Section D

Addressing the problem of overweight and obesity

8 THE PRINCIPLES OF PREVENTION AND MANAGEMENT OF OVERWEIGHT AND OBESITY

8.1 Introduction

There can be no doubt that obesity is a serious public health problem requiring immediate action. The escalating rates and global prevalence of obesity have been highlighted in Section A while the impact of this problem on the health and well-being of individuals and communities, together with the financial burdens, have been documented in Section B. If the problem of obesity is to be tackled in a comprehensive and progressive manner then it is essential that the factors implicated in its development set out in Section C are attended to. Section D looks at addressing the problem of overweight and obesity and outlines the different levels of action that need to be considered in the development of coherent and comprehensive prevention and management strategies to deal with overweight and obesity at local, national and international levels.

Although there is still much to be determined about the complex and diverse factors involved in the etiology of weight gain and obesity, the current level of understanding is quite detailed and provides firm principles for addressing the issue of prevention and management of obesity. It is now understood 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 explaining excessive weight gain which, if corrected, can serve to prevent obesity.

The effective prevention and management of obesity needs to focus on:

- Those elements of the social, cultural, political, physical and structural environment which 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 co-morbidities.

- Management protocols for those individuals with existing obesity.

It is also important to recognize that, in many societies, an undue focus 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 careful to avoid precipitating the development of eating disorders associated with undue fear of fatness, especially in young adolescent girls. Interventions should also be careful to discourage other unhealthy behaviours, for example cigarette smoking, which may be adopted in the belief that they will prevent weight gain.

This chapter examines the principles behind prevention and management strategies of 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 through a variety of settings and shared responsibility by key stakeholders. Major points include:

- Coherent and comprehensive strategies for the effective prevention and management of obesity need to focus on:
  - Those elements of the environment that affect the weight status of the community or population at large.
  - Those individuals and groups who are at particularly high risk of obesity and its co-morbidities.
  - Management protocols for those individuals with existing obesity.
- Obesity management encompasses a spectrum of four key strategies:
  - Prevention of weight gain.
  - Promotion of weight maintenance.
  - Management of obesity co-morbidities.
  - 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 addressed this area directly.
- Obesity prevention is not simply a case of preventing normal weight individuals from becoming obese. It also considers the prevention of overweight in normal weight 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.
- Prevention interventions for obesity can be usefully classified according to three levels:
  - 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).

    This replaces the more traditional classification of disease prevention, which can be confusing when applied to a complex, multifactorial condition such as obesity.

- A preliminary analysis of obesity management approaches through existing national health care services in a range of countries 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.

- 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. Harmonizing national food and nutrition policies and public health policies should integrate obesity with NCD control programmes.

8.2 The spectrum of strategies for addressing the problem of overweight and obesity

Until recently, obesity prevention and obesity management were perceived as two distinct processes with the former aimed at preventing weight gain and the latter focused on weight loss. Management was seen as the role of the clinician, whereas prevention strategies were considered to be the domain of health promotion or public health departments. However, it is now realized that the process of obesity management covers a spectrum of strategies ranging from prevention, through weight maintenance and management of obesity co-morbidities, to weight loss (see Figure 8.1). The elements of this spectrum are interdependent, so truly effective obesity management strategies will need to address all elements in a coordinated manner through 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 concerning obesity management. However, as Figure 8.1 highlights, considerably more attention needs to be given to prevention activities than at present, as these are likely to have a much greater impact on the effective long-term control of obesity.

Figure 8.1 The spectrum of obesity management

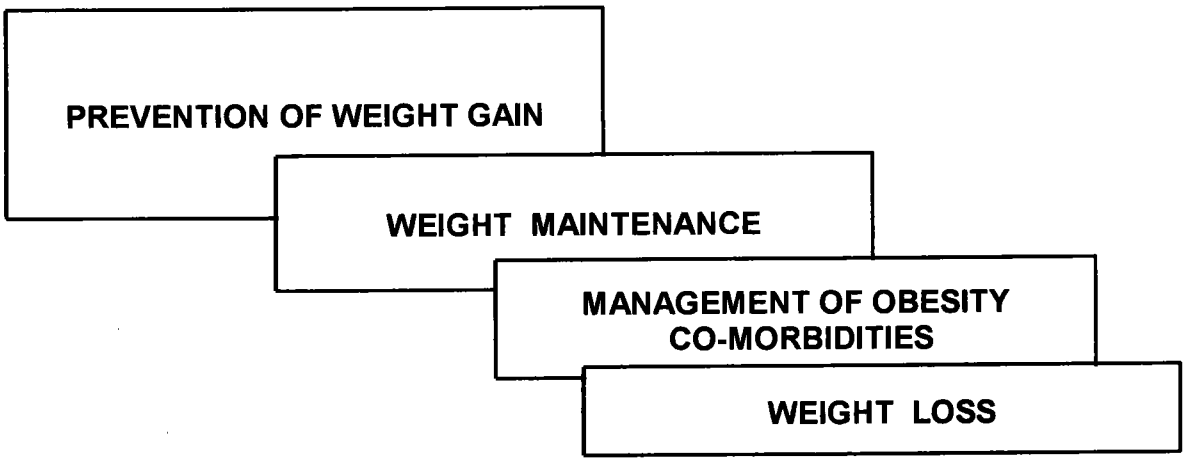


Figure 8.1 This diagram illustrates the broad range of overlapping activities which should be considered integral to obesity management. The size of each element indicates its relative contribution to effective control of obesity.

8.3 Prevention strategies

8.3.1 The rationale

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 strategies aimed at treating obesity after it has fully developed.

- Obesity develops over time and, once it has, is difficult to treat. Indeed, a number of analyses have identified the failure of many obesity treatments to achieve long-term success *(1–9)*.

- The health consequences associated with obesity result from the cumulative metabolic and physical stress of excess weight over a long period and may not be fully reversible by weight loss *(10,11)*.

- 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 *(12)*.

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

8.3.2 The evidence for effectiveness

Despite the strong rationale behind prevention strategies outlined above, there has been little comprehensive research addressing the question of whether such strategies would be effective. Indeed, only two studies have so far been specifically aimed at preventing weight gain in adults, and short-term results from these are insufficient to inspire confidence in the ability to prevent obesity *(13,14)*. Furthermore, the fact that obesity rates are rising rapidly and unchecked in almost all areas of the world casts doubt over 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. This 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 throughout the world, the extent of such increases in body weight often vary 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 revealed that men and people in higher social classes exhibited much smaller increases in body weight between 1976–1980 than women and people in lower social classes *(15)*. A similar analysis in Finland also found lower rates of increase in mean BMI from 1972–1992 in the most highly educated groups *(16)*. In fact, in some areas of Finland, the average BMI has actually fallen after 1987 in men in the groups of highest and lowest education, and the rates of increase in mean BMI in women of 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 Figure 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 explosion in obesity rates has mirrored similar epidemics in NCDs such as CHD, which are now abating in countries where preventive strategies to deal with these conditions have been adopted. Comprehensive obesity prevention programmes have been introduced very recently in Singapore and a few other countries, but not enough time has yet elapsed to be able to evaluate their sustained success.

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 *(15)*

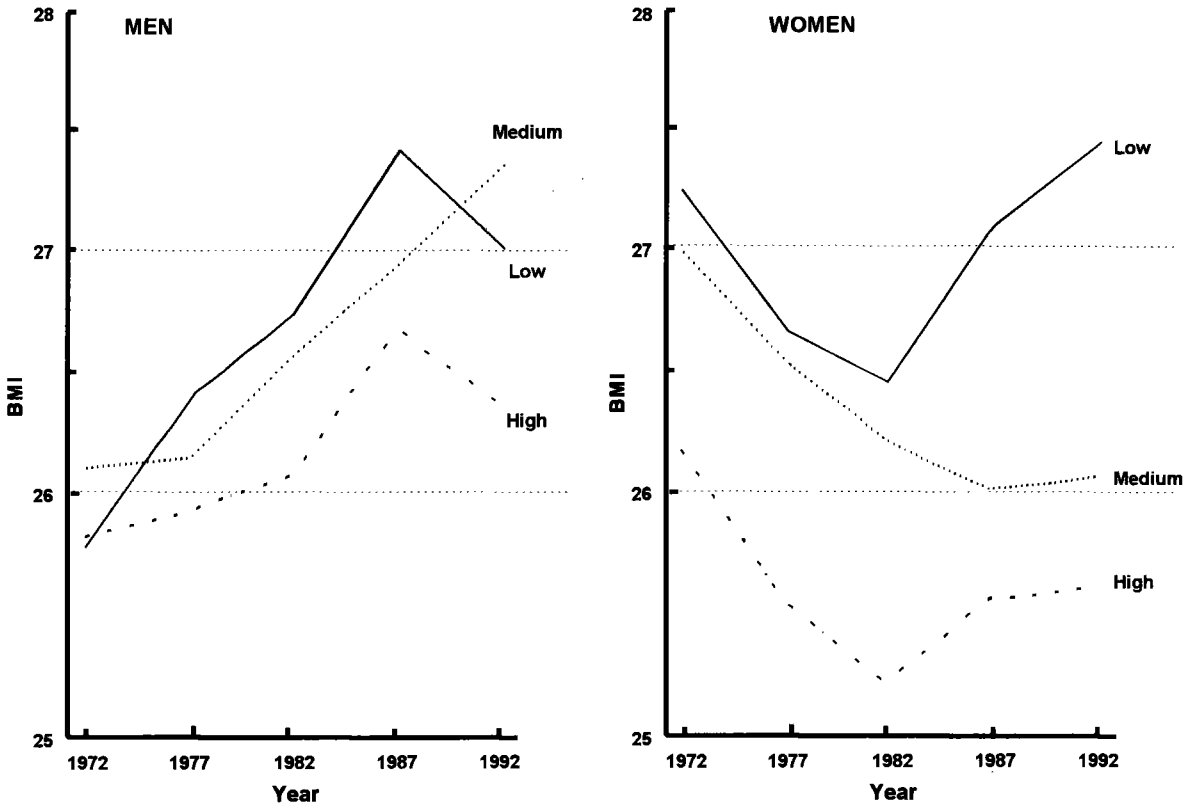


Figure 8.2 shows that the mean BMI of Finnish men from low- and high-education groups has actually declined from a peak in 1987. In Finnish women, the mean BMI declined until 1982 but increased afterwards. Although this increase appears to be levelling off in women from high- and medium-education groups, continues rapidly in low-educated 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.

Finally, a number of researchers *(17–20)* have shown that effective management and support of overweight and obese children can significantly reduce the number of children who carry this weight problem into 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 studies where 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 pre-study body weight *(20)*.

8.3.3 The aims

It is important to recognize that the concept of obesity prevention is not simply a case of preventing normal-weight individuals from becoming obese. It encompasses a range of prevention 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.

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

8.3.4 Levels of preventive action

The use of the traditional classification system for prevention, which is organized into primary, secondary and tertiary interventions, often results in a great deal of ambiguity and confusion, especially among clinicians. Under this scheme the objective of primary prevention is to decrease the number of new cases (incidence); secondary prevention is to lower the rate of established cases in the community (prevalence); and tertiary prevention is to stabilize or reduce the amount of disability associated with the disorder. This system was originally developed to describe actions in relation to acute conditions with an identifiable, unifactorial cause but is more difficult to apply to preventive actions associated with a complex, multifactorial condition. As a result attention has usually focused on individual risk factors when applying this classification system to a multifactorial condition such as CHD. Thus, primary prevention of CHD has involved national programmes to control blood cholesterol levels, secondary prevention dealt with reducing further risks in those with existing CHD and elevated blood cholesterol levels, and tertiary action has been associated with preventing re-infarction in those who have had a previous heart attack.

Similar problems arise when attempting to apply this classification system to obesity prevention. For example, it is not clear whether primary obesity prevention refers to the prevention of overweight people from becoming obese, or whether this is secondary prevention. Nor is it clear whether tertiary prevention is concerned with the prevention of established obesity from becoming more severe, or rather with the control of co-morbid conditions such as hypertension.

More recently, an alternative classification system for prevention strategies aimed at chronic multifactorial conditions such as obesity has emerged *(21,22)*. This is based on the level of intervention rather than on the target outcome. A modified version of this concept defines three levels of prevention (Figure 8.3):

- ***Universal/public health prevention*** (directed at everyone in the population).

- ***Selective prevention*** (directed at subgroups of the population with an above-average risk of developing obesity).

- ***Targeted prevention*** (directed at high-risk individuals who may have a detectable amount of excess weight but who are not yet obese).

In this new scheme, prevention is used to describe only those actions that occur before the full development of the condition. Many actions concerned with reducing the disability associated with obesity, previously classified as tertiary prevention, are redefined as maintenance interventions.

Figure 8.3 Levels of prevention measures

Figure 8.3 represents 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 core, the selective preventive approach directed at high-risk individuals and groups is represented by the middle layer, and the broader universal or population-wide prevention approach is represented by the outer circle.

Universal or public health prevention

Universal 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 issue in dealing with a problem of extremes in weight is a reduction in the mean weight of the population. The association between the mean level of BMI and the prevalence of obesity is discussed in Chapter 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 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 those who may be at low risk to make changes similar to those at high risk *(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 a high risk of developing obesity. High-risk subgroups (identified in Chapter 7) possess genetic, biological or other factors which have been associated with increased risk for obesity. This risk may be acute as in the case of certain vulnerable life stages, or it may be a life-long concern such as a genetic predisposition to weight gain.

Selective prevention strategies may be initiated through schools, colleges, worksites, community centres, shopping outlets and primary care, or through any appropriate setting which allows access to high-risk groups. Selective prevention is concerned with improving the knowledge and skills of groups of people to allow them to deal more effectively with the factors which put them at a high risk of developing obesity.

Targeted prevention

Targeted prevention deals with individuals who are already overweight or showing biological markers associated with excessive fat stores but who are not yet obese. These are high-risk individuals, and failure to intervene at this stage will result in many of these people becoming obese and suffering the associated ill-health consequences in the future.

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

8.3.5 Integrating obesity prevention into other noncommunicable disease prevention efforts

Several factors suggest that there is much to be gained from integrating the objectives of obesity prevention into the strategies and programmes set up to tackle broadly other NCDs. First, overweight and obesity are important contributors to the risk of several NCDs, with health risks extending as a continuum over the full range of excess body weight. When obesity and overweight co-exist with other NCD risks, the effect is multiplicative (Chapter 4). Second, dietary modification and PALs are key determinants of the preventive programmes for both obesity and NCD prevention, and a number of countries have existing NCD prevention programmes which deal with issues that are pertinent to obesity prevention.

In fact, WHO has repeatedly emphasized the global importance of obesity and other NCDs arising during periods of economic transition. Over the last 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. These embrace the WHO philosophy and concept of the cost- and health-effectiveness of such an approach to NCD prevention and control, particularly in the face of the dilemma of funding priorities caused by the re-emergence of devastating communicable diseases such as AIDS, the Ebola virus and tuberculosis.

In developed countries, overweight and obesity predominate in the socioeconomically disadvantaged segments of the population. Public health measures to control NCDs are still inadequate and equity considerations make the evolution of such policies a high priority. The prevention of obesity, in parallel with existing efforts to control other risk factors for NCDs, would be expected to provide better control of NCDs. However, it is important that such strategies focus more on obesity *per se* rather than treating obesity as just another risk factor for NCDs.

In developing countries, where nutritional deficiency disorders and the emerging epidemic of NCDs demand concurrent attention, strategies that integrate public health action 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 be easily exhausted by the need for expensive and technologically intensive curative care, especially in transitional societies. Furthermore, the anticipated reversal of the social gradient associated with the NCD epidemic will pose insurmountable problems of equity and access to health in those societies.

