energy could produce an average 5-kg weight loss in obese subjects, although a number of other studies have failed to give the same result.

After major weight loss, an *ad libitum* low-fat high-carbohydrate diet programme has been shown to be superior to calorie-counting in maintaining weight loss 2 years later (39). Replacing a proportion of the fat by protein instead of carbohydrate may further increase the weight loss.

Severe/moderate energy-deficit diets
The standard practice in many lay and commercial systems for slimming is for the patient to be prescribed a standard energy intake, normally 1000–1200 kcal$_{th}$/day (4184–5021 kJ/day). These intakes are usually selected by dietitians or doctors in accordance with nutritional

guidelines for healthy people and are prescribed, unchanged, to large numbers of adults. However, not all patients have the same energy requirements, and the magnitude of the energy deficit imposed by the diet will be greater with higher energy requirements. Furthermore, energy intake at this level is usually associated with a deficient intake of several nutrients.

Based on published studies, diets providing fewer than $1200\,kcal_{th}$ $(4184\,kJ)$ induce up to 15% weight loss over 10–20 weeks (*40*) but, without a maintenance programme, most of the weight lost is regained (*41*). Patients are rarely assessed for longer than a year, and most of the trials that induce this rate of weight loss have, in fact, combined behaviour modification with the dietary regimen. Drop-out rates tend to be high, although major improvements in compliance and continuing involvement in weight management can be made if associated support systems are established to cope with patients' needs.

Very-low-calorie diets

Very-low-calorie diets (VLCDs) can induce rapid weight loss over a 3-month period but do not seem particularly conducive to long-term weight maintenance (*42*, *43*). They should usually be reserved for achieving rapid short-term weight loss on medical grounds (e.g. before surgery) in patients with a BMI >30. The use of VLCDs by individuals without medical supervision is unwise and should not be recommended.

Concerns over loss of body protein/lean tissues with traditional VLCDs highlighted the need for a minimum energy level and the proper formulation of such diets. Nowadays, VLCDs usually provide a ketogenic (high-protein, high-fat, low-carbohydrate) diet with an acceptable minimum energy level of $800\,kcal_{th}$/day (3347 kJ/day) in the form of protein-, mineral- and vitamin-enriched meals or drinks. Research has shown that VLCDs with energy levels of less than $800\,kcal_{th}$/day (3347 kJ/day) do not produce greater weight loss, and are less well accepted, than diets providing this energy level (*44*).

10.5.2 Physical activity and exercise

The combination of exercise and diet is more effective than either method alone in promoting fat loss (*45*). Exercise also limits the proportion of lean tissue lost in slimming regimens (*46*) and limits weight regain (*45*, *47*), while physical activity may favourably affect body fat distribution (*48*).

Physical activity has numerous beneficial effects regardless of BMI and age. Individuals who engage in moderate or vigorous exercise at

Table 10.3
Suggested mechanisms linking exercise with the success of weight maintenance[a]

Increased energy expenditure
Better aerobic fitness
Improved body composition:
fat loss
preservation of lean body mass
reduction of visceral fat depot
Increased capacity for fat mobilization and oxidation
Control of food intake:
short-term reduction of appetite
reduction of fat intake
Stimulation of thermogenic response:
resting metabolic rate
diet-induced thermogenesis
Change in muscle morphology and biochemical capacity
Increased insulin sensitivity
Improved plasma lipid and lipoprotein profile
Reduced blood pressure
Positive psychological effects

[a] Reproduced from reference *50* with the permission of the publisher. Copyright John Wiley & Sons Ltd.

least once a week are less likely to have NIDDM or CVD, hip fractures and mental illness, and have lower mortality rates than those who are least active. Integrated exercise schemes consistently show the beneficial effects of physical activity and exercise on both physiological and psychological well-being (*48, 49*).

Table 10.3 summarizes the possible mechanisms whereby exercise can improve the success of weight maintenance.

Achieving appropriate levels of physical activity
Evidence now suggests that the activity required to maintain and lose weight, and to gain physiological and psychological health benefits, may not have to be as vigorous as was previously believed (*48, 51*). Indeed, the US Surgeon General's report (*48*) stressed that low-intensity, prolonged physical activity, such as purposeful walking for 30–60 minutes almost every day, can substantially increase energy expenditure, thus reducing body weight and fat.

Physical activity strategies should aim at encouraging higher levels of low-intensity activity and reducing the amount of leisure time spent in sedentary pursuits. The main goal is to convert inactive children and adults to a pattern of "active living". Two general schemes can be envisaged for promoting physical activity:

- *Measures to increase modest daily exercise*, as in walking or cycling, where the energy expended amounts to about an extra 60–200 kcal$_{th}$/h (125.5–251 kJ/h) depending on the intensity of the exercise. In sedentary overweight and obese patients, an extra 3 hours daily of any activity involving standing rather than sitting increases the 24-hour energy expenditure from 40% to more than 75% above the BMR (*52*).

- *Physiological fitness training with moderate/vigorous exercise*, usually involving group-supervised exercise sessions of 45–60 minutes each three times a week. Extensive studies show that these regimens have very substantial benefits but are difficult to sustain in obese patients.

