

YOUR QUESTIONS ANSWERED
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OBESITY

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CHURCHILL
LIVINGSTONE

Obesity

YOUR QUESTIONS ANSWERED

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Preface

The World Health Organization recognizes obesity as the greatest health threat of the twenty-first century. The rapid rise in prevalence across the world has caught governments and health services by surprise, and the consequences are clearly evident. In the United Kingdom obesity now causes more chronic ill health than smoking, and accounts for more than 5% of national health service expenditure. The cost to individuals is immense with years of ill-health, early retirement, and a reduction in life expectancy of 9 years. However, it is not only adults who are affected: obesity is increasingly a phenomenon of childhood, and carries risks of comorbid disease into adult life. The crisis has prompted some to suggest that we are now producing a generation of children who may be outlived by their parents.

In February 2004, the Wanless Report for the UK government recognized the magnitude of the health crisis caused by obesity. Accepting the role obesity plays in a host of serious comorbid diseases, the report called for a radical change in the way health services should be delivered, demanding a shift in emphasis from a 'national health service which treats disease, to a national health service which focuses on preventing it'. Improving the health of the nation will save the NHS billions of pounds in the years ahead. The concept of disease prevention is not new, but what is unusual, and borne out by research, is the prediction that investing in the prevention and treatment of obesity will actually save money, not to mention improve the quality of life of millions.

The authors of this book have worked together for years in the National Obesity Forum UK to identify the optimum way to deliver 'best practice' in weight management in a clinical setting. We have met and discussed the concerns of health professionals across the world, and have found that in Europe, Asia or North America, the same challenges exist. Most health professionals are now convinced by the overwhelming evidence that obesity is a disease in its own right, but are concerned about low levels of professional training and resources, and a lack of local health service or even national governmental support. They are troubled by previous experience of treatment failures and a perception of the inevitability of weight regain.

This book is therefore written for health professionals who would like to provide weight management services, but are unsure how to proceed. It may also prove useful for those not directly involved in weight management

but who recognize the need to be well informed, and to be able to identify how obesity impacts on their own clinical domain. It has been written to inform about the compelling argument for the need for weight management; to provide a wealth of background knowledge of obesity, its causes