8.4 Dealing with individuals with existing overweight and obesity

Although a focus on 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 those individuals who are currently obese. As indicated in Chapter 3, this segment of society is alarmingly high in most developed and many developing countries. Effective management strategies to deal with these individuals require coordinated and programmed care offered throughout the community and health care services which concentrate on weight maintenance, management of obesity co-morbidities and weight loss.

8.4.1 The current situation

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

A preliminary survey by Deslypere *(25)* examined obesity management approaches through existing national health care services in Australia and in representative countries from South America, South-East Asia and Europe. It revealed a wide variation in obesity care services between countries and indicated that very few countries have a coherent and comprehensive range

of services capable of providing the level of care required to effectively manage obese patients. This situation is in stark contrast to other chronic diseases such as NIDDM and CHD, where integrated care is frequently provided with specialist services supporting the defined management practices that are implemented through primary health care services.

The Czech Republic, where a five-year plan for the prevention and management of obesity has been established, provided a welcome exception to the rule *(26)*. 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 co-morbidities is treated in obesity outpatient clinics. Severely obese patients are referred to specialist university obesity clinics. Internists receive post-registration training in the care of obese patients, and an obesity management handbook has been prepared for nurses and another is under development 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 about obesity

Several studies have concluded that family doctors and other primary health care professionals have incomplete, confused and occasionally incorrect knowledge of obesity and nutritional issues *(27–29)*. Often the basics of weight control are understood, but confusion abounds in relation to how best to manage and advise patients or the public *(30)*. Certain genetic and metabolic disorders which lead to the development of obesity are often given undue prominence in discussions in medical textbooks about weight gain and 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 to be the most reliable and credible source of health information by the general public *(31)* and are consulted for weight loss more often than any other health professional *(32)*. Obesity is not a common subject in the pre-qualification training of health care workers *(33–35)* and opportunities for post-registration update training are usually limited. National obesity societies have generally not taken an active role in the training of health professionals.

Although there has been limited assessment of the current attitudes of health professionals in the medical literature, a number of studies in industrialized countries indicate that the current situation is far from adequate. The majority of health professionals are pessimistic about their ability to successfully influence the lifestyle of patients for weight loss, and many consider obesity management to be frustrating, time-consuming and pointless *(36,37)*. Although health professionals appear to have accurate beliefs about the causes of obesity, many maintain negative and even derogatory stereotypes of the obese, especially of the morbidly obese *(38–41)*. Obesity is generally not viewed as a serious medical condition, and so many doctors fail to advise and treat the majority of their obese patients. It tends to be treated only when a co-morbidity is present, rather than before it develops or is exacerbated by the obese state *(36)*. Recently, a study in Germany examined the frequency with which the diagnosis "overweight" or "obesity" was entered into outpatient medical records; despite the high prevalence of overweight and obesity in Germany, they were documented in the records of only a very small percentage of patients and usually only when accompanied by another chronic condition *(42)*. Even when doctors are aware

of the importance of obesity management, they often have limited time and resources to spend in the management and monitoring of obesity *(31)*.

Other health professionals actively involved in the management of obesity are nurses and, in some countries, dietitians. However, although they have been identified as providing more comprehensive weight management advice than medical doctors *(43)*, the quality and efficacy of this advice does not appear to be any higher than that provided by doctors. Confidence in their ability to assist weight loss and maintenance is low among nurses *(44)* and even dietitians doubt the effectiveness of their current input into obesity *(45)*. Negative attitudes towards obesity and the obese also appear to be present in both the nursing *(46)* and dietetic *(41)* professions. Furthermore, in many countries (particularly in Eastern Europe) the profession of dietetics is not well-established and there are no tertiary education opportunities in dietetics. Often dietary advice is provided by "dietary assistants" or "diet nurses" who have no formal training at all. One exception to the above is Sweden, where nurses can receive further training to become "dietetically competent" and have demonstrated efficacy in weight management *(47)*.

8.4.3 Improving the situation

There is an urgent need for improved training of all health care workers involved in the management of obese patients. This is important not only to improve the level of knowledge and skills in obesity management strategies but also to help overcome the negative attitude that many health professionals exhibit 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. Clear communication between the different types of health care service is 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 *(48,49)*. Richman et al. evaluated a shared-care obesity management programme between general practitioners and a hospital-based specialist obesity service, and found that obese patients managed in a shared care 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 *(50)*.

It is recognized that improvements in obesity management services will cause a large draw on resources from all areas of health care, not least because of the widespread nature of the obesity problem. However, by allocating sufficient resources to the prevention and effective management of weight gain, it can be reasoned that significant savings may be made in other areas where obesity is an important underlying cause of morbidity. It has also been well-documented that an increase in BMI is associated with a concomitant rise in the length of patient hospital stays, medical consultations and demand for medication *(42,51,52)*. Thus, preventing weight gain and

obesity in the first place 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 focus on the promotion of healthy diets, on increasing levels of physical activity, or both, they cannot be seen as the sole responsibility of any one sector. To be effective, strategies should be multisectorial with active participation from governments, the food industry/trade, the media and consumers. Furthermore, they provide an excellent opportunity for synergism of government health 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 Figure 8.4. It shows how strategies to promote appropriate eating and physical activity behaviours involve coordinated action by all concerned sectors.

Promoting healthy diets

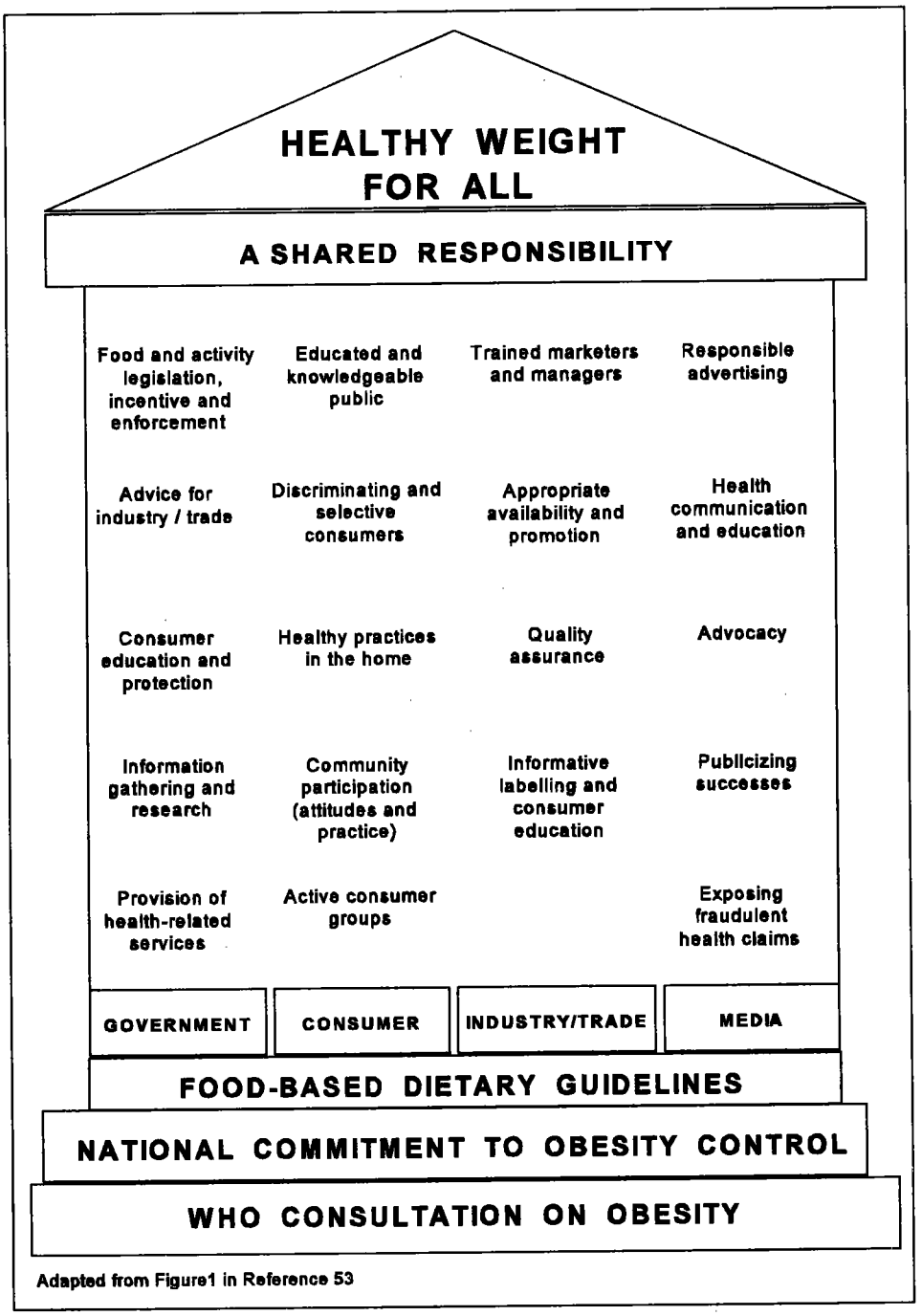
The promotion of healthy diets that are low in fat, high in complex carbohydrates and plentiful in fruit and vegetables should be a priority for obesity prevention efforts. Although it is consumers who ultimately choose which foods to consume, choices are influenced by a range of factors such as experience, 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 which specifies food-protection standards, and decides on subsidies and taxes on food products.

Consumption of a high-fat diet may reflect government policies which fail to regulate food quality, abundant advertising of high-fat products by the food industry and media, ready access to processed high-fat fast foods, lifestyles that favour the convenience of pre-prepared meals, and excessive consumption driven by the hedonistic properties of fat.

The shared responsibilities of governments, food industry, media and consumers outlined above offer multiple sites for intervention. Appropriate targets for nutrition strategies identified in prior FAO/WHO documents *(53–55)* include consumer education and protection, the development and implementation of dietary guidelines, food labelling, nutrition education in schools, altered feeding programmes and efforts to ensure truth in advertising. The food industry plays an important role in the development and promotion of affordable healthy products while media are crucial in advocating change, publicizing successes and exposing fraudulent health claims. Governments have the responsibility to support research and the collection of information on dietary intake and nutritional status of the population through epidemiological investigation and surveillance. Programmes aimed at improving the nutritional well-being of people, in particular that of groups

at greatest risk, should be supported through the allocation of adequate resources by the public and the private sectors so as to ensure their sustainability.

Figure 8.4 Healthy weight for all – a shared responsibility



Adapted from Figure1 in Reference 53

Promoting increased physical activity

Greater emphasis on improved opportunities for physical activity is clearly needed, especially given the conditions associated with increased urbanization and the parallel increases in time devoted to sedentary pursuits. Provision of convenient and safe exercise facilities, allocation of time for activity, media focus on the role of activity in health promotion, workplace interventions aimed at increasing physical activity and consumer education all offer appropriate targets for increasing energy expenditure.

As with diet quality, PALs depend on the interaction of influences from multiple sectors, which 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 in adults and children, and traffic policies and workplace practices should positively help promote sustained physical activity throughout life.

8.5.2 Coordination of government policies

Action to improve the prevention and management of overweight and obesity, as well as their co-morbidities, provides an opportunity for synergism between national nutrition policies and NCDs. Goals and strategies recommended for obesity control, such as monitoring of weight status and the promotion of healthy diets and active lifestyles, should be integrated and given prominence within existing nutrition and NCD policies. The development and effective implementation of such policies and programmes requires the active participation of governmental education and agriculture agencies.

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9 THE PREVENTION AND MANAGEMENT OF OVERWEIGHT AND OBESITY IN POPULATIONS: A PUBLIC HEALTH APPROACH

9.1 Introduction

Obesity is a public health problem and needs to be addressed from a population or community perspective. Health problems which affect the well-being of a major proportion of the population are unlikely to be effectively controlled by strategies that focus on disparate 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 to the early detection and management of disease.

A public health approach to obesity focuses on strategies dealing with the weight status of the population as a whole, in contrast to other interventions which deal exclusively with factors influencing body fatness of individuals. In many developed as well as developing nations, underprivileged minority groups carry a disproportionate burden from higher-than-average levels of obesity. Thus, in dealing with inequalities in health status as a fundamental principle of public health, it is necessary to consider the specific issues which make particular groups more vulnerable to weight gain.

This chapter deals with the need to develop population-based strategies that tackle the environmental and societal factors identified in Chapter 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. Key points raised include:

- Obesity is a major global public health problem; public health problems need to be addressed from a public health perspective.

- A public health approach to obesity focuses on strategies dealing with the weight status of the population as a whole in contrast to other interventions which 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. A population median BMI range of 21–23 is thought to be optimum to minimize the level of obesity; adult populations from developing countries are likely to gain greater benefit from a median BMI of 23 whereas adult populations from 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 need both to improve population knowledge about obesity and its management and to reduce the exposure of the community to an obesity-promoting environment.

- The two priority areas for public health interventions aimed at preventing the development of obesity should be increasing levels of physical activity and improving the quality of the available diet within the community. The approaches adopted will depend on the population, especially with respect to economic circumstances.

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

- Current obesity prevention initiatives need to be evaluated, their limitations recognized, and their designs improved. Lessons learned from public health campaigns addressing other issues can be applied to improving public health campaigns for obesity.

- The prevention and management of obesity is not just the responsibility of individuals, their families, health professionals or health service organizations; they require a commitment from all sectors of society.

- Public health strategies intended to improve the prevention and management of obesity should work towards producing an environment that supports improved and appropriate habits concerning eating and physical activity throughout the entire community. Areas for action include urban design and transportation policies, laws and regulations, school curricula, economic incentives, catering standards, promotion and education, and family food production. Priority action for public health in developing and newly industrialized nations include improving standards of living 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 non-infectious diseases such as CHD and obesity. The merit of population-level interventions has been questioned by some observers because all members of the community may be required to make changes (or have them imposed) to deal with a problem that currently affects only a proportion of those individuals *(1,2)*. However, if the link between the average and extreme levels of body fatness within a population (Figure 9.1) is understood, then the importance of

population-level interventions in obesity can be appreciated, especially as the majority of the adult population in industrialized societies are disadvantaged by excess weight gain.

9.2.1 The relationship between average population BMI and the level of obesity

The classification of obesity as a BMI ≥ 30 (Chapter 2) is purely arbitrary. It indicates greatly increased health risks above this level of body fatness but does not imply that BMIs below this level are free from associated risks. In reality, the population is not composed of two distinct 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 multi-country International Corporative Study on the Relation of Blood Pressure to Electrolyte Excretion in Population (INTERSALT) study by Rose *(3)* provides a useful analysis of body weight data from 52 communities. This study demonstrated variations in the distribution of BMI in different adult populations 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 (Figure 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. This occurs 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 (Figure 9.1). In the UK between 1980 and 1993, the mean BMI increased from 24.3 to 25.9 for men and 23.9 to 25.7 for women. Over this same period, the rates of overweight have increased by a third whereas those of obesity have 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 effective prevention of obesity should focus on preventing a rise in the mean community BMI. Focusing obesity prevention and management efforts on people with existing weight problems (individuals in the right-hand tail of the distribution in Figure 9.2) will do little to prevent the onset of new cases of obesity.