More intensive degrees of exercise need to be considered on an individual basis in overweight and obese patients. Breathlessness and musculoskeletal problems are common in the obese, and will prevent them from sustaining exercise that uses a substantial amount of energy.

Improving compliance

Analysis of randomized trials of public involvement in physical activity programmes (*53*) has indicated that compliance is improved by:

— home-based activities rather than structured programmes in a special facility or centre;
— encouragement by frequent professional contact either by telephone or home visit;
— social support, particularly from family members (*16*);
— informal and unsupervised exercise;
— low/moderate-intensity exercise;
— promoting walking as a form of exercise;
— taking exercise from time to time during the day rather than in a single burst of continuous activity (*48*).

On this basis, additional walking or other modest exercise may prove most conducive to maintaining compliance in overweight and obese patients. The first three items in the list are also relevant to improved dietary compliance.

10.5.3 *Behaviour modification*

The primary goal of behavioural treatment is the improvement of eating habits (i.e. what to eat, where to eat, when to eat, how to eat) and levels of physical activity. Behavioural treatment is considered to be an essential component of any adequate obesity-treatment programme (*54*).

Method of treatment
Behavioural treatment has a number of core features:

- *Self-monitoring*: the detailed, daily recording of food intake and the circumstances in which it occurs provides the essential information needed for selecting and implementing intervention strategies. It also forms part of the behaviour modification process, through evaluation of progress, and identification of personal and environmental influences that regulate eating and physical activity.

- *Stimulus control*: limiting exposure to cues that prompt overeating. For example, patients are instructed to separate eating from other activities so that they remain fully aware of their actions.

- *Emphasis on improved nutrition*: rigid dieting is discouraged in favour of balanced and flexible food choices.

- *Cognitive restructuring*: a method of identifying and modifying dysfunctional thoughts and attitudes about weight regulation.

- *Study of interpersonal relationships*: assists in coping with specific triggers for overeating and in increasing social support for weight control.

- *Relapse prevention*: a continuing process designed to promote the maintenance of treatment-induced weight loss.

Evaluation of treatment outcome
Behavioural treatment has been more intensively researched, and its effects more thoroughly documented, than any other obesity intervention. It is effective in changing behaviour in the short term and consistently produces significant weight loss in patients with mild to moderate obesity. In the long term, however, results are not encouraging, virtually all adult patients returning to their pretreatment baseline within 5 years (*44*). Long-term outcomes in children, by contrast, are more promising (*55*); they indicate that behavioural changes resulting from family-based therapy last 10 years or more. Further research is needed on ways of increasing the effectiveness of behavioural techniques.

Limitations of behavioural treatment
It is thought that behavioural treatment is ineffective in the long term because patients fail to follow the self-regulatory strategies that they learn in treatment. Some investigators have therefore stressed the need for lifelong treatment; obesity is a chronic condition and treatments, whether behavioural, dietary or pharmacological, do not work when they are not used (*54*).

Other benefits of behavioural treatment
Despite its limitations in producing long-term weight loss, behavioural treatment is of value in modifying behaviours linked to adverse health effects and psychological distress, without necessarily causing weight loss in obese individuals. It can also promote behaviours that directly affect health, such as reducing fat intake and increasing physical activity, although there are also problems in sustaining them in the long term. Finally, behavioural treatment can be used to help obese patients to become more assertive in coping with the adverse social consequences of being overweight, to enhance their self-esteem, and to reduce their dissatisfaction with their body image regardless of their lack of success in losing weight (*56*).

10.5.4 *Drug treatment*

The information presented here was up to date at the time of writing, but drug treatment of obesity is constantly changing.

Drug treatment of obesity has often been seen as controversial, largely because of failure to understand how it should be used. However, it has been re-evaluated in recent years and the concept of long-term drug treatment has emerged as an adjunct to other weight-loss therapies and as a way of helping to maintain body weight over time (*57*).

Due to the paucity of data, no particular strategy or drug can yet be recommended for routine use. However, the availability of new evidence of the long-term efficacy and safety of several drugs currently awaiting approval is likely to change the situation. When the pharmacological treatment of obese patients is prescribed in the future, it will be important to consider the effect of the drug on both weight loss (or weight maintenance) and comorbidity, as well as any detrimental side-effects (*14, 58*).

Principles of drug treatment
In any discussion of the rational use of drugs for the treatment of obesity, it is important to understand the following:

• Currently approved drugs are best used in conjunction with diet and lifestyle management. Drugs used for weight management assist patient compliance with dietary, exercise and behaviour-change regimens.

• Weight-management drugs do not cure obesity; when they are discontinued, weight regain occurs.

• Drugs for weight management should be used under medical supervision.

- Drugs for weight management do not work if they are not taken (59). Weight regain can be expected when drugs are discontinued.
- Drug treatment should be considered part of a long-term management strategy for obesity tailored to the individual. Risks associated with drug treatment should be balanced against those of persistent obesity.
- Drug treatment should be continued only if it is considered to be safe and effective for a given patient. Current criteria in the United Kingdom suggest that the use of weight-management drugs for longer than 3 months should be considered only if a total weight loss of at least 10% has been achieved from the start of the episode of managed care (i.e. including weight loss achieved as a result of the obligatory 3–6 months of lifestyle intervention before drug treatment is initiated (60). However, this principle has been criticized as being unrealistic in most cases.