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

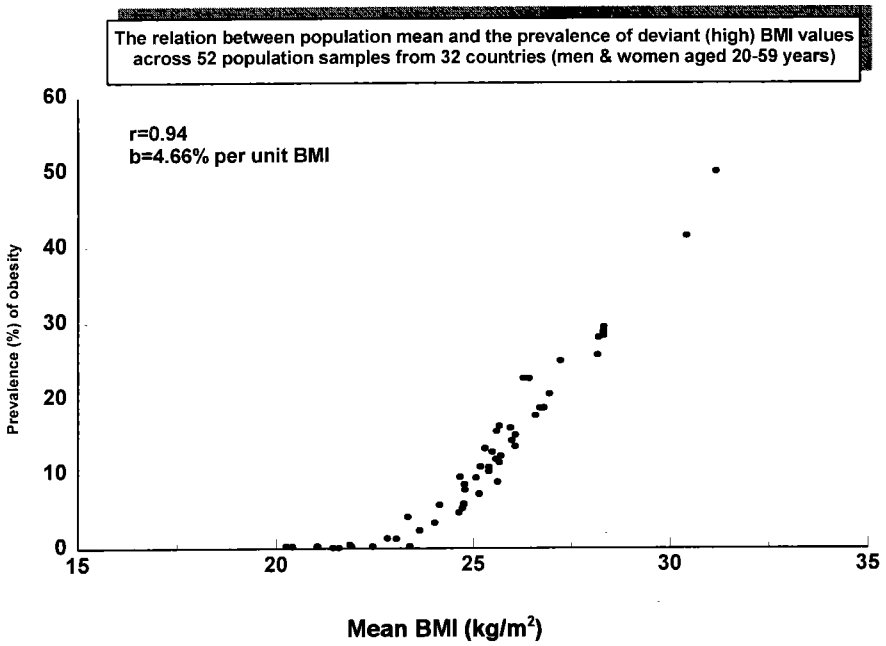
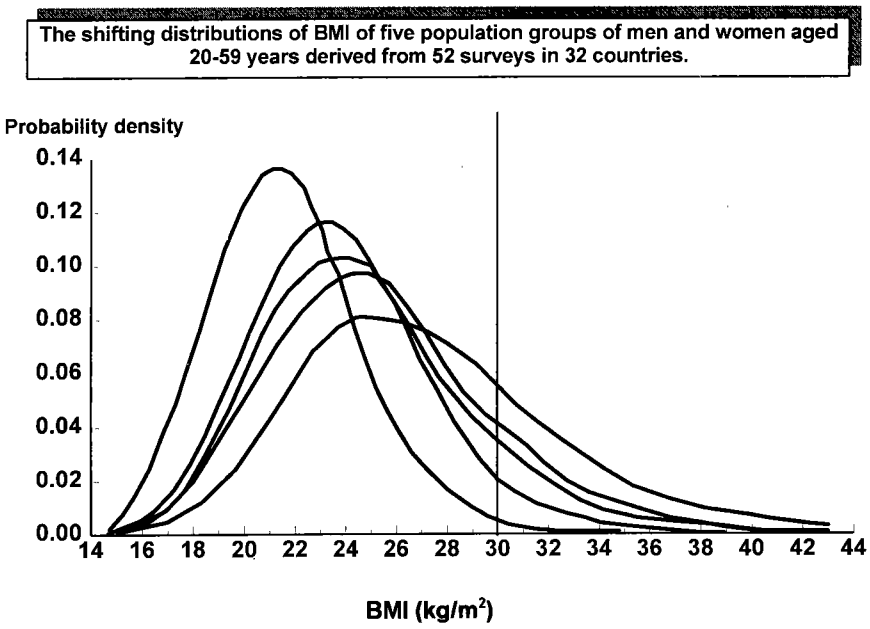


Figure 9.2 Skewed BMI distribution with increasing population mean BMI



Figures 9.1 and 9.2 show two analyses of body weight data from 52 communities in the INTERSALT study. The clear relationship between the mean BMI and the prevalence of obesity in a population is shown in Figure 9.1. 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 (Figure 9.2). Public health interventions seek to prevent this upward shift in mean population BMI *(3)*.

9.2.2 Optimum population BMIs

The optimum mean BMI for a population is likely to vary with environmental conditions, e.g. the demand for work 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, which reflect vastly different economic and environmental circumstances.

There are hazards associated with both underweight (i.e. BMI < 18.5) and overweight (i.e. BMI 25–30). Underweight, for example, 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 both to minimize the number of adults with a BMI > 30 (Figure 9.2) as well as to minimize the proportion of underweight adults with a BMI < 18.5 in a community, 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 we seek to limit the extent of overweight by minimizing the proportion of the population with a BMI $\geq$ 25 and are less concerned about limiting the number of adults with a BMI < 18.5, then a median BMI of 21 is optimum *(5)*.

In industialized countries there is evidence that a BMI in the lower part of the normal range is associated with the best health outcome *(6)*. However, in Third World environments, a BMI < 18.5 is not conducive to sustaining prolonged and intensive agricultural work *(4)*.

A median BMI range of 21–23 seems reasonable, with Third World adults gaining greater benefit from a median BMI of 23 and adults from affluent societies with more sedentary lifestyles possibly being better off with a BMI of 21. National strategies may need to improve the weight status of underweight children and adults in rural communities (target mean BMI 23) and simultaneously limit 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 targeted at maintaining or reducing the mean BMI of the whole population may result in an increase in the levels of underweight, anorexia and eating disorders of the community *(7,8)*. Assessment of the Rose analysis 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 increasing numbers of individuals falling into the underweight category. However, it is important to understand that the data from the populations recruited for the INTERSALT study used in Rose's analysis included some countries where undernutrition remains a significant problem. This is especially relevant for the lowest quintile in Figure 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 which 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 community level strategies aimed at preventing weight gain in the whole population should be careful to avoid precipitating the development of eating disorders associated with weight-loss programmes for individuals *(10)*.

9.3 Public health intervention strategies

There are generally two types of public health intervention strategy that can be used to tackle obesity; (a) those which aim to improve the knowledge and skills of individuals in a community, and (b) those which aim to reduce 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 population-control of obesity have been based on an individual approach. They have generally relied on education and behaviour change strategies that can be disseminated to a wide audience through mass media education, worksite interventions, school-based programmes and education curricula, skills training delivered within a network of clubs and community centres, and multi-strategy community projects.

In contrast to many other public health problems, however, strategies aimed at improving the knowledge and skills of the community have not produced impressive results in dealing with 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 are also 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, which points to the importance of preventive strategies.

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 the educational dimension and deals with those environmental and societal factors that induce the obesity-promoting behaviour of individuals within a population in the first place (see Figure 7.1). In this way, it may be possible to reduce the exposure of the whole population to obesity-promoting forces, such as the persistent temptation of high-fat foods and the convenience of a sedentary lifestyle. Unfortunately, however, strategies such as these remain relatively unexplored.

9.4 Priority areas for interventions

Regardless of the type of intervention strategy employed to tackle obesity on a population level, two priority areas for targeting factors important in the development of obesity have been identified in this report. These are increasing levels of physical activity and improving the quality of the diet. Approaches adopted to deal with these issues will depend on the circumstances of the population, particularly with respect to the economic situation. Thus, in developing countries, the main aim of intervention to promote physical activity should be to prevent reduced physical activity that usually accompanies economic development. In affluent countries, however, the main emphasis will be to discourage 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 countries. Evaluation of interventions is crucial.

9.4.1 Increasing physical activity

Interventions aimed at increasing community-wide levels of physical activity are an important approach to preventing further increases in the average BMI of a whole population. Such interventions need to take into account the following points:

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

- Long-term increases in population physical activity are more likely to be achieved through environmental changes which increase or maintain incidental daily activity and low-intensity leisure pursuits rather than by encouraging occasional vigorous exercise. Emphasis should be on promoting relatively low-intensity, long-duration physical activity which can be conveniently incorporated into daily life (also see Box 7.2 and the section on *Physical activity levels for prevention of excessive weight gain* in Chapter 7). Popular examples of leisure pursuits include walking a dog, gardening, dancing, cycling, home improvements and swimming. Walking in pedestrian precincts rather than depending on car travel and ensuring that part of one's work is conducted when standing rather than sitting will help to increase incidental 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 the promotion of a variety of general activities in young children may be especially important.

9.4.2 Improving the quality of the diet

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

- A major concern associated with 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 are excluded from initiatives 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 diets are increased in their energy content by the addition of fat and refined carbohydrate.

- It is unusual for energy deficiency to arise in adults simply as a result of bulkiness of the food exceeding capacity to eat enough. A greater problem arises from the ready overconsumption of energy-dense diets rich in fat and highly refined products and low in fibre. These diets, especially when eaten by relatively inactive individuals, promote overconsumption and weight gain.

The implication of the above is that care is needed when examining both the energy density and the nutrient/energy ratio of diets. The age group targeted in health promotion strategies as well as the normal dietary constituents available to them should be considered. When diets are based on indigenous local foods with little refining, and contain a suitable proportion of cereals, legumes, vegetables and affordable animal proteins, there is less likelihood of such diets being inappropriate in either their energy density or their nutrient/energy ratios. Identifying the optimum ranges of both nutrient/energy ratios and energy densities for young children and the different ratios and densities for older children and adults remains a challenge.

9.4.3 Measures for evaluation of prevention efforts

The aim of obesity prevention efforts is to arrest or reduce the number of new cases of obese individuals within a population. This can only be achieved if rises in the average BMI of the population are prevented.

From a purely scientific viewpoint, the most accurate measures for evaluating obesity prevention programmes are changes in mean population BMI or in obesity incidence. However, in practical

terms, incidence is rarely assessed and public 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 co-morbidities are the most commonly used measures of success or failure for prevention interventions associated with obesity control. 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 move them out of the obese category. Second, the time taken for appropriate environmental, societal and behavioural changes to be reflected in population-weight status is often considerable. Third, estimates of the prevalence and trends in obesity are often unreliable because small sample sizes compromise their accuracy. Finally, the multiple etiology of obesity co-morbidities 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 independent 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 valuable outcome indicator for evaluating obesity prevention efforts would be to combine the assessment of changes in the prevalence of overweight (BMI ≥ 25) with short-term process indicators such as standardized measures of dietary change and of PALs. In fact, prevalence estimates of overweight give a better reflection of population-weight distribution 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. Assessment of mean population BMI and changes in obesity prevalence are also desirable.

9.5 Past public health interventions in controlling obesity

To date, there have not been any well-evaluated and truly concerted public health programmes aimed at the population-level management or prevention of obesity. A number of countries have recently developed a lifestyle strategy with a focus on weight control but, with the exception of Singapore, these have not been set up as controlled trials and so are unlikely to provide any definitive evidence of their impact.

The nearest examples are community-wide CHD prevention programmes that have included a reduction in BMI as one of the measurable outcomes.

Alternatively, there are studies which have targeted those factors identified as important in the development of obesity, namely physical activity and the quality of the food supply. However, it is debatable how much can be interpreted from the results of such programmes on the potential of public health strategies to manage weight.

9.5.1 Countrywide public health programmes

At present there are very few countries that have a comprehensive population-wide national policy or strategy to deal specifically with the problem of overweight and obesity. This is despite reports being produced in a number a countries, such as Australia *(11)*, Canada *(12)*, and the UK *(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 across the population. The Government of Singapore has an overall strategy which is translated into programmes directed at all stages of life including pre-school, school years, national service and broader community projects for adults. Such programmes rely heavily on input from the community in their establishment and management *(14)*. Recent results from the Trim and Fit programme are promising, with 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 with regular physical activity within schools. The programme is supported by specialized training for school principals, teachers and canteen workers as well as the provision of equipment for improved catering and physical activity. A national monitoring programme to assess fitness and weight status also runs in conjunction with this initiative *(16)*. Recent results indicate that the number of children successfully completing the fitness tests is improving annually, and that the rates of obesity have dropped 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 Community-wide CHD prevention programmes

Over the last two decades there have been a handful of well-funded large-scale, community-wide intervention programmes aimed at preventing CHD. These have attempted to reduce the level of risk factors including smoking, high blood pressure, high blood cholesterol and obesity. In-depth evaluation of these programmes and their results have consistently revealed that obesity is harder to control than any other risk factor.

- ***The Stanford Three Community Project (17) and the Stanford Five City Study (18).*** These studies both utilized mass media, interpersonal education and community organization to increase awareness and knowledge about CHD and to teach skills required for appropriate behaviour change to reduce CHD risk *(19)*. Both projects viewed weight reduction and increased physical activity 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, the intervention communities gained significantly less weight than the control communities (0.57 kg compared with 1.25 kg) over the six years. However, results from 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 seven years in six matched communities (rural, urban and suburban). It utilized similar strategies to the Stanford studies but 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. With regards to obesity, the seven-year intervention had little impact. Indeed, BMI showed a strong secular increase despite such innovative weight control programmes as adult education classes, a worksite weight-control programme, weight loss by home correspondence, and a weight-gain-prevention programme *(20)*.

- ***The North Karelia Project.*** Initiated in 1972 in North Karelia, a county in Eastern Finland *(21)*, this intervention was delivered through the usual mass-media education, worksite and school-based programmes but included a 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, structural and legislative support made healthy behaviours easier to adopt. Despite remarkable reductions in CHD risk factors, which continue to decline today *(22)*, the average BMI and the level of obesity remained similar throughout the project. Similar trends have been observed since then *(23)*.

- ***Mauritius.*** In 1987, an NCD intervention project was established by the Government of the developing island nation of Mauritius after a population survey revealed high levels of NIDDM and hypertension, and moderately high levels of CHD. An intensive community-wide prevention programme was established which made extensive use of mass media, community, school and workplace health education activities as well as fiscal and legislative measures to encourage healthy nutrition, increased exercise, smoking cessation and reduced alcohol intake. After five years there had been significant decreases in 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 $\geq$ 30) increased by 33% and 56%, respectively, in men and by 19% and 46%, respectively, in women *(24)*.

Programme limitations

Possible explanations as to why community-wide CHD intervention programmes have been disappointing in terms of obesity and weight control have been suggested by Jeffery *(20)*:

- The major focus of the projects was 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 escalating secular trends in weight may have overwhelmed any intervention effects aimed at curbing the rise.

- The powerful societal and environmental obesity-promoting factors have evolved at a rapid rate in many societies over the last few decades, and the intervention programmes may not have been strong enough or sufficiently coordinated to overcome these forces.

- 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 and are acting to control their weight, so even intensive intervention actions may not increase the number of people actively participating in such programmes.

- The interventions may have tried to change too many behaviours at once (i.e. cholesterol reduction, blood pressure control, physical activity, smoking cessation, etc). Health promotion research has shown that focused campaigns are often more effective in encouraging a behaviour change than interventions which seek simultaneous change in multiple behaviours *(25,26)*.

9.5.3 Interventions targeting factors important in the development of obesity

Increasing physical activity

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

A recent review by King was able to identify only a few well-evaluated and truly comprehensive community-wide programmes aimed at improving levels of physical activity *(27)*. These programmes have usually involved a series of physical activity 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, worksites, schools). However, the level of integration of these different interventions to reach the whole population has varied greatly between programmes. Evaluating the success of any such interventions has been hampered by problems associated with objective assessment of physical activity, by confused definition of the components of physical activity, and by a lack of clear goal-setting in terms of expected improvement in activity.

Evidence from a number of community-wide CHD prevention programmes suggest that intensive intervention can improve physical activity participation rates, at least in the short term. This conclusion is supported by 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", which was introduced one 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 successes of community-wide programmes to improve physical activity tended to be only short term, they do suggest that physical activity can be improved on a population basis. Some of the limitations of community-wide CHD prevention programmes discussed earlier are equally relevant to interventions to improve physical activity. With very few exceptions, most of the intervention strategies were aimed at improved awareness and motivation to exercise without tackling the environmental barriers to improved participation. The Minnesota Heart Program did attempt to improve exercise facilities in the community and to involve community groups in establishing their own committees to review other methods to improve activity, but most other programmes relied on interventions based on personal education and behaviour change. All programmes aimed the interventions at improved levels of leisure-time exercise, and did not attempt to influence the factors such as transportation and urban design which have an impact on occupational and incidental daily activity patterns.

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

Improving the quality of the diet

The energy density and fat content of the food supply have been identified as the major dietary factors implicated in the development of obesity (Chapter 7). In many countries, nutrition promotion programmes have succeeded in dramatically altering the fatty-acid composition of diets, and some have also been successful in achieving a small reduction 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 actions at all levels necessary to achieve such a dramatic dietary change.

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

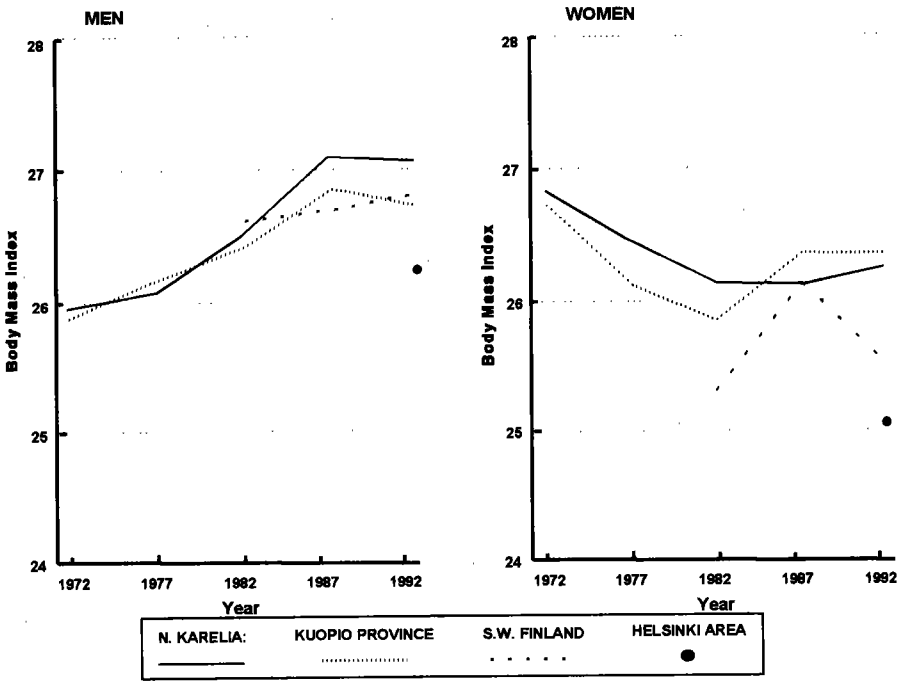


Figure 9.3 shows that mean BMI for men in North Karelia and Kuopio of Finland have been stabilizing or even falling since 1987 after rapid rises in the preceding 15 years. The rise in mean BMI for women in the same regions observed after 1982 also appears to be levelling out. These data suggest that the community-wide changes in diet that have occurred in these regions over the last 25 years may be contributing to a stabilization of population mean BMI *(23)*.

Two countries which have instituted broad-reaching national nutrition programmes are Norway and Finland. 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 concomitant decreases in levels of physical activity *(23)* (Figure 9.3). In Norway, a recent study analysed data from all 40- to 42-year-old men and women recruited to a countrywide CHD prevention programme (except Oslo) and found that obesity rates have decreased slightly in females since the 1960s *(30)*. In Norwegian men, obesity rates remain lower than in other European countries but, in contrast to the Norwegian women, obesity rates have increased substantially since the 1960s.

9.5.4 Implications for future public health efforts to control obesity

What has been demonstrated by these and other lifestyle intervention programmes is that approaches that are 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 opposing behaviours that lead to a chronic positive energy imbalance *(31)*. It would therefore seem appropriate to devote resources to programmes which focus on reducing the exposure of the population to obesity-promoting agents by addressing the environmental factors such as transportation, urban design, advertising and food pricing which promote the availability of high-fat energy-dense diets and physical inactivity.

9.6 Lessons to be learned from other successful public health campaigns

Campaigns that have been relatively successful in dealing with public health problems in the past include those targeting smoking, not wearing seatbelts, drink-driving and poor immunization rates. Analyses of these campaigns have helped to identify features that may provide important leads for public health interventions to control obesity. For example, it appears that programmes which involve government, the food industry, media and the community, and which are of long duration, lead to positive and sustainable change.

Public health programmes to manage obesity are unlikely to achieve the same spectacular rates of success as those associated with the control of infectious disease; unlike the case of pathogens, it is not feasible to remove totally the causes of obesity. Nor is it a simple process 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 are.

The main features of past 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)*.

Table 9.1 Main features of past 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, such as with seat-belt use and anti-drink-driving efforts, legislative action has been necessary to facilitate 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 improvement in smoking rates and exposure to passive cigarette smoke *(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 educational measures to reduce cooking salt use, to reduce consumption of salted codfish and salted sausage and, with local bakers, to reduce the salt content of bread. Strong local support was obtained from village leaders, doctors and nurses. After one year, salt consumption had fallen markedly (by 50%) with a 5 mmHg reduction in average blood pressure *(36)*.

9.7 Appropriate public health strategies to improve the prevention and management of obesity

As highlighted in Chapter 7, many elements in the modern environment are conducive to a positive energy balance. Traditional foodstuffs are being replaced by high-fat, energy-dense food which is appetizing, packaged attractively, pre-processed for convenience, advertised heavily and relatively inexpensive. There is good evidence suggesting that exposure to television food advertisement influences food selection among children and adolescents *(37–39)*, especially 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 developing countries. The Massachusetts Medical Society Committee on Nutrition suggested that fast-food dining has become so well accepted that recommendations to reduce or eliminate it are likely to be met with little or no success *(41)*. An effective approach would therefore be to improve the nutritional quality both of the convenience foods available as well as 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 the use of stairs, and there is a common perception that it is unsafe to walk or play in the streets due to the risk posed by traffic or crime *(43)*. The level of occupational activity has also been declining in recent years due to a shift in composition of the labour force to more sedentary professions.

9.7.1 Developed countries

In the face of the current environment characterized by easy availability of high-fat/energy-dense diets and physical inactivity, it is not surprising that interventions focusing on education for behaviour change have had limited success in controlling obesity. There is a desperate need to focus obesity-prevention efforts on producing an environment which 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 set out in Table 9.2. The implementation of such an approach will require general acceptance that the prevention and management of obesity is not just the responsibility of individuals, their families or health professionals but requires 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 potential environmental strategies for obesity control suggested in Table 9.2 are very sophisticated and assume a certain level of infrastructure which may not exist in developing countries. However, the underlying targets to improve dietary quality and ensure appropriate levels of physical activity for healthy weight 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 nations will not be prevented by simply educating 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 food industry, the media, communities and individuals. Public health action will therefore need to address wider issues such as the development of national dietary guidelines and the importation, pricing and availability of food. Improving the standard of living of all sectors of society, especially within often neglected native or minority populations, should be a priority. The support of international agencies such as FAO, United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), WHO and the World Bank as well as NGOs dealing with NCDs is essential to address the factors which contribute to obesity and other NCDs.

Table 9.2 Potential environmental strategies to control obesity

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 peripheral car parks 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) • Improve street lighting for safety • Install traffic-calming measures to improve safety for children walking and playing in street • 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 sufficient allocation of curriculum time to physical activity lessons • Ensure training in practical food skills for all children
Food and catering standards	• Develop nutrition standards and guidelines for institutionalized food services and catering (e.g. school meals and worksite 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 TV 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 improve the environment to one that promotes rather than inhibits improved exercise and dietary habits • Educate the public about important factors in the development of obesity so that victimization of the obese is reduced
Family food production	• Encourage use of land in towns and cities for "family" growing of vegetables, legumes and other nutrient-rich crops

Adapted from Reference 32

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10 THE PREVENTION AND MANAGEMENT OF OVERWEIGHT AND OBESITY IN AT-RISK INDIVIDUALS: A HEALTH CARE SERVICES AND COMMUNITY SETTINGS APPROACH

10.1 Introduction

This chapter focuses on programmes that deal with individuals and groups who are already overweight or obese, or who are at particularly high risk of obesity and its co-morbidities. Particular emphasis is given to an integrated health-care-services approach in community settings. Key points include:

- Effective weight management for individuals and groups at risk of developing obesity requires that attention be paid to the complete spectrum of long-term strategies outlined in Chapter 8, i.e. prevention, weight maintenance, management of co-morbidities, and weight loss.

- No long-term trials have investigated 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 which are directly aimed at preventing weight gain in adults can have a positive impact on body weight.

- The basic principles of an effective weight management protocol involve 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 of weight-loss and weight maintenance. Well-run self-help groups also offer a useful and inexpensive form of continuing group support. Commercial weight-loss groups can be of use in weight management provided such organizations adhere to a code of practice in relation to fees, training of counsellors and promotion of services.

- There are some well-established and evaluated therapies for the treatment of obesity. These include 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 within an individually tailored plan. More evaluation is required of current lifestyle strategies and the combination of therapies to determine their usefulness in achieving long-term weight loss.

- Drug therapy may be appropriate for high-risk obese patients for whom changes in lifestyle alone has 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 the risks of persisting obesity. Long-term administration, as part of an management strategy tailored to the individual, would appear to be the most logical and effective use of weight management drugs. However, data concerning the benefit/risk ratio of the long-term use of these drugs are still lacking.

- Gastric surgery is considered 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 focus on weight loss, child treatment focuses on the prevention of weight gain.

- Three strategies for the treatment of obese children can be identified: 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 implementation of obesity prevention and treatment therapies 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 recognize the complete spectrum of approaches set out in Figure 8.1, namely:

- Prevention of weight gain.

- Promotion of weight maintenance.

- Management of co-morbidities.

- Promotion of weight loss.

10.2.1 Prevention of weight gain

Prevention is probably the most effective, but currently under-utilized, approach to weight management. Chapter 8 suggested that prevention efforts can be separated into three levels, two of which are directed at those who are at high risk of weight gain and its consequences:

- ***Selective prevention*** (directed at subgroups with an above average risk of developing obesity).

- ***Targeted prevention*** (directed at high-risk individuals who may have a detectable amount of excess weight but are not yet obese).

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

As outlined in Chapter 8, there is urgent need for intervention studies that are specifically aimed at preventing weight gain in adults. So far, only two studies have been published. The first was a small-scale trial in a relatively select group of normal-weight individuals to evaluate 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 one 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)*. Further subgroup analysis showed that the greatest impact was among men, individuals over the age of 50, non-smokers, and those with little prior experience with formal weight-loss services. The second publication describes the first-year results of the Pound of Prevention (POP) study, an ongoing trial that builds on the first study by evaluating a similar approach but examines 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 three years, should produce a positive outcome. However, trends in the low-income group were negative at one year. Further follow-up will reveal whether the low-intensity educational strategy being tested is effective in reducing rate of weight gain in the groups being studied, and may help to identify behavioural correlates of weight gain that could provide guidance for further research on this important topic.

Prevention through worksite settings

In recent years, health education interventions at worksites have been a popular method of targeting high-risk individuals and groups, but most studies have been of short duration. Longer-term interventions such as the six-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, for high-risk individuals, proved to be ineffective in lowering BMI. In the USA, a two-year study which focused on cigarette smoking and obesity found no differences in the mean BMI or any change in BMI for worksites where weight-loss classes were offered (on four occasions) compared to those which did not *(4)*.

Prevention through health care services

To date, there have been no long-term trials investigating the effectiveness of obesity prevention *per se* through health care services (see Chapter 8). However, in one UK practice, 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% to 1.5% between intervention and control groups after only one 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. It is also an important element of all weight management programme. 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 which is kept constant over a decade as a result of a weight management programme therefore represents a successful outcome. This is a particularly valuable achievement in those patients with family histories of obesity and/or its medical complications, and who are particularly prone to weight gain and obesity. Figure 10.1 presents weight maintenance 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.

Figure 10.1 Possible indicators of success in obesity management programmes

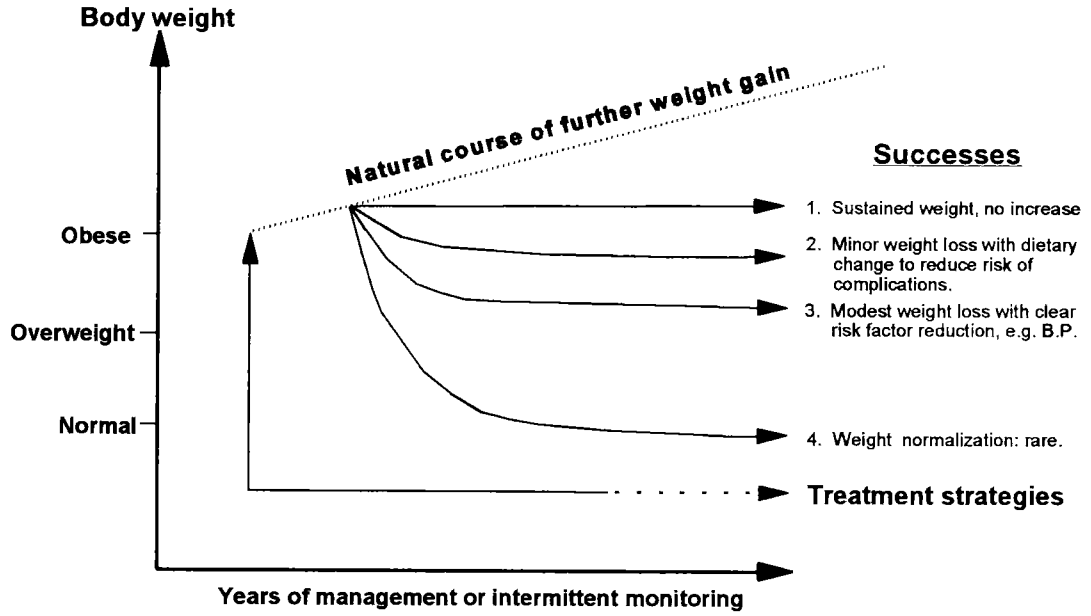


Figure 10.1 illustrates the concept that weight maintenance or minor weight loss are successful outcomes of programmes aimed at controlling obesity when otherwise (without intervention) weight gain would occur.

10.2.3 Management of obesity co-morbidities

The management of obesity co-morbidities (health risks associated with obesity) can improve health outcomes regardless of whether or not substantial weight loss is achieved *(9,10)*. As highlighted in Chapter 4, these co-morbidities 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 co-morbidities are suggested in Table 10.1.

Table 10.1 Appropriate targets for the management of obesity and co-morbidities

	Appropriate target*
Fatness	Reduce body weight by 5% to 15% (less 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 Hgb levels, and reduced use of oral hypoglycaemic agents and/or insulin
Hypertension	Fall in blood pressure and reduction in the need for co-existing 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
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.

* Quantitative estimates of magnitude of change in target value may vary for specific populations.