Drug treatment for obesity can be considered when patients:

— have a BMI >30 and treatment with diet, exercise and behaviour regimens has proved unsuccessful;
— have substantial comorbidities associated with a BMI >25 that have persisted in spite of an improved diet, exercise and behavioural treatment.

Weight-management drugs are not recommended for use in children as there are insufficient data on their effects on eating behaviour during the peripubertal period or in the longer term.

Types of drugs for weight management
Weight-management drugs can be broadly divided into two types — those that act on the central nervous system to influence feeding behaviour, appetite and other mechanisms, and peripherally acting drugs such as those that target the gastrointestinal system and inhibit absorption or enhance a feeling of fullness. As there is no published evidence to suggest that bulk-forming agents taken in a medicated form (e.g. methylcellulose) have any beneficial long-term effect in reducing weight, they are not discussed further here. However, increasing dietary fibre as part of dietary modification may have a role in energy restriction.

Weight-management drugs currently available in certain countries are summarized in Table 10.4. A number of them are considered in greater detail below. Many additional agents are currently under investigation.

In 1997 concerns were raised about the safety of two widely used weight-management drugs, fenfluramine and dexfenfluramine, be-

Table 10.4
Anti-obesity drugs currently available for use

Principal mode of action	Drug
Centrally acting:	
noradrenergic	Phentermine
combined serotonergic and noradrenergic	Sibutramine
Peripherally acting:	
lipase inhibitor	Tetrahydrolipostatin
Peripherally and centrally acting:	
thermogenic and anorectic	Ephedrine; caffeine

cause of their association with heart valve problems when used alone or in combination with phentermine. As a result of these concerns the manufacturer agreed to withdraw both treatments from the market. These drugs are therefore not considered in this report.

Efficacy of currently available drugs
A clinically useful drug for obesity treatment should have the following characteristics (*61*):

— demonstrated effectiveness in reducing body weight and weight-dependent disease;[1]
— tolerable and/or transient side-effects;
— no addictive properties;
— remains effective when used long-term;
— no major problems after many years of administration;
— known mechanisms of action(s);
— reasonable cost.

Ephedrine and caffeine combination. Data from a study by Astrup et al. (*62*) demonstrate the sustained effects of ephedrine in combination with caffeine on body weight when administered with a restrictive diet over a 1-year period. Although ephedrine and caffeine have thermogenic effects, around 75% of weight loss was attributed to the anorectic properties of this combination.

Tetrahydrolipstatin. Tetrahydrolipostatin is a pancreatic lipase inhibitor developed specifically for weight management. It blocks the cleavage of triglycerides in the gastrointestinal tract and thereby prevents

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[1] Details of safe and efficacious dosages are beyond the scope of this report; appropriate medical references should be consulted. Drug approval agencies such as the Food and Drug Administration in the USA require drugs to produce at least 5% greater weight loss than a placebo, or to result in significantly more subjects achieving a 5–10% weight loss than can achieve a similar loss with a placebo.

the absorption of up to 30% of ingested dietary fat (*63*). Undigested fat is excreted unchanged in the faeces, causing an increase in intestinal side-effects (such as fatty/oily stools, abdominal pain and flatulence) especially if the ingested diet has a high fat content. Tetrahydrolipostatin has been shown to produce dose-dependent weight loss with improvements in total and LDL cholesterol and glucose tolerance in short-term trials (*64, 65*). It does not have the CNS side-effects of centrally acting drugs, but concern has been raised about the possibility of carotenoid malabsorption with extended use.

Phentermine. Phentermine acts as an anorexiant agent and original reports indicated good short-term weight loss when the drug was used in continuous or intermittent therapy for periods of up to 36 weeks (*66, 67*). However, side-effects such as insomnia, irritability, agitation, tension and anxiety occur in some patients and limit its use. There have been few recent trials of phentermine as a single anti-obesity agent and its widest use was in combination with fenfluramine before this agent was withdrawn from the market.[1]

Sibutramine. Sibutramine is a new drug developed for the treatment of obesity that combines the beneficial effects of serotonergic and adrenergic drugs. Controlled trials in obese patients have shown consistent results, and dose-related weight loss (at the optimum drug dose of 10–15 mg daily) was maintained for up to 12 months (*68, 69*). Weight loss is accompanied by a reduction in waist : hip ratio and by improvements in blood lipids and glycaemic control (*70*). Side-effects of sibutramine are moderate, and include nausea, dry mouth, constipation, dizziness and insomnia. Small increases in blood pressure and heart rate have also been reported in patients taking sibutramine, suggesting that these parameters need to be closely monitored. However, in longer trials, blood pressure has been shown to decrease with loss of weight in sibutramine-treated groups (*71*).

Drugs not appropriate for treatment of obesity per se
A number of drugs have a history of inappropriate and unsafe use for the promotion of weight loss (*58*). Diuretics, human chorionic gonadotropin (HCG), amfetamine, dexamfetamine and thyroxine are not treatments for obesity and should not be used to achieve weight loss. Thyroxine should never be prescribed for obesity, only

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[1] Concerns about the possible side-effects (heart valve problems) associated with the use of fenfluramine and dexfenfluramine, either alone or in combination with phentermine, led to the withdrawal of these drugs from the market.

for biochemically proven hypothyroidism. Metformin and acarbose may be useful in the management of obese NIDDM patients but have no proven efficacy for obesity alone.

Fluoxetine, serraline and other selective serotonin reuptake inhibitors have a legitimate use in the treatment of a depressive condition associated with obesity but not for obesity itself. They may help some patients lose weight and are preferred to tricyclic agents for overweight depressed patients. Fluoxetine is licensed in certain countries for the management of bulimia nervosa.

Appropriateness of long-term drug treatment

While the clinical tolerance of most drugs appears to be acceptable, their long-term use raises some safety concerns. The importance of this issue has been highlighted by the recent reports of heart valve problems in a small number of patients taking fenfluramine and dexfenfluramine (72).

As with drugs prescribed for long-term treatment in other chronic diseases (e.g. hypertension, NIDDM), the risk associated with long-term drug use for weight management must be weighed against the potential benefits for each individual. In addition, weight-management drugs should be withdrawn in poor responders after 1–3 months of evaluation. Preliminary research suggests that it is possible to identify patients at an early stage of treatment who are most likely to respond (71). However, more research is needed before criteria can be recommended. Long-term outcomes also need to be assessed.

Comparative trials are necessary as new drugs are introduced for therapy, particularly with regard to reduction in comorbidities.

10.5.5 Gastric surgery

Surgery is now considered to be the most effective way of reducing weight, and maintaining weight loss, in severely obese (BMI >35) and very severely obese (BMI >40) subjects. On the basis of cost/kg of weight lost, surgical treatment has been estimated, after 4 years, to be less expensive than any other treatment (estimates cited in reference 73).

Surgical procedures

A variety of different surgical methods are available for the treatment of obesity, generally based on restriction of energy intake, on malabsorption or maldigestion of food, or on a combination of both. It is now agreed that vertical-banded gastroplasty and Roux-en-Y gastric bypass are effective and safe, with follow-up of 15 years or more in some series. The full evaluation of long-term safety and efficacy of biliopancreatic bypass and laparoscopic adaptations of restrictive

(e.g. adjustable banding) and combined procedures is still awaited. Intestinal bypass surgery is no longer recommended as a primary surgical method of treating obesity (16, 74).

Patient selection

Patients should be selected for surgery in accordance with the following principles:

- Non-surgical treatment including dietary measures and weight-reducing drugs should be tried first.

- Gastrointestinal surgery for obesity should be used only on well informed and motivated patients with acceptable operative risks.

- Patients should have a BMI >40, or >35 together with high-risk, life-threatening comorbid conditions.

- Surgery should be undertaken only by an experienced surgeon in an appropriate clinical setting under expert medical surveillance, and with access to ventilator facilities and the support of a multidisciplinary team.

Improvements after surgery

Weight loss of more than 20 kg generally occurs within 12 months of operations, although some weight is regained within 5–15 years. Analysis of the results of the SOS study in Sweden showed weight losses of 30–40 kg over 2 years depending on the surgical procedure used (75).

Gastric bypass surgery ameliorates obesity-related morbidity in the majority of obese patients. In the SOS study, surgical treatment produced remission of NIDDM in 68% of obese patients and of hypertension in 43%. For those who did not have risk factors at baseline, a 30-kg weight loss was associated with a 14-fold risk reduction for NIDDM, and 3–4-fold risk reductions with respect to the development of hypertension and other cardiovascular risk factors (75). In addition, surgical treatment has been shown to prevent progression of impaired glucose tolerance to NIDDM (76) and to reduce mortality from diabetes 4–5-fold.

Quality of life measures, including employability, median wage, number of sick days, social interaction, mobility, self-image, assertiveness and depression, are also improved in the majority of patients after antiobesity surgery. Recently, patients in the surgical intervention group of the SOS study reported marked improvements in social interaction, perceived health, mood, anxiety, depression and obesity-specific problems compared with controls (75).

Risks associated with surgery

Risks associated with gastric surgery include micronutrient deficiencies, neuropathy, postoperative complications, "dumping syndrome" and late postoperative depression *(74)*. It has been suggested, however, that most of the complications associated with this type of surgery, unlike most other surgery, are treatable with behavioural therapy. Kral *(77)*, for example, notes that the vomiting seen in approximately 10% of patients after surgery is due more to eating behaviour than to stenosis or stricture of the gastroplasty stoma.

Operative mortality in experienced centres is a fraction of the mortality observed in unoperated patients and in those remaining on waiting lists for operations.[1]

Liposuction of unwanted subcutaneous fat depots is being used extensively for cosmetic reasons but offers no medical benefit in terms of comorbidities linked to obesity.

10.5.6 *Traditional medicine*

Many countries have traditional medical systems that provide treatment in addition to, or in place of, conventional medical services. Traditional treatments for a range of illnesses, including obesity, are often available and are commonly used by people in developing countries. Although there are limited data on the efficacy of the medicines used, there is anecdotal evidence of their potential value. For example, some preparations of plant products containing capsaicin have been shown to increase energy expenditure by increasing thermogenesis *(78)*. More research is required to evaluate the potential use of such traditional remedies.