10.2.4 Weight loss

The benefits of modest, intentional weight loss have been set out in Chapter 5. Doctors and their patients need to recognize that moderate but sustained weight loss in the range of 5% to 15% of initial weight is medically very advantageous if achieved on a long-lasting basis *(9,11)*. Substantial improvements in obesity co-morbidities 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 misperception has been transmitted to the public, and has been reinforced by the mass media promotion 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 within 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:

- A principal factor relating to health risk is weight gain. This risk is independent of the actual level of BMI *(12)*.
- Substantial benefit, such as a 25% decline in mortality, can accrue from modest weight losses of 5–10 kg in one year *(10)*.
- Physiological responses limit weight loss, so it is unusual to return to normal weight unless patients are very deliberate and effective in monitoring and controlling their drive to eat. Severe dietary restrictions are unhealthy and may precipitate eating disorders in specific circumstances *(13)*.
- Repeated failures to achieve and sustain a substantial weight loss may amplify 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 a period.
- Clinical trials show that most patients are unable to continue losing weight for longer than 12–16 weeks (4–8 kg loss) and that weight loss does not continue past 6 months *(14)*. Patients are seldom applauded or rewarded for achieving this modest loss, even though it represents prolonged hard work and brings major health benefits.

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

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

The need for a coordinated approach to obesity management in line with the strategies outlined in Chapter 9 has been identified. A primary goal of long-term weight maintenance should be combined with appropriate treatment for modest weight loss and management of co-morbidities 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 evolve the guidelines appropriate to its own particular needs and health care structures. However, the basic principles of an effective weight management protocol remain the same and involve 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. Three key methods of recruitment and referral can be envisaged:

- ***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, based on BMI and waist circumference.
- ***Opportunistic screening*** in patients who present for other conditions, e.g. infections, trauma or other intercurrent illness.
- ***Public health screening systems*** incorporated into health service systems, e.g. immunization, mother and infant welfare clinics, screening programmes for tuberculosis, infestations, 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, co-existing illnesses, social and personal situation, and a history of those problems and precipitating factors which lead to weight gain. The components of such an analysis might be:

Personal weight history

A simple categorization of patients can be obtained by a series of standardized questions based on, for example: 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; number of weight-loss attempts.

The environmental circumstances and the life events which 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 to allow an assessment of occupational and recreational levels of activity *(18)*.

Dietary patterns

Habitual food intake, meal patterns and reasons for eating can be obtained from a dietary record or brief interview. Patients with eating disorders need to be identified with questionnaires or interviews and appropriate strategies included in the management plan to deal with this issue.

Recommendations for selecting appropriate dietary assessment methods tend to focus on epidemiological research requirements and do not consider their use in a clinical setting *(19)*. Recording bias, particularly under-reporting by obese subjects is a recognized problem. Generally, food diaries have been adapted to include behavioural questions and quantitative scales for describing patients feelings, but there is no one accepted format that is widely used *(20)*.

Assessment of health indicators and risk factors

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

- ***Smoking.*** Smoking is particularly important to document 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 or weight-gaining individuals are likely to develop these complications.

Psychosocial and behavioural assessment

It is important to collect and understand 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 the patient wishes to lose weight, and the presence of mood disturbances. There is a need for validated

questionnaires that address issues such as depression, anxiety, eating behaviour, etc. which are appropriate to the culture of the individual.

Medical examination

A routine 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 simple to undertake.

Laboratory tests

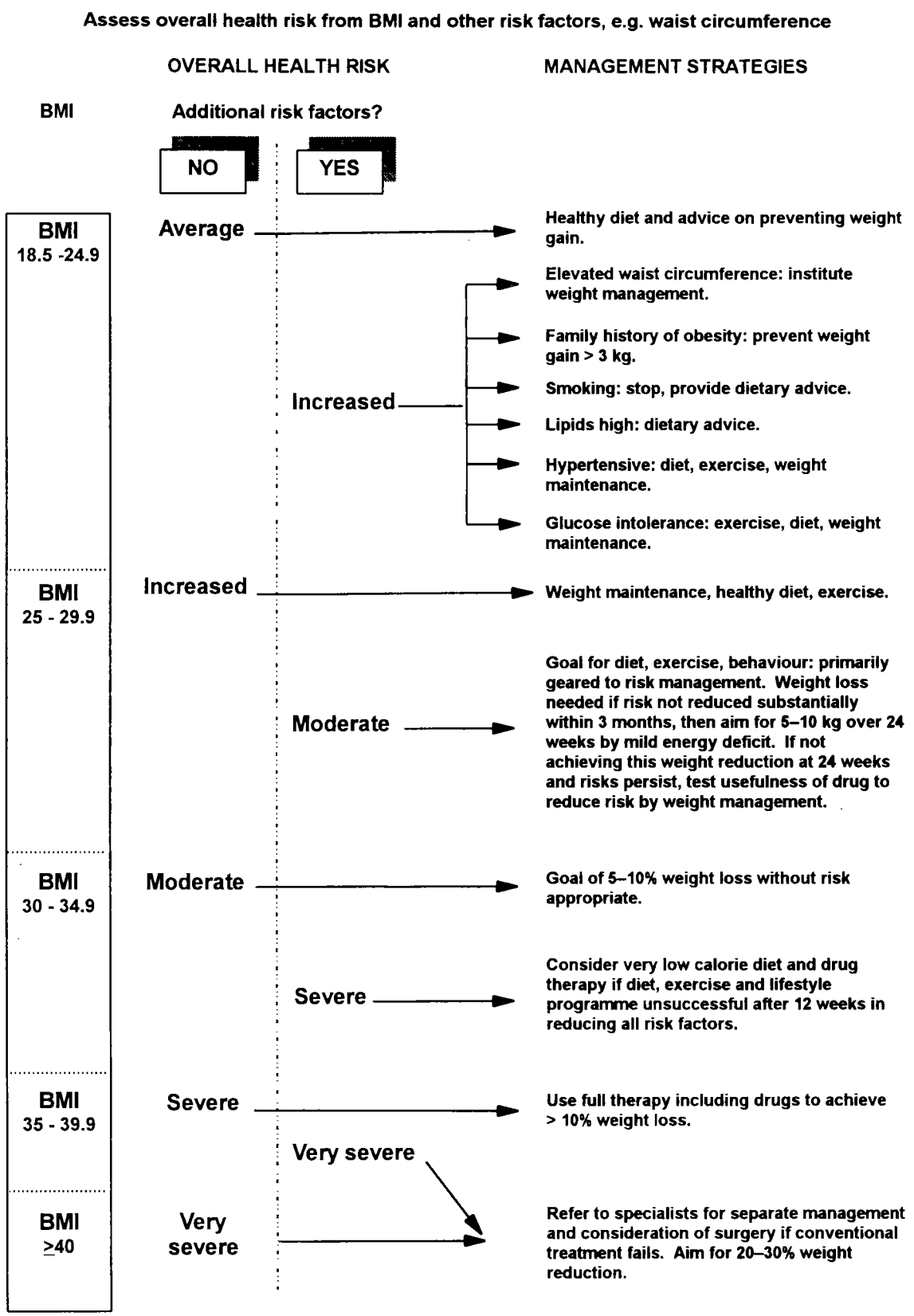
Where resources are available, the health assessment might include the analysis of blood and urine for metabolites which are indicative of disease risk, e.g. plasma glucose and blood lipids. Some tests which are carried out routinely in overweight and obese patients (e.g. hormone levels for rare abnormalities) 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 the doctor and patient to agree on a realistic and appropriate goal. This is critical to 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 consider the presence of other risk factors and social and personal circumstances. This concept is illustrated in Figure 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 and confusion about setting appropriate weight goals *(24)*.

Figure 10.2 A systematic approach to management based on BMI and other risk factors



The North American professional body of obesity experts *(17)*, the Scottish group *(16)*, and a recent report from a subgroup of the IOTF *(25)* all support a strategy for setting appropriate management goals based on the following (specific values for cut-offs (see Table 2.1) may need to be defined for ethnic subgroups):

- ***BMI 25–29.9.*** Where there are no risk factors such as increased waist circumference, the emphasis should be on weight stability. Where co-morbid conditions are present, risk management should be implemented using dietary, exercise and lifestyle measures. 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 long-term weight management with some preliminary weight loss is advisable. When health risks are extremely high (e.g. BMI > 40), and conventional therapy has failed to reduce them appropriately, patients should be referred to a specialized service so that the appropriateness of surgical option 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 *preventing* at-risk individuals from gaining weight, the approach should be geared towards healthier eating and a more active lifestyle. To induce *weight loss*, or to decrease body fat, a temporary negative energy (or fat) balance has to be created so that fat stores can be utilized to supply energy demands. This means either reducing intake or increasing energy expenditure or both. *Management of co-morbid conditions* may require that special attention be paid to specific dietary features, e.g. salt intake in hypertensive patients.

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

- A personal support scheme which 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 which links environmental and psychosocial issues to the changes needed in diet and physical activity.

- Additional therapies may also be indicated depending on the degree of overweight and presence of co-morbidities.

The various therapies available for obesity treatment are outlined in section 10.5. Suitability of any particular therapy depends on BMI, on the targets that have been set, and on the clinical characteristics of the patients obtained in the assessment stage. In most cases, a combination of several therapies are advisable.

10.3.5 Monitoring, reward and evaluation

Regular monitoring of patients' progress is probably one of the most important aspects of the weight management process. This should not cease when patients have reached agreed goals but should be instituted as part of continuing care. Regular review allows weight management progress to be supported, medical conditions to be monitored, and problems to be addressed at the earliest possible opportunity. It is important that achievements in weight maintenance or weight loss (no matter how small) are recognized and it is often useful to instigate a programme of rewards for achieving set goals. These 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 to audit 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 who have been 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 *(26)* have been achieved.

Table 10.2 Potential criteria for evaluating weight maintenance strategy

• Maintenance of a stable weight over time (even if not normalized)
• Reduction in the number of obese people who develop obesity-related co-morbidities
• 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 from a programme
• Low relapse rates
• Improvement in risk factors and co-morbidities.

Source: Adapted from Reference 26

10.4 Patient support in obesity treatment

There is considerable evidence to suggest that patient support from health professionals, peers and family members can notably improve weight loss and weight maintenance success *(27–29)*.

10.4.1 Support within the health care service

Evaluation of weight-management programmes within health care settings suggests the following important points in relation to the nature and value of support systems *(30)*:

- Specially trained health personnel (i.e. nurses, dietitians, trained lay persons) produce better results than untrained staff involved in routine medical management.
- There is greater value in frequent rather than monthly or longer intervals between visits.
- Better responses are achieved with most patients in a group setting.

These points reinforce the value of trained personnel who have frequent contact with patients, preferably as part of a support group. 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 the success in weight maintenance. Black and Threlfall 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 *(31)*. Similarly, Pratt found that drop-out rates were reduced when the patient's spouse was included in a weight control programme *(32)*.

Additional evidence for the important role of family support in successful weight management comes from the work of Epstein and colleagues *(33)* in 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 vary 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 worksite, neighbourhood and community-organized self-help groups. These groups generally comprise people with weight or eating problems, and operate at little or no cost without professional intervention.

These groups 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 that encourage long-term participation and can be a useful adjunct to professional care.

Overweight and obese persons advocacy groups such as the Size Acceptance Network in the USA serve a different function from self-help groups. They aim to reduce the stigma and social dislocation 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 groups

There are numerous commercial organizations offering a mixture of instruction, guidance and support in weight loss. These programmes are usually not run by health professionals although they may be based on material produced by such people and advice from professional consultants. The unifying feature of such organizations is that they rely on counsellors (who vary in their level of training) to provide services to individual clients for a fee. Regular sessions cover a wide range of issues from specific information about dieting, nutrition and physical activity, to techniques for changing behaviour. Well-known international franchised weight-loss programmes include Weight Watchers, Jenny Craig and Nutri-System. The cost of such programmes varies enormously, from a nominal fee paid on each attendance to thousands of dollars paid up-front to purchase special dietary supplements and pre-packaged foods which form part of the programme.

Concern has been raised about the regulation of commercial weight-loss organizations. There is a risk of financial exploitation, and for counsellors are not required to have a minimum level of training. Attempts to evaluate the effectiveness of commercial programmes have resulted in few objective assessments because of issues of confidentiality, drop-out rates and lack of interest among the organizations themselves *(34)*. The US Food and Nutrition Board Committee has suggested that there is a need for guidelines for voluntary accreditation within the commercial weight-loss industry *(15)*. The deceptive marketing of weight-loss programmes is an area that has often been an issue of complaint to consumer organizations.

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

10.5 Therapies for treatment of obesity

A wide variety of therapies are available for the treatment of obesity. These include 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/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 which 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 the poor long-term effectiveness of dietary management is widely recognized *(35)*, especially when used in isolation. 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 warranted to identify the optimal diet composition for the treatment of obesity (i.e. weight loss, weight maintenance and management of co-morbidities).

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 kcal/day to 600 kcal/day (2000 kJ/day to 2500 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 *(36)*.

The specific energy intake that is prescribed to patients is based on an estimate of their initial maintenance requirement minus the agreed deficit. It is preferable to calculate maintenance estimates using the equations of Lean and James *(37)*, based on body weight and age, rather than based on self-reported dietary intakes which are notoriously unreliable among obese subjects *(38)*. After subtracting the deficit, the energy prescription can be translated into a dietary plan using a food exchange system based on healthy eating principles, i.e. approximately 20% to 30% or less energy as fat, 15% as protein, and 55% to 60% or greater as carbohydrate (primarily complex carbohydrate). The assessment of current dietary patterns should be used to construct and educate the patient on a dietary plan appropriate to their circumstances. The prescribed energy level of such diet plans should generally not be lower than 1200 kcal/day (5000 kJ/day).

Low-fat, high-carbohydrate diets

The main argument in favour of low-fat diet approaches to weight loss is their beneficial effect on CVD risk factors (39). However, low-fat diets have also been shown to cause weight loss proportional to pre-treatment weight, and to the long-term reduction in dietary fat content. Astrup et al., for example, found that a reduction of 10% fat energy could produce an average 5 kg weight loss in obese subjects *(40)* although a number of other studies have failed to show this 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 two years later *(41)*. 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 kcal/day to1200 kcal/day (4000 kJ/day to5000 kJ/day). These intakes are usually designed 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 so the severity of the energy deficit imposed by the diet will increase 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 induce up to 15% weight loss over 10–20 weeks *(42)* but, without a maintenance programme, most of the weight lost is regained *(43)*. Rarely are patients assessed beyond a year and most of the trials which 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 there are associated support systems to cope with patients'needs.

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 *(44,45)*. 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 proper formulation of these diets. Nowadays, VLCDs usually provide a ketogenic diet with an acceptable minimum energy level of 800 kcal/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 per day do not produce greater weight loss, and are less well accepted, than diets comprising 800 kcal *(46)*.

10.5.2 Physical activity and exercise management

The combination of exercise and diet is more effective than either method alone in promoting fat loss *(47)*. Exercise also limits the proportion of lean tissue lost in slimming regimens *(48)* and limits weight regain *(47,49)*, while physical activity may favourably affect body fat distribution *(50)*.

Physical activity has numerous beneficial effects regardless of BMI and age. Individuals who engage in moderate or vigorous exercise at least weekly 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 show consistently the benefits of physical activity and exercise on both physiological and psychological well-being *(50,51)*.

Table 10.3 summarizes mechanisms by which exercise can potentially improve the success of weight maintenance.

Table 10.3 Proposed mechanisms linking exercise with the success of weight maintenance *(52)*

Increased energy expenditure
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 • RMR • Diet-induced thermogenesis
Change in muscle morphology and biochemical capacity
Increased insulin sensitivity
Improved plasma lipid and lipoprotein profile
Reduced blood pressure
Better aerobic fitness
Positive psychological effects

Achieving appropriate physical activity levels

Evidence now suggests that the level of activity required to maintain and lose weight, and to gain physiological and psychological health benefits, may not be as vigorous as was previously believed *(50,53)*. Indeed, the US Surgeon General's report highlighted that low intensity, prolonged physical activity such as purposeful walking for 30 to 60 minutes almost every day can substantially increase energy expenditure, thus reducing body weight and fat *(50)*.