Caution is necessary, however. A variety of herbal preparations widely promoted by commercial organizations as traditional remedies have been shown to be of little medical value and, in some cases, to contain dangerous substances.

10.5.7 *Other treatments*

A number of other treatments have been promoted as effective in the management of weight but very little objective research has been done on them. In uncontrolled trials, acupuncture and yoga have been shown to assist weight loss, and an assessment by Rand & Stunkard indicates that support from psychoanalysts can produce weight loss

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[1] Kral JG. Surgery. In: Guy-Grand B, ed. *Management of obesity and overweight,* 1996. Background paper prepared by Obesity Management subgroup of International Obesity Task Force.

and maintenance in their patients (79). There is no evidence that hypnotherapy for obesity is any more effective in the long term than the usual diet and behavioural treatment programmes (80). However, hypnosis may improve self-image and possibly help patients to adhere to a prescribed diet (81).

10.6 Management of obesity in childhood and adolescence

The objectives of weight-management strategies for children differ from those for adults because consideration needs to be given to the physical and intellectual development of the child. Whereas adult treatment may target weight loss, child treatment targets the prevention of weight gain. Lean body mass increases as children age, so that reducing fat mass or keeping it constant will result in a normalization of body weight.

The treatment of obese children to prevent them from becoming obese adults can be classified as targeted prevention (see section 8), because childhood obesity substantially increases the risk of adult obesity (see section 7). Treatment of childhood obesity should therefore be considered together with selective preventive strategies aimed at high-risk groups of children as well as part of a universal approach to the community-wide prevention of childhood obesity.

10.6.1 *Evidence that treatment of childhood obesity prevents later adult obesity*
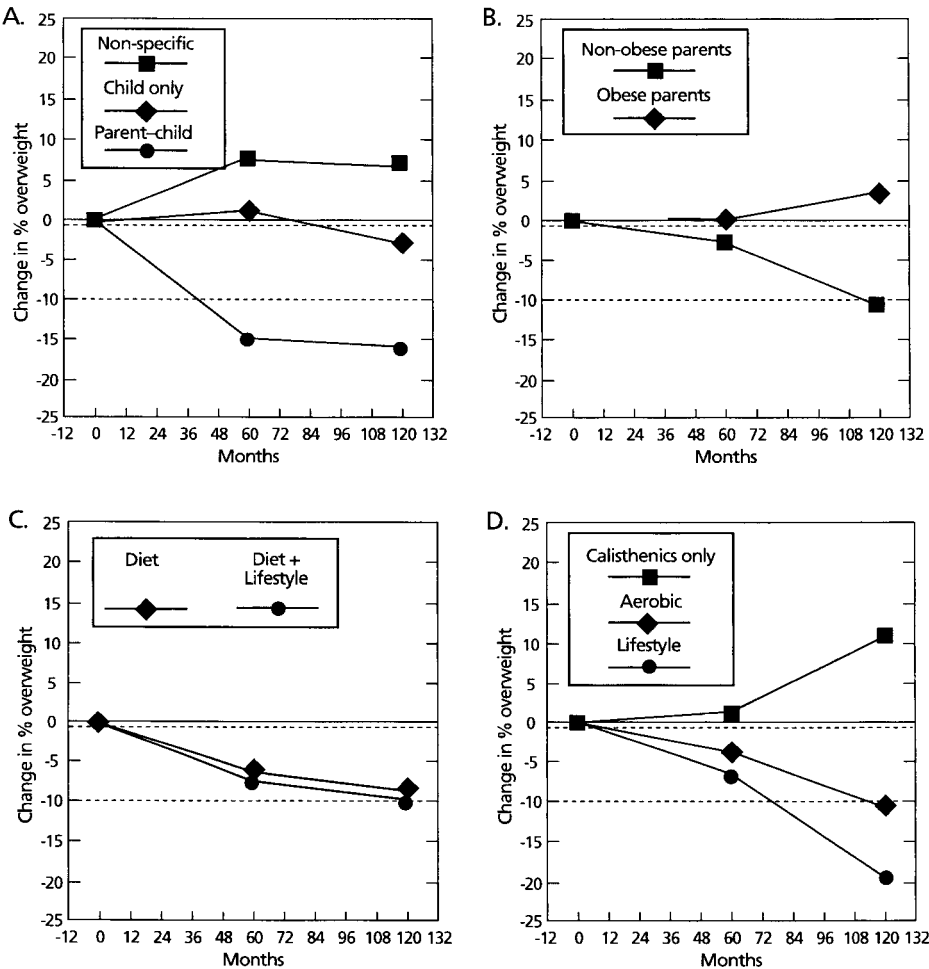
Evidence that the treatment of obesity in children can be successfully managed over the period from childhood through adolescence to adulthood is provided by the work of Epstein and colleagues. In a series of four studies, data from 158 families with children at high risk for significant adult obesity were followed up 10 years after their initial treatment. At the time of the initial treatment, the children were between 6 and 12 years of age, averaged 40–50% overweight and, with the exception of one study group, had at least one obese parent. Different treatment conditions were investigated but all involved a diet plan together with intensive group behaviour modification over an 8–12 week period, followed by monthly maintenance sessions for 6–12 months (55).