Physical activity strategies should focus on encouraging increased 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 kcal/hour to 200 kcal/hour depending on the intensity of the exercise. In overweight and obese patients who are sedentary, an extra three 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 *(54)*.

- ***Physiological fitness training with moderate/vigorous exercise***, usually involving three-weekly group-supervised exercise sessions of 45–60 minutes each. 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 musculo-skeletal problems are common in the obese, and will inhibit them from sustaining exercise at a level that uses a substantial amount of energy.

Improving compliance

Analysis of randomized trials of public involvement in physical activity programmes *(55)* has indicated that compliance is improved by:

- Home-based activities rather than structured programmes set in a special facility or centre.

- Frequent professional contact for encouragement 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.
- Accumulating physical activity over the course of the day rather than continuous activity *(50)*.

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

10.5.3 Behaviour modification

The primary goal of behaviour 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. Behaviour treatment is considered to be an essential component of any adequate obesity treatment programme *(56)*.

Description of treatment

Behaviour therapy has several core features:

- ***Self-monitoring:*** the detailed, daily recording of food intake and the circumstances under which it occurs provides essential information for selecting and implementing intervention strategies. It also forms part of the behaviour change 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 over-eating. For example, patients are instructed to separate eating from other activities so that they remain fully aware of their actions.
- ***Focus on improved nutrition:*** rigid dieting is discouraged in favour of balanced and flexible food choices.
- ***Cognitive restructuring:*** used to identify and modify dysfunctional thoughts and attitudes about weight regulation.
- ***Interpersonal relationships:*** addressed in order to cope with specific triggers for overeating and to increase 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 intervention for obesity. Behaviour therapy methods are effective in changing behaviour during the short term and consistently produce significant weight loss in patients with mild to moderate obesity. In the long term, however, results are not encouraging, with virtually all adult patients returning to their pre-treatment baseline within five years *(46)*. Long-term outcomes in children, by contrast, are more promising *(57)*; they indicate that behaviour change resulting from family-based therapy lasts 10 years or more. Further research is needed into ways of extending the effectiveness of behavioural techniques.

Limitations of behaviour therapy

It is thought that behaviour treatment is ineffective in the long term because patients fail to adhere to the self-regulatory strategies they learn in treatment. Some investigators have therefore highlighted the need for lifelong treatment; obesity is a chronic condition and treatments do not work when they are not used, whether behaviour, dietary or pharmacological *(56)*.

Other benefits of behaviour therapy

Despite its limitations in producing long-term weight loss, behaviour treatment is of value in modifying behaviours that are linked to adverse health effects and psychological distress, without necessarily causing weight loss in obese individuals. It can also modify behaviours that bear directly on health, such as reducing fat intake and increasing physical activity, although there are also problems in sustaining these in the long term. Finally, behaviour treatment can be used to help obese patients become more assertive in coping with the adverse social consequences of being overweight, in enhancing their self-esteem, and in reducing their dissatisfaction with body image regardless of their lack of success in losing weight *(58)*.

10.5.4 Pharmacological treatment

The pharmacological treatment of obesity is a rapidly evolving field. The information presented here was current at the time of writing.

Drug therapy for obesity has often been seen as a controversial option, largely due to a misconception of its rational use. It is currently undergoing re-evaluation, however, and the concept is now emerging of long-term prescription of drugs as an adjunct to other weight loss therapies or, more importantly, in helping to maintain body weight over time *(59)*.

Due to the paucity of data, no particular strategy or drug can yet be recommended for routine use. However, the availability of new evidence showing long-term efficacy and safety of several drugs currently awaiting approval is likely to rectify the situation. When prescribing pharmacological treatment to obese patients in the future it will be important to consider the effect of the drug on both weight loss (or weight maintenance) and co-morbidity, as well as any detrimental side-effects *(14,60)*.

Principles of drug therapy

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

- Currently approved drug therapy is best used in conjunction with diet and lifestyle management. Drugs for weight management assist patient adherence to 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.
- Like other medical interventions, drugs for weight management do not work if they are not taken *(61)*. Weight regain can be expected when drugs are discontinued.
- Drug therapy should be considered part of a long-term management strategy for obesity that is tailored to the individual. Risks associated with drug treatment should be balanced against the risks of persistent obesity.
- Drug treatment should be maintained only if it is considered to be safe and effective for a given patient. Current UK criteria suggest that the use of weight management drugs beyond three 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 therapy is added). However, this principle has been criticised as being unrealistic in most cases.

Drug therapy for obesity could be considered when patients:

- Have a BMI > 30 and treatment with diet, exercise and behaviour regimens has proved unsuccessful.
- Have substantial co-morbidities associated with a BMI > 25 which have persisted in spite of diet, exercise and behaviour treatments.

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

Classes of drugs for weight management

Weight management drugs can be broadly divided into two categories, those which act on the central nervous system to influence feeding behaviour, appetite and other mechanisms, and

peripherally acting drugs such as those which target the gastrointestinal system to 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. methyl cellulose) have any beneficial long-term action for weight reduction, these will not be discussed further. However, increasing dietary fibre as part of dietary modification may have a role in energy restriction.

Weight management drugs which are currently available in certain countries, or are under development, are listed in Table 10.4. A number of these are considered in further detail in the following sections on *Efficacy of currently available drugs* and *Drugs awaiting approval*.

Table 10.4 Weight-management drugs currently available for use or under development

Principal mode of action	Drug name
Centrally acting	
Noradrenergic	Phentermine
Serotonergic	Dexfenfluramine/Fenfluramine
Combined serotonergic and noradrenergic	Fenfluramine + Phentermine
Combined serotonergic and noradrenergic	Sibutramine
Peripherally acting	
Lipase inhibitor	Orlistat (Tetrahydrolipostatin)
Peripherally and centrally acting	
Thermogenic and anorectic	Ephedrine/Caffeine

Efficacy of currently available drugs

A clinically useful drug for obesity treatment should have the following characteristics *(62)*:

- Demonstrated effect on reducing body weight and weight-dependent disease[a]
- Tolerable and/or transient side-effects
- No addictive properties
- Maintained efficacy when used long-term
- No major problems after years of administration
- Known mechanisms of action(s)
- A reasonable cost

[a] Safe and efficacious dosage should be consulted in appropriate medical references and is beyond the scope of this document. Also note that drug approval agencies such as the US Food and Drug Administration (FDA) require that drugs produce at least 5% greater weight loss than in the placebo condition or, alternatively, result in significantly more subjects achieving a 5% or 10% weight loss than in the placebo condition.

Box 10.1

Withdrawal of fenfluramine and dexfenfluramine, September 1997

Subsequent to the June 1997 WHO Consultation on Obesity, new evidence has emerged showing significant potential side-effects (heart valve problems) associated with the use of fenfluramine and dexfenfluramine, either alone or in combination with phentermine. The manufacturers agreed to withdraw voluntarily both treatments from the market on the basis of concern expressed by the US FDA. These new findings do not invalidate the principles of drug therapy for obesity; instead, they emphasize the critical importance of fully evaluating both efficacy and safety of drugs over several years, and reinforce the current process which seeks to develop drugs with targeted sites of action.

Dexfenfluramine

Dexfenfluramine is currently available, and considered to be suitable, for long-term treatment of obesity in the USA and many other countries. This is primarily based on the results of a large international double-blind placebo-controlled trial which showed that the percentage of patients losing more than 10% of initial body weight was approximately doubled by addition of dexfenfluramine to a calorie-restricted dietary regimen, and that the weight loss was sustained over the 12 months of the trial *(63)*. A separated smaller study in Australia gave similar results *(64)*.

Weight lost as a result of dexfenfluramine has been associated with preferential loss of visceral adipose tissue *(65)* and reduced waist circumference (although surprisingly few studies document fat loss), as well as with reduced hypertension, hyperglycaemia and hyperlipidaemia *(66,67)*.

Dexfenfluramine does not appear to be addictive. However, reported side-effects include moderate and transient tiredness, drowsiness, dry mouth and diarrhoea. Concern has also been raised over increased risk of pulmonary hypertension *(68)*, although the risk is considered to be small compared to the potential benefits when dexfenfluramine is prescribed appropriately *(69)*.

Phentermine

Phentermine and fenfluramine were each approved for use in the treatment of obesity by the FDA in the USA a number of years ago. However, the drugs are very often used in combination in the USA despite the fact that such a prescription has never been explicitly approved (the number of prescription for "fen-phen" in the USA exceeded 18 million in 1996). Using the drugs in combination is thought to be as effective as using either drug alone, with the added advantage of the need for lower doses of each agent.

Weintraub and others recently evaluated the use of phentermine plus fenfluramine as an adjunct to other forms of weight control therapy in a long-term clinical trial. The continuous combination

therapy was significantly more efficacious than placebo, subjects lost 14.2 kg after 34 weeks of treatment with "fen-phen" although this had declined to 11.6 kg after 104 weeks, 9.4 kg after 156 weeks and 5.0 kg after 190 weeks. Concomitant improvement of risk factors was also observed *(70–73)*.

Ephedrine and caffeine combination

Data from a study by Astrup et al. illustrate the sustained effects of ephedrine in combination with caffeine on body weight when administered with a restrictive diet over a one-year period *(74)*. Although ephedrine and caffeine have demonstrated thermogenic effects, around 75% of weight loss was attributed to the anorectic properties of this combination.

Drugs awaiting approval

Sibutramine

Sibutramine is a new pharmacological agent developed for the treatment of obesity. It combines the beneficial effects of serotonergic and adrenergic agents by inhibiting re-uptake of these neurotransmitters. Controlled trials in obese patients have shown consistent results, with dose-related weight loss maintained to 12 months *(75,76)*. Weight loss is accompanied by a reduction in WHR, and by improvements in blood lipids and glycaemic control *(77)*. 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 monitored closely. However, in longer trials blood pressure has been shown to decrease with loss of weight in sibutramine-treated groups *(78)*. An approval letter has recently been issued in the USA for this drug by the FDA.

Orlistat

Orlistat is a pancreatic lipase inhibitor that blocks digestion of dietary fat *(79)*. Undigested fat is excreted unchanged in the faeces, causing an increase in stool fat loss of up to 30% of ingested fat. Side-effects are restricted to transitory gastro-intestinal upsets which may include anal leakage if patients continue to consume high-fat diets *(80,81)*. Although short-term trials have not shown any nutritional problems, concern has been expressed about potential reduction in the absorption of fat-soluble vitamins and carotenoids, and the results of longer-term trials will have to be evaluated when published. In the USA, orlistat was recommended for approval by the FDA's Endocrinology and Metabolic Drugs Advisory Committee.

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 *(60)*.

Diuretics, human chorionic gonadotrophin (HCG), amphetamine, dexamphetamine and thyroxine are not treatments for obesity and should not be used to achieve weight loss. Thyroxine should

be prescribed only 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 re-uptake inhibitors (SSRI) have a legitimate use in the treatment of a depressive condition associated with obesity but not for obesity itself. They may help some patients to 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 therapy

While clinical tolerance of most drugs appears acceptable, their long-term use raises concerns over safety. The importance of this issue has been highlighted by the recent reports of primary pulmonary hypertension in a small number of patients taking fenfluramine and dexfenfluramine.

As with drugs prescribed long term for other chronic diseases (e.g. hypertension, NIDDM), the risks associated with long-term drug therapy for weight management have to be weighed against the potential benefits in 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 *(78)*. However, more research is needed before criteria can be recommended. Long-term outcomes also need to be assessed.

Comparative trials as new drugs enter the therapeutic field, particularly with regard to reduction in co-morbidities, are warranted.

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 a kg/weight loss basis, surgical treatment has been estimated after four years to be less expensive than any other treatment *(82)*.

Surgical procedures

A variety of different surgical methods are available for the treatment of obesity. These are generally based on two principles, restriction of energy intake and malabsorption of food. Some surgical methods achieve a combination of both restriction and malabsorption effects. However, there is now clear agreement that vertical banded gastroplasty, Roux-en-Y gastric bypass, duodenal switch and the use of certain laparoscopic techniques are among the procedures considered effective. Full evaluation of long-term safety and efficacy is pending. Intestinal *(16,83)* bypass surgery is no longer recommended as a surgical option to treat obesity.

Patient Selection

Patients should be selected for surgery according to the following principles:

- Non-surgical treatment including dietary measures and weight-reducing drug therapy should be tried first.
- Surgery with gastric plication procedures should be used only on well-informed and motivated patients with acceptable operable risks.
- Patients should have a BMI > 40 or >35 together with high-risk, life-threatening co-morbid conditions.
- Surgery should be undertaken only by an experienced surgeon in an appropriate clinical setting which incorporates expert medical surveillance, access to ventilator facilities and the support of a multi-disciplinary team.

Improvements after surgery

Substantial weight loss of more than 20 kg generally occurs within 12 months of the operation, although some weight is regained within 5 to 15 years. Analysis of patients from the SOS study in Sweden showed weight losses of 30–40 kg over two years depending on the surgical procedure used *(84)*.

Surgical gastric bypass treatment ameliorates obesity-related morbidity in the majority of obese patients. In the SOS study, surgical treatment remitted NIDDM in 68% of obese patients and 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- to 4-fold risk reductions with respect to the development of hypertension and other cardiovascular risk factors *(84)*. In addition, surgical treatment has been shown to prevent progression of impaired glucose tolerance to NIDDM *(85)*.

Quality of life measures including employability, median wage, sick days, social interaction, mobility, self-image, assertiveness and depression are also improved in the majority of patients after anti-obesity surgery. Recently, patients in the surgical intervention group of the SOS reported marked improvements in social interaction, perceived health, mood, anxiety, depression and obesity-specific problems compared to controls *(84)*.

Risks associated with surgery

Risks associated with gastric surgery include micronutrient deficiencies, neuropathy, postoperative complications, "dumping syndrome", and late post-operative depression *(83)*. It has been proposed, however, that most of the complications associated with this type of surgery, unlike most other surgery, are modifiable with behaviour therapy. Kral 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 *(86)*.

Operative mortality in experienced centres is a fraction of the mortality observed in unoperated patients and in those remaining on waiting lists for operations *(87)*.

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

10.5.6 Alternative systems of medicine

Many countries have traditional medical systems which operate in addition to, or in place of, conventional medical services. Traditional therapies 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 such preparations, there is anecdotal evidence for their potential value. For example, some preparations that contain chilli or other products containing capsaicin have been shown to increase energy expenditure by increasing thermogenesis *(88)*. More research is required to evaluate the potential use of such traditional remedies.

Caution is necessary, however. A variety of herbal preparations which are 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 therapies

A number of non-conventional therapies have been promoted as effective in the management of weight but there is very little objective research into these claims. Uncontrolled trials of acupuncture and yoga have shown a beneficial effect in assisting weight loss, and an assessment by Rand and Stunkard indicates that support from psychoanalysts can produce favourable weight loss and maintenance in their patients *(89)*. There is no evidence that hypnotherapy for obesity is any more effective in the long term than the usual diet and behaviour modification programmes *(90)*. However, hypnosis may improve self-image and possibly help patients to adhere to a prescribed diet *(91)*.