After 10 years of follow-up, six out of nine actively treated groups showed a net reduction in percentage overweight of between 10% and 20% (Fig. 10.3). Inclusion of a parent with the child in treatment and introduction of exercise into the basic diet and behaviour change programme enhanced the long-term effects.

It may be premature to make broad generalizations about the efficacy of obesity treatment in children, especially as it may not always be

Figure 10.3
Changes in percentage overweight after 5 and 10 years of follow-up for obese children randomly assigned to 10 interventions across four studies[a]

WHO 98278

The 95% confidence interval for the total sample of children is represented by dotted lines. The interventions all contained a diet and behavioural change component plus the specific approaches under investigation. In the four separate studies in which Epstein et al. examined the impact of different interventions for obesity management in overweight children, all had the same basic diet and behavioural change intervention for 8–12 weeks and monthly review for 6–12 months. Study A compared results for children alone, children with one parent, and nonspecific directions. Study B compared relative weight changes in children of obese and non-obese parents. Study C examined the benefit of adding lifestyle (unstructured exercise) to a diet programme. Study D compared the effectiveness of different forms of exercise in aiding weight control. Both children and parents were followed up 5 and 10 years after the initial programme. The results show excellent long-term benefits and demonstrate the value of family support and a positive family environment and the value of unstructured exercise in weight control in children.

feasible to provide the high level of support given in the studies mentioned above, and the children in these studies were recruited from largely white, middle-class, two-parent families. However, they provide grounds for optimism in that comprehensive behavioural treatments appear to offer enduring benefits to obese children. A longitudinal trial to determine whether results like those achieved by Epstein and colleagues can be replicated at other sites and in other populations, and whether tangible health benefits, in both the health and social domains, can be demonstrated, would be highly desirable.

10.6.2 Treatment of overweight and obese children

Overweight and obesity during childhood are among the major risk factors for the development of obesity in adulthood, since approximately 30% of obese children become obese adults (82). Childhood obesity affects health, resulting in reduced fitness, increased blood pressure and adverse blood lipid levels (see section 4). In addition to the immediate health effects, obesity in adolescence increases the risk of adult morbidity and mortality 50 years later, independently of the effects of adult obesity (83, 84). These are powerful reasons for developing effective obesity therapies for children.

Reducing energy intake and improving dietary quality
It is generally recommended that only small reductions in energy intake should be made in the diet of the overweight child, as an adequate intake of both energy and nutrients is required by children to ensure that normal growth and development are not compromised. Treatment is recommended only for children over 6 years of age.

Limiting portion sizes of energy-dense foods is a useful method of reducing energy intake in obese children. This can be achieved by preparing and serving smaller quantities of such foods or by encouraging free consumption of fruits and vegetables so that energy density is reduced without imposing dietary restrictions. However, only limited data support the suggestion that an increased variety of food intake results in a decreased intake of energy-dense foods (85).

Limiting take-away and ready-prepared foods, which tend to be particularly high in fat and energy-dense, may also help to control energy intake. These foods are making increasingly large contributions to the energy intake of children and adolescents around the world (86–88). Children should also be encouraged to eat fewer high-fat snacks, and to avoid obtaining a large proportion of total energy from sweetened beverages or even to choose unsweetened drinks or water. One study on prepubertal children in which an attempt was made to reduce fat intake over 12 months did not achieve weight loss

or reductions in weight gain in the target group despite achieving some dietary change (*89*). However, the children concerned were not obese.

Promoting the consumption of food high in complex carbohydrates, low in fat and low in energy density is likely to be important in preventing excessive energy consumption in children. It is important to encourage all children, whether overweight or not, to adopt healthy eating habits from an early age and to continue them into adulthood.

Increasing physical activity

Research on the value of exercise in treating childhood obesity is very limited, and much remains to be elucidated, particularly in relation to the long-term benefits of physical activity in the control of weight through childhood and adolescence. Available evidence suggests that exercise alone is not sufficient for the effective management of childhood obesity, and that a combination of diet and exercise is more effective for long-term control (*90*).

All children should be encouraged to be as active as possible. However, it appears that energy expenditure can be increased more effectively through increased general activity and play rather than through competitive sport and structured exercise (*90*). Obese children are particularly sensitive to peer attitudes towards body shape and exercise performance, and have the same problems as adults in adhering to long-term exercise programmes. Since this tends to limit their willingness to be involved in team sports (*91*), it is likely to be counterproductive to pay too much attention to the reintroduction of competitive sports at schools to improve the poor levels of physical activity in schoolchildren.

Some of the methods that have been used to improve adherence to exercise programmes in adults may be equally useful for children. These include making the activity enjoyable by increasing the choice of type and level of activities, as well as by providing positive reinforcement of their achievements during exercise rather than only after the successful completion of the exercise session (*90*).

Increasing physical activity in children is associated with benefits other than raising energy expenditure. For example, being active may compete with snacking and thereby make adherence to a diet easier. In addition, resistance training may have effects on body composition that complement, or are superior to, those of aerobic exercise alone; resistance training will lead to an increase in lean body mass, thus increasing metabolic rate and total daily energy expenditure, and may

have positive effects on body image (90). Thus, although improvement in aerobic fitness is likely to be beneficial, it should not be an overriding concern.