10.6 Special issues in the 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 focus on weight loss, child treatment targets the prevention of weight gain. Children experience increases in lean body mass as they age, and so reducing or keeping fat mass 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 Chapter 8), because childhood obesity substantially increases the risk of adulthood obesity (see Chapter 7). Treatment of childhood obesity should therefore be considered alongside selective prevention 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 to support the concept that treatment of childhood obesity prevents later adulthood 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, 158 children who were at high risk for significant adulthood 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% to 50% overweight, and had at least one obese parent. The studies investigated different treatment conditions, but all involved a diet plan together with group behaviour modification presented intensively over an 8- to 12-week period, followed by monthly maintenance sessions for 6 to 12 months *(33)*.

After ten years of follow-up, six out of nine actively treated groups showed a net reduction in percent overweight of between 10% and 20% (Figure 10.1). The three remaining groups did not succeed in the long term, but this is thought to be due to a lack of focus in the interventions offered to those groups.

It may be premature to make broad generalizations about the efficacy of obesity treatment in children, especially as the high level of support given in the study may not always be feasible, and the children in these studies were recruited from largely white, middle-class, intact families. However, these studies give reason for optimism in that comprehensive behaviour treatments appear to offer enduring benefits to obese children. A much needed research step is to conduct a longitudinal trial that evaluates whether results like those achieved by Epstein and colleagues can be replicated at other sites and in other populations, and whether tangible health benefits, both in the health and social domains, can be demonstrated.

10.6.2 Treatment of obese children

Overweight and obesity during childhood are among the major risk factors for the development of obesity in adulthood, with approximately 30% of obese children becoming obese adults *(92)*. Childhood obesity affects health, resulting in lowered fitness, increased blood pressure and adverse blood lipid levels (see Chapter 4). In addition to the immediate health effects, being obese in adolescence increases the risk of adult morbidity and mortality 50 years later, independent of the effects of adult obesity *(93,94)*. These are powerful reasons for developing effective obesity therapies for children.

Reducing energy intake and improving dietary quality in overweight and obese children

It is generally recommended that only small reductions in energy intake be made to 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 *(95)*.

Limiting take-away and ready-prepared foods, which tend to be particularly high in fat and energy-dense, may help also help to control energy intake. These foods are making increasingly larger contributions to the energy intake of children and adolescents around the world *(96–98)*. Children should also be encouraged to eat fewer high-fat snacks such as crisps and biscuits, and to avoid consuming a large proportion of total energy from sweetened beverages or even to choose unsweetened drinks or water. One study on prepubertal children which attempted to reduce fat intake over 12 months did not achieve weight loss or reductions in weight gain within the target group despite achieving some dietary change *(99)*. However, these children were not obese.

Promoting consumption of food high in complex carbohydrate, 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 with these into adulthood.

Increasing physical activity in overweight and obese children

Research into 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 effective management of childhood obesity, and that the combination of diet and exercise is more valuable for long-term control *(100)*.

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 *(100)*. Obese children are particularly sensitive to peer attitudes towards body shape and exercise performance, and have the same problems as adults associated with adhering to long-term exercise programmes. Since this tends to limit their willingness to be involved in team sports *(101)*, it is likely to be counter-productive to focus too much attention on the re-introduction 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 over type and level of activities, as well as by providing positive reinforcement of their achievements during exercise rather than only after successful completion of the exercise session *(100)*.

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 for 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 *(100)*. Thus, although improvement of aerobic fitness is likely to be beneficial, it should not be an overriding concern.

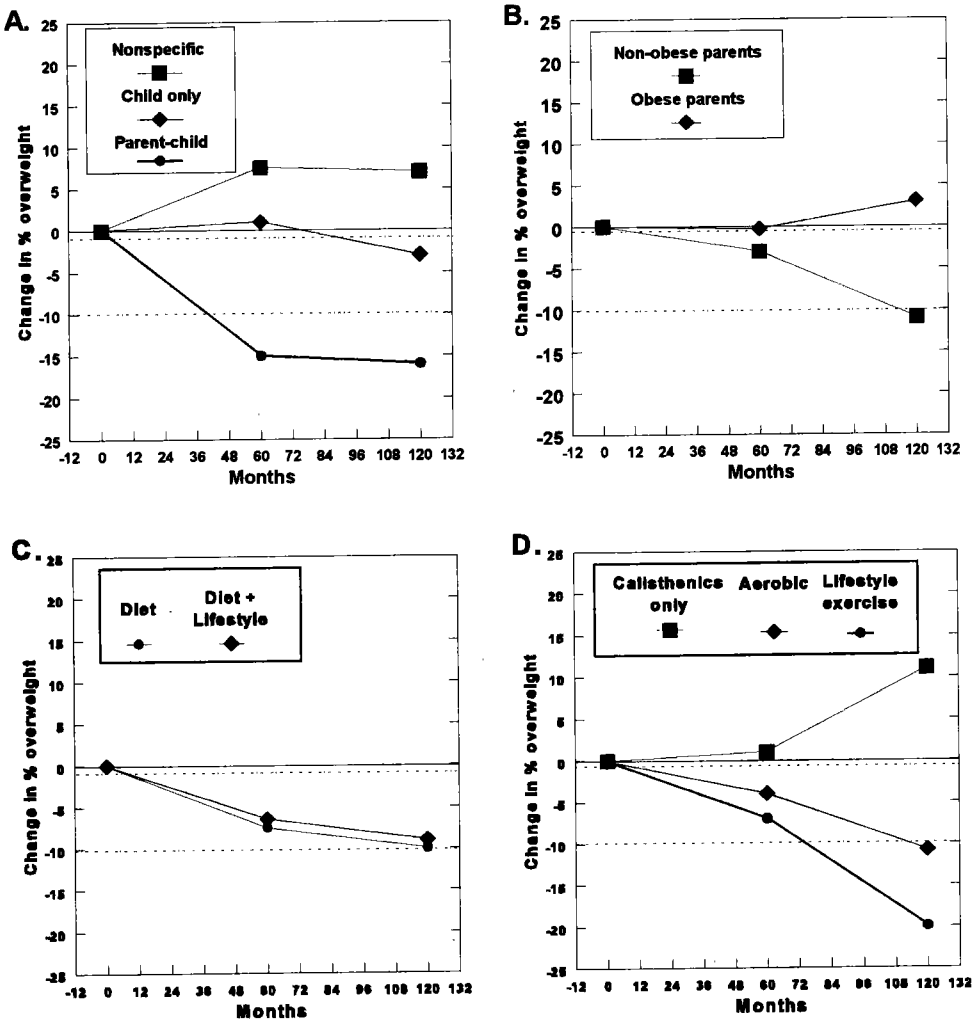
Reducing time spent in sedentary behaviour

New research is beginning to indicate that the amount of time spent in sedentary behaviour or inactivity may have an even more important role than low levels of physical activity in the genesis of children's weight problems. The rapid rise overweight in childhood has been mirrored by an explosion of non-active leisure pursuits for children such as computers and video games. Television represents the principal source of inactivity for most children and adolescents in developed countries and has been linked to the prevalence of obesity *(102,103)*. Television viewing is also associated with increased intake of high-energy snacks *(103,104)*. Of particular interest, a recent study by Epstein et al. 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 *(105)*.

The role of drugs and surgery in treating childhood obesity

Limited information is available regarding the use of aggressive forms of therapy such as drugs and surgery for children and adolescents although such therapies may be indicated in children with potentially lethal complications of obesity.

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



The 95% confidence interval for the total sample of children is represented by dotted lines. The interventions all contained a diet and behaviour change component plus specific approaches under investigation.

The results of four separate studies in which Epstein et al. examined the impact of different interventions for obesity management in overweight children. All studies had the same basic diet and behaviour 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 non-specific directions. Study B compared relative weight changes in children of obese and non-obese parents. Study C examined the benefit of adding lifestyle exercise to a diet programme. Study D compared the effectiveness of different forms of exercise in aiding weight control. The children and parents were followed up 5 years and 10 years after the initial programme. The results show excellent long-term benefits and demonstrate the value of family support, a positive family environment and the value of unstructured (lifestyle) exercise in weight control for children *(57)*.

10.6.3 Appropriate settings for the implementation of prevention and treatment therapies in children

Three key settings for implementing obesity management support programmes aimed at children can be identified: family-based, school-based programmes, and primary-care based programmes. These are considered in detail below.

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 efforts would appear to be the families of susceptible children. Indeed, the provision of appropriate education on eating and lifestyle behaviour to parents has been shown to significantly reduce the prevalence of obesity in children of participating families for periods of three months to three years when compared to families not receiving advice and support *(106)*. Parental attitudes, purchase and presentation of food, parental modelling of eating and exercise habits, and support for active leisure pursuits can all effect 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 to those treated alone *(107)* and Wadden et al. made similar findings in black American teenage girls *(108)*. A more detailed analysis by Epstein et al. suggested that weight regulation effects are improved if at least one parent is included with the child in treatment. When the effect of targeting an overweight child alone was compared with that of targeting a child and a parent together, the latter group showed significantly less weight gain at five years follow-up and were still below the relative weight at which they started the study at ten years follow-up (Figure 10.3B) *(57)*. Furthermore, children of non-obese parents were better able to obtain and maintain reductions in relative weight (Figure 10.3C). Epstein's findings are especially important because maintenance of relative weight occurred 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 directing obesity preventive efforts at the family of susceptible children there is the added bonus that all members of the family are likely to benefit. This helps to increase social support and to reduce feelings of isolation that may occur 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 *(56)*.

School-based programmes

There are a number of reasons that justify for instituting obesity prevention programmes through schools. A large proportion of children attend school (although this percentage varies from country to country) and a great deal of a child's eating and exercise is carried out 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 commencement of schooling correlates with a period of increased risk for excessive weight gain as children begin to exert independence and vary their diet and activity patterns in line with their new circumstances.

Results from various school-based obesity intervention programmes targeting high-risk children and adolescents suggest that these can be successfully implemented and can reach substantial proportions of children in need of obesity prevention *(109–111)*. Obese children in treatment groups have consistently shown greater reductions in percentage overweight than untreated obese controls. Results over periods of three to six months are modestly encouraging and would seem to justify additional research in this area.

Increasing physical activity through integrating regular exercise programmes into the school curricula is a strategy that has often been proposed as an effective means of improving weight and health status of children *(112,113)*. The evaluation of a two-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 *(114)*. A subsequent study which built on this project by including classroom lessons on nutrition and physical health was also able to demonstrate improvements in indices of fitness and body fat levels *(115)*. Similar programmes have been run in US *(100)* and Singapore schools *(116)* where short-term results appear promising. However, despite beneficial results, the maintenance of these programmes within the school curricula in the long term has proved more 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 under-valued and under-utilized *(16)*. One UK general practice has had some success in reducing obesity by providing healthy eating advice to pregnant women and their children.

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. This indicates that similar strategies may be equally effective in prevention *(117)*. Regular assessment and contact through home visits provide an excellent opportunity for education about potential lifestyle risk factors associated with obesity, as well as 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 *(118)*. 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. It is vital that the following issues be considered 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 forms of psychological distress *(56)*.

- ***Risk of isolation*:** it is important that overweight children not be ostracized and made to feel any more different from their peers than is necessary either at home or at school *(93)*. 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 sole goal is to lose weight.

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Section E

Challenges for the next millennium

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 General conclusions

1. Obesity (BMI $\geq$ 30) is a disease that is largely preventable through changes in lifestyle. Overweight (BMI $\geq$ 25) is a major determinant of many NCDs including NIDDM, CHD and stroke, and it increases the risk of several types of cancer, gallbladder disease, musculoskeletal disorders and respiratory symptoms. In some populations, the metabolic consequences of weight gain start even at modest levels of overweight. The costs attributable to obesity are high not only in terms of obesity's contribution to increased health care costs and premature death, particularly from co-morbid diseases, but also in view of related disability and diminished quality of life.

2. The prevalence of overweight and obesity is escalating rapidly worldwide. In many developing countries overweight and obesity co-exist with undernutrition. This presents a double burden for those countries and their efforts to combat both should be balanced carefully. There is an urgent need to prevent or reverse unhealthy trends in diet and physical activity patterns in developing countries.

3. Some individuals may become overweight and obese because they have a genetic or biological predisposition to gain weight readily in an unfavourable environment. However, the fundamental causes of the obesity epidemic are societal, resulting from an environment that promotes sedentary lifestyles and the consumption of high-fat energy-dense diets. These two principle factors interact, so while it is possible for people who sustain moderately high levels of physical activity throughout life to tolerate diets with a higher fat content (e.g. 30% to 40% of energy), increasing evidence suggests that lower fat intakes (e.g. 20% to 25% of energy) are needed to minimize energy imbalance and weight gain in sedentary individuals and societies.

4. Prevention of overweight and obesity should begin early in life. It should involve the development and maintenance of life-long healthy eating and physical activity patterns. In adults, the prevention of overweight should include efforts to prevent further weight gain even when BMI is still in the acceptable range. Healthy lifestyles, including balanced diets of lower energy density (increased vegetables, fruits, grains and cereals) with increased levels of physical activity (such as walking) and reductions in sedentary behaviour, should be promoted. Prevention is not just the responsibility of individuals but requires structural changes in societies.

5. Management of individuals who are already obese should combine a primary goal of long-term weight maintenance with appropriate treatment to achieve a modest weight loss (5% to 15% initial weight) and management of co-morbidities. Individuals and groups who are at high risk of becoming obese in the future because they are overweight (BMI 25–29.9) should also receive medical attention but here the emphasis should be on prevention of weight gain. Appropriate support and assistance for making sustainable dietary, physical, activity and other healthy lifestyle changes should be an intrinsic part of all management strategies. Drug therapy and surgery can be considered as adjuvant therapy for obese individuals who fail to respond to primary management approaches, especially when there is concurrent risk from other NCDs. However, many countries lack health care delivery systems to implement such a management system. There is an urgent need for adequate training of health professionals and selected lay people, based on the principles outlined above and recognizing that stigmatization of the obese is counterproductive.

6. Obesity cannot be prevented or managed solely at the individual level. Communities, governments, the media and the food industry need to work together to modify the environment so that it is less conducive to weight gain. Such partnerships are reqired to ensure that effective and sustainable changes in diet and everyday levels of physical activity can be achieved throughout the community. This approach will also allow obesity prevention and management strategies to be harmonized with existing public health policies and programmes for the control of all NCDs.

11.2 Recommendations

This section sets out the recommendations from the June 1997 WHO Consultation on Obesity on how best to tackle the global epidemic of obesity. They are presented in line with the overall structure of the report as follows:

- Defining the problem of overweight and obesity
- Establishing the true costs of the problem of overweight and obesity
- Understanding how the problem of overweight and obesity develops
- Addressing the problem of overweight and obesity

The recommendations in sections A, B and C are mainly concerned with identifying priority areas for further research. The recommendations in section D deal primarily with strategies and actions required to manage effectively the global epidemic of obesity.

11.2.1 Section A. Defining the problem of overweight and obesity

International classification of overweight and obesity

General recommendations

For meaningful comparisons between populations, the classification of overweight and obesity should be standardized on an international basis.

- ***Adults***: The existing WHO classification of adult body weight status based on BMI is endorsed with minor modifications. The category of "overweight" (BMI $\geq$ 25) is subdivided into "pre-obese" (BMI 25–29.9) and "obese" (BMI $\geq$ 30). The category of obese is further subdivided into 3 classes:
  - Obese class I: BMI 30–34.9
  - Obese class II: BMI 35–39.9
  - Obese class III: BMI $\geq$ 40
- ***Children***: The existing WHO classification of overweight and obesity in children based on weight-for-height values of +2SD or more of the median NCHS (National Center for Health Statistics) reference curves should be used until a new consensus is reached and a more appropriate classification system can be recommended. Caution is needed when interpreting BMI data collected from populations with stunted children, especially in countries undergoing rapid nutrition transition, as the relationship of BMI to adiposity may be altered.