Reducing time spent in sedentary behaviour

New research is beginning to indicate that the amount of time spent in sedentary behaviour or inactivity may play an even more important role than low levels of physical activity in the genesis of children's weight problems. The rapid rise in overweight in childhood has been accompanied by an explosion of non-active leisure pursuits for children such as computer and video games. Television is the principal cause of inactivity for most children and adolescents in developed countries and has been linked to the prevalence of obesity (92, 93). Television viewing is also associated with increased intake of high-energy snacks (93, 94). It is of particular interest that the study by Epstein et al. (95) clearly showed that short-term weight losses were greater in a group of children who were instructed to reduce sedentary behaviour than in children who were encouraged to increase exercise. Reducing physical inactivity also resulted in improved maintenance of weight loss and a more positive attitude towards vigorous activity.

Role of drugs and surgery

Limited information is available on the use of aggressive forms of treatment such as drugs and surgery for children and adolescents, although such treatment may be indicated in children with potentially fatal complications of obesity.
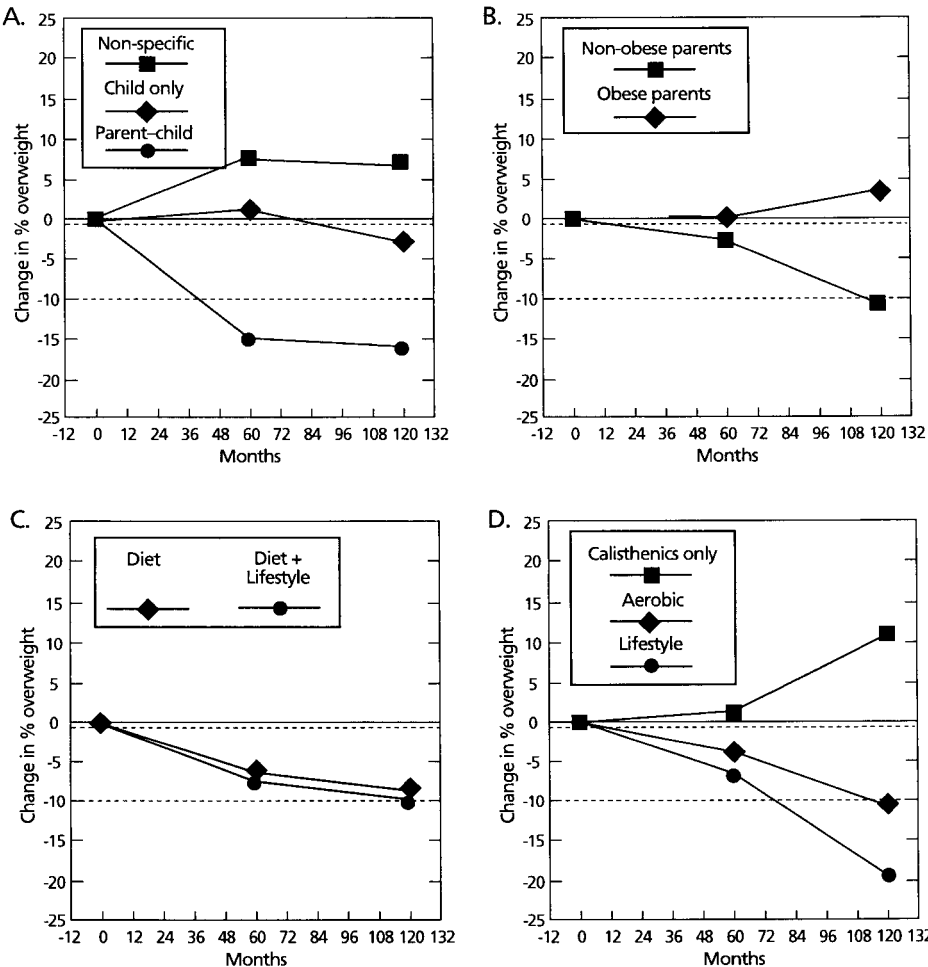
10.6.3 Obesity-management programmes for children

Three main types of obesity-management programmes aimed at children can be identified — family-based, school-based, and primary-care-based programmes. These are considered in detail in the following paragraphs.

Family-based programmes

As the family environment is one of the strongest influences on a child's risk of obesity, a logical setting for childhood obesity prevention and management would appear to be the families of susceptible children. Indeed, the provision of appropriate education on eating and lifestyles to parents has been shown to significantly reduce the prevalence of obesity in children of participating families for periods of 3 months to 3 years when compared with families not receiving advice and support (96). Parental attitudes, purchase and presentation of food, modelling of eating and exercise habits, and support

Figure 10.3
**Changes in percentage overweight after 5 and 10 years of follow-up for obese
children randomly assigned to 10 interventions across four studies[a]**

WHO 98278

The 95% confidence interval for the total sample of children is represented by dotted lines.
The interventions all contained a diet and behavioural change component plus the specific
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same basic diet and behavioural change intervention for 8–12 weeks and monthly review for
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nonspecific directions. Study B compared relative weight changes in children of obese and
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support and a positive family environment and the value of unstructured exercise in weight
control in children.