Priority areas for further research

- Establishment of the most useful standard methodology for defining childhood and adolescent obesity which should then be used to formulate new reference curves for growth and to evaluate existing and future child and adolescent data sources from around the world.
- The validity and tracking of simple measures of excess weight, e.g. BMI-for-age and sex in children and adolescents from different societies and ethnic groups.
- The relationship between BMI and adiposity in stunted children.
- BMI standards for the elderly (> 60 years or > 80 years).

International comparisons of obesity rates

General recommendations

Cross-sectional studies utilizing nationally representative samples should be regularly undertaken in all WHO regions to facilitate international comparisons of adulthood obesity rates, to predict the magnitude of the future obesity problem, and to monitor and evaluate the effectiveness of intervention strategies. These studies should document BMI and waist circumference and assess progressively the variety of intervention strategies underway.

- Countries in WHO's African Region, Region of the Americas, and South-East Asian and Eastern Mediterranean Regions are particularly in need of regular larger scale surveys of body weight status.

- Data should be recorded according to a standard protocol, i.e. utilizing the WHO classification system for body weight status (BMI $\geq$ 25 for overweight and BMI $\geq$ 30 for obesity) and based on measured rather than self-reported height and weight.

- Data should be age-standardized and divided according to urban and rural areas.

- Where appropriate, data should be linked to morbidity and mortality outcomes (e.g. WHO's International Classification of Diseases).

- Countries with the highest obesity rates and/or where secular trends in obesity are rising rapidly should be identified within each WHO region and highlighted in regional reports.

- Waist circumference measurements should be included as a useful additional tool for more readily identifying NCD risk.

11.2.2 Section B. Establishing the true costs of the problem of overweight and obesity

Health impact of overweight and obesity in adults

General recommendations

The health consequences of overweight and obesity should be fully evaluated in all parts of the world and among different ethnic groups.

- Short-duration studies are useful for identifying the major health impact of obesity. However, long-term monitoring of health indicators is required to determine the full range and impact of obesity-related illnesses, and where the outcome (e.g. cancer) is the result of a multistage process in which obesity has an effect on some, but not necessarily on all, stages.

- Standard procedures for estimating the relative risks of chronic health problems associated with weight gain and obesity should be established.

- The prevalences and relative risks in different societies of the chronic health problems associated with obesity should be documented.

- The psychosocial impact of weight gain should be re-evaluated using modern psychosocial techniques.

Priority areas for further research

- The relationship between obesity and the development of certain cancers.

- The non-fatal health consequences associated with obesity, especially in developing countries.

- The interactions between measures of fatness (specifically BMI and waist circumference) and both dietary factors and physical actvity in determining obesity co-morbidities.

- The sex and population-specific relationships between measures of fatness (specifically BMI and waist circumference) and both morbidity and mortality.

Health impact of overweight and obesity in childhood

General recommendations

The health consequences associated with overweight and obesity in childhood and adolescence need to be investigated further.

Priority areas for further research

- The long-term health consequences of childhood obesity and its persistence into adulthood.
- The implications of early excess weight gain in different populations and ethnic groups.
- The nature of the association between rapid childhood growth, early menarche and the later risk of breast cancer.

Health impact of weight loss

General recommendations

The health benefits and risks of weight loss need further investigation through well-controlled studies which distinguish between unintentional weight loss (which may result from underlying disease or smoking) from intentional weight loss.

Priority areas for further research

- An accurate definition of the health benefits and risks for both morbidity and mortality of sustained weight loss (i.e. > 2, and preferably 5, years).
- The quantification of the health impact of varying degrees of weight loss in individuals, with and without co-existing disease.
- The impact of weight cycling on obesity-associated illness and the likelihood of future weight gain.
- The impact on intentional weight loss of alterations in the diet and physical activity.

Economic impact of overweight and obesity

General recommendations

The economic burden of overweight and obesity should be systematically evaluated in all regions of the world using a standardized methodology.

- Evaluation is required in a variety of health care systems so that different countries and regions can apply the analyses to their own national and regional policies.

- Wherever possible, assessments should include an analysis of the broader social and quality of life issues relating to excess weight gain.

Priority areas for further research

- Evaluation of the relative cost-effectiveness of different management strategies aimed at both the prevention and treatment of excess weight gain.

11.2.3 Section C. Understanding how the problem of overweight and obesity develops

Providing a basis for intervention strategies

General recommendations

To enable the global problem of obesity to be in a coherent and progressive manner, it is essential that the range of factors implicated in its development, both from an individual and population perspective, are fully characterized and investigated through a coherent strategy of short- and long-term studies. In particular, the relative importance of dietary factors and physical activity patterns associated with living a modern lifestyle should be investigated further.

Priority areas for further research

- Dietary factors

  - The influence of the energy density and/or fat content of the diet on the propensity to consume excess energy relative to requirement, and how this relationship is influenced by different levels of physical activity.

  - The quantitative significance of sweetened foods or sweet-fat combination foods in promoting a passive over-consumption of energy.

- How taste preferences and eating patterns (including those associated with the consumption of energy-dense diets) develop during childhood and whether these are associated with any specific developmental stages.

- The optimum ranges of energy density and nutrient/energy ratios for children's diets that will promote appropriate growth and development but prevent the development of excess adiposity.

- Physical activity patterns

  - The relationship between levels of physical activity and future weight gain.

  - Factors that promote and re-inforce physical inactivity.

  - The relationship between obesity and sedentary behaviours such as television viewing, video watching and computer work in a wide variety of countries.

  - Quantification of the amount of voluntary energy expenditure necessary to prevent weight gain in adults in sedentary occupations.

  - Changes in food selection in the general population with relatively small changes in levels of physical activity.

- Societal and cultural factors influencing energy intake and physical activity patterns

  - The effects on the development of overweight and obesity in children of existing programmes in developing countries to combat undernutrition.

  - The relative influence of different aspects of modernization on the energy density of the food supply and levels of physical activity.

  - The influence of socioeconomic status, including educational level, on the risk of becoming obese.

  - The process of nutrition transition and its impact on average body weight in a population.

- Genetic/biological factors involved in weight gain and obesity

  - The identification of genes and mutations responsible for the susceptibility of some individuals and groups of people to weight gain in the presence of an energy-dense diet and a sedentary mode of life.

- The relative importance of vulnerable periods of life for the development of obesity.

11.2.4 Section D. Addressing the problem of overweight and obesity

Focus on prevention strategies

General recommendations

Considerably more attention should be given to strategies aimed at preventing weight gain and obesity. These are likely to be more cost-effective and have a greater positive impact on the long-term control of body weight than strategies designed to deal with obesity once it has fully developed.

- The development of effective strategies for the prevention of overweight and obesity requires action at three levels:
  - ***Universal/public health prevention*** (directed at everyone in the population).
  - ***Selective prevention*** (directed at subgroups of the population with an above-average risk of developing obesity).
  - ***Targeted prevention*** (directed at high-risk individuals with existing weight problems but who are not yet obese).
- Small-scale pilot projects should be carried out to determine the practicality and appropriateness of specific intervention strategies.
- Practical evaluation of obesity prevention programmes should be based on assessment of changes in the prevalence of overweight (BMI > 25) combined with short-term process indicators of dietary change and physical activity levels. Assessment of changes in the prevalence of obesity (BMI > 30) and its co-morbidities are less reliable but may be useful in the long term. Changes in the incidence of obesity and mean population BMI are more accurate measures of change in population weight status which can be used for a more detailed and closely controlled analysis.
- Current obesity prevention initiatives should be evaluated, their limitations identified and their designs improved.

Improving physical activity levels and healthy eating

General recommendations

Prevention of overweight and obesity should begin early in life. It should be based on the development and maintenance of life-long healthy eating and physical activity patterns.

- Schools should promote physical activity by incorporating a variety of recreational activities into teaching curricula. They should also encourage healthy eating through training in practical food skills and by adopting healthy nutrition standards for school meals.

- Community facilities should be designed and traffic and town planning policies should be developed to facilitate everyday walking and exercise in adults and children.

- Workplaces should promote physical activity and healthy eating by providing exercise and changing facilities, adopting healthy nutrition catering standards, and initiating other appropriate schemes.

- Obesity prevention and management interventions should be carefully designed so that they do not cause undue fear of fatness and precipitate eating disorders.

- Consumers should be educated and encouraged to demand food products of high nutritional quality.

- Strategies adopted should be population-specific, especially with respect to economic circumstances. Thus, for example, the main aim of physical activity interventions in developing countries should be to prevent any decline in physical activity that usually accompanies economic development, whereas the main emphasis in affluent societies should be to discourage existing patterns of sedentary behaviour.

The need for public health strategies

Obesity prevention efforts should focus on population-based (universal) public health strategies that aim to reduce the obesity-promoting aspects of the environment and to improve a population's knowledge about obesity and its management.

- Strategies should be multi-sectoral; governments, regional authorities, the food industry, the media, communities and the consumer should all be engaged in collaborative programmes.

- Strategies should aim to produce an environment which supports improved eating and physical activity habits throughout the entire community.

- Novel and practical strategies that go beyond traditional health promotion programmes should be investigated.

- Strategies should aim to achieve the optimum population median BMI range of 21–23. Adults from developing countries are likely to gain greater benefit from a median BMI of 23, whereas adults from affluent societies with a more sedentary lifestyle are likely to gain greater benefit from a median BMI of 21.

- Strategies should be adapted according to the specificity of each community or country.

- Improving the standard of living of all sectors of society, especially within often neglected native or minority populations, should be a priority for public health action in developing and newly industrialized nations.

- Lessons learned from past campaigns to address other public health problems (e.g. poor immunization rates and drink-driving) should be considered carefully and incorporated when designing public health strategies for controlling obesity.

The need for health care and community services

General recommendations

Obesity management programmes should be established within health care and community services to target individuals and subgroups of the population who have developed, or are at risk of developing, obesity and its co-morbidities.

- Primary health care services should play the dominant role, but hospital and specialist services are also required to deal with very high-risk individuals.

- Clear communication between the different levels of health care service is essential.

- Weight management services and protocols should be based on the principles outlined in this report but should be adapted to fit the circumstances of each country.

- In addition to strategies aimed at modest weight loss, strategies for weight maintenance and management of obesity co-morbidities should be an integral part of management programmes for individuals with existing overweight and obesity.

- Use of simple anthropometric methods, e.g. waist circumference and WHR, should be used to identify overweight individuals at increased risk of obesity-related illness due to abdominal fat accumulation.

- The efficacy of management schemes should be evaluated over a period of at least one year and preferably 2–5 years.

Priority areas for further research

- Further investigation to determine whether the documented successful management programmes for overweight in children and adolescents can be replicated under different situations and in different populations.

Improved training in the management of obesity

General recommendations

Improved training of all health care workers involved in the management of obese patients is urgently required.

- Obesity should be viewed as a serious medical condition in its own right. It is a disease which can be treated with lifestyle modification and effective management. Obesity warrants treatment even when co-morbidities are not present.

- Negative attitudes of health care prefessionals towards obesity and obese patients should be overcome, since stigmatization of obese individuals adds to the existing burden of this disease.

The need for evaluation

General recommendations

Systematic assessment and evaluation should be a routine part of all interventions aimed at preventing and managing overweight and obesity.

- The effectiveness of different weight management therapies should be evaluated in clearly defined groups of patients and in the social context of each country.

- The effectiveness of all public health programmes set up to prevent weight gain in the population should be evaluated.

- Sound experimental design and statistical principles should be used to critically evaluate the impact of each proposed intervention.

Priority area for further research

- More long-term studies are required to evaluate the benefit/risk ratio of prolonged and integrated management schemes (with and without the use of drugs) for weight loss and maintenance in terms of mortality, co-morbidities, quality of life and cost-effectiveness.

Shared responsibility

Obesity cannot be prevented or managed solely at the level of the individual. Governments, the food industry, international agencies, the media, communities and individuals all need to work together to modify the environment so that it is less conducive to weight gain.

- The prevention and management of overweight, obesity and associated co-morbidities require the synergism of national health policies on nutrition and NCD control.

- Effective government action for the prevention and management of overweight requires the co-ordinated participation of health, educational and agricultural sectors.

- Appropriate strategies for integrated approaches to the prevention and management of overweight include consumer education, development and implementation of dietary guidelines, food labelling, nutrition and physical education in schools, altered feeding programmes, and efforts to ensure truth in advertising.

- The food industry is responsible for developing and promoting affordable healthy food products.

- Governments should enforce adherence to regulations governing the marketing, advertising, and labelling of food.

- The media should not induce or exacerbate eating disorders, or encourage the stigmatization of the obese in societies where these factors are not yet associated with obesity.

- The support of international agencies and NGOs dealing with NCDs other than obesity is essential for developing successful public health efforts to control obesity in developing and newly industrialized countries.

Annex 1. Criteria of evaluating commercial institutions involved in weight loss (Scottish Intercollegiate Guidelines Network, 1996)

Appropriate criteria should include:

1. Identifying and recording an individual's BMI or an equivalent weight-for-height prior to advice being given.

2. Methods of record-keeping and analysis should be open to scrutiny by a health centre if patients are to be referred from the centre. Data on the health centre's patients should be available on request.

3. An admission protocol which excludes those within desirable weight range from a weight reduction programme.

4. Identifying an individual or family-based approach to weight reduction.

5. Providing clear written as well as oral guidance on the dietary regimen, used together with details of the expert(s) used in drawing up such guidance.

6. Specifying methods used, if any, for encouraging physical activity.

7. Defining the nature of behavioural modification programmes, the frequency of visits, the use of group or individual support and the origin of the behavioural scheme.

8. Whether food additives, drugs or other medicaments (e.g. ephedrine, caffeine homeopathic remedies, and nutrient supplements) are used in association with therapy.

9. Methods for verifying therapeutic claims made in advertisements or in weight management programmes.

10. The methods chosen to alert the members' doctors to untoward effects.

11. Any plans for coordinated activity with a health centre on weight management.

12. Experience, training and qualifications of staff.

13. Success criteria offered to clients.

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Annex 3. Agenda

1. Opening

2. Review of definitions and measurement standards of overweight and obesity

3. Global prevalence and trends in obesity among children and adults in developed and developing countries (particularly with regard to urbanization and lifestyle changes)

4. Factors contributing to the development of obesity

   4.1 Dietary factors affecting the physiological regulation of food intake

   4.2 Physical activity and body weight regulation

   4.3 Physiological and health factors promoting weight gain

   4.4 Individual susceptibility

   4.5 Environmental and societal factors contributing to weight gain

   4.6 Socio-economic and cultural influences

5. Health consequences of obesity

   5.1 Obesity as a risk factor for chronic noncommunicable diseases

   5.2 Other health effects of obesity

   5.3 Health consequences of obesity in childhood and adolescence

6. Development of prevention strategies

   6.1 The principles of obesity prevention

   6.2 Approaches to the prevention of obesity

   6.3 Current obesity prevention efforts

   6.4 Processes and strategies for preventing obesity

7. Development of management guidelines

   7.1 Assessing obesity

   7.2 Setting appropriate goals and targets

   7.3 Management strategies

   7.4 Evaluating success and usefulness of management

   7.5 Matching treatment and individual

   7.6 Management of obesity within health care systems as a public health priority

   7.7 Cost/benefits of obesity management strategies

8. Recommendations for action in: (a) prevention; (b) management; (c) research.

9. Conclusions and closing