[a] Adapted from reference *55* with the permission of the publisher and authors. Copyright 1994
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feasible to provide the high level of support given in the studies mentioned above, and the children in these studies were recruited from largely white, middle-class, two-parent families. However, they provide grounds for optimism in that comprehensive behavioural treatments appear to offer enduring benefits to obese children. A longitudinal trial to determine whether results like those achieved by Epstein and colleagues can be replicated at other sites and in other populations, and whether tangible health benefits, in both the health and social domains, can be demonstrated, would be highly desirable.

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for active leisure pursuits can all affect a child's eating and exercise pattern.

Strong evidence for the important role of family support in childhood obesity and weight-management programmes comes from a number of successful interventions. Flodmark et al. found improved weight loss or weight maintenance in children aged 10–11 years treated with family therapy when compared with those treated alone (97), and Wadden et al. obtained similar results in African-American teenage girls (98). A more detailed analysis by Epstein et al. (55) suggested that weight regulation is improved if at least one parent is treated together with the child. When the effect of targeting an overweight child alone was compared with that of targeting a child and a parent together, the latter showed significantly less weight gain at 5 years follow-up, and were still below the relative weight (weight corrected for height) at which they started the study at 10 years follow-up (Fig. 10.3B). Furthermore, children of non-obese parents were better able to obtain and maintain reductions in relative weight (Fig. 10.3C). Epstein's findings are especially important because relative weight was maintained throughout adolescence when weight gain can be a major problem. Other investigators have also found improved effectiveness of family-based programmes in preventing the progression of childhood obesity.

By targeting obesity-prevention measures on the family of susceptible children there is the added advantage that all members of the family are likely to benefit. This helps to increase social support and to reduce the feelings of isolation that may develop when one child is treated separately from the rest of the family. In addition, parents are able to exert a higher degree of external control over the child's eating and activity patterns under these circumstances (54).

School-based programmes

The introduction of obesity-prevention programmes in schools is justified for a number of reasons. A large proportion of children attend school (although this percentage varies from country to country) and much of a child's eating and exercise takes place in this setting. Schools can also assist in identifying children who may be at risk of obesity through educational programmes and visits to the school doctor at key developmental stages. Furthermore, the start of schooling corresponds to a period of increased risk for excessive weight gain as children begin to become independent and vary their diet and activity patterns in line with their new circumstances.

The results of various school-based obesity-intervention programmes targeting high-risk children and adolescents suggest that these can

be successfully implemented and can reach substantial numbers of children in need of obesity prevention (99–101). Obese children in treatment groups have consistently shown greater reductions in percentage overweight than untreated obese controls. Results over periods of 3–6 months are modestly encouraging and would seem to justify additional research in this area.

Increasing physical activity through integrating regular exercise programmes into school curricula is a strategy that has often been suggested as an effective means of improving the weight and health status of children (102, 103). The evaluation of a 2-year project in South Australia, where a 50-minute session of daily physical activity was introduced into a number of primary schools, demonstrated that children who took part in the programme were fitter, slimmer and had lower diastolic blood pressure (boys only) than their non-participating counterparts (104). A subsequent study in which classroom lessons on nutrition and physical health were included was also able to demonstrate improvements in indices of fitness and body fat levels (105). Similar programmes have been introduced in schools in the USA (90) and Singapore (106), where short-term results appear promising. However, despite these beneficial results, the maintenance of these programmes within the school curricula in the long term has proved difficult due to competition for school time, the need for teacher/adult supervision, and financial limitations.

Primary-care-based programmes
The delivery of childhood obesity-management programmes through primary care has received little formal assessment so far, and its potential role appears to be undervalued and underutilized (16). One general practice in the United Kingdom has had some success in reducing obesity by providing healthy eating advice to pregnant women and their children. Obesity prevalence was only 2% within the patient sample compared with 8% among patients who did not receive advice (5).

Frequent contact with health professionals from an early age has been identified as one of the most important strategies for the effective management of overweight and obese children, which suggests that similar strategies might be equally effective in prevention (107). Regular assessment and contact through home visits provide an excellent opportunity for education about the potential lifestyle risk factors associated with obesity, as well as for advice, encouragement and support to help parents to adopt healthy household eating and exercise patterns at an early stage in life. It has been suggested that obesity prevention should start with appropriate advice about breast feeding,

weaning and diet for toddlers (*108*). In many countries, child health nurses already play a crucial role in monitoring the development of infants and young children.

Special considerations in the management of childhood obesity
The value of prudent attempts to prevent excessive weight gain in normal-weight children, or to reduce weight gain in children who are already obese, is evident. Consideration of the following issues is of vital importance when developing interventions aimed at preventing or treating obesity in young children.

- *Risk of malnutrition.* As adequate nutrition is essential for promoting healthy growth, only small reductions in overall energy intake are recommended where such an approach is advised.

- *Risk of eating disorders.* It is important that interventions do not encourage the type of dietary restraint that has been linked to the development of eating disorders and other psychological problems (*54*).

- *Risk of isolation.* It is important that overweight children are not ostracized and made to feel any more different from their peers than is necessary, either at home or at school (*84*). The message that everyone is potentially at risk of obesity may help, but there is also a need to generate family awareness of the need for healthier lifestyles without suggesting that the one and only goal is to lose weight.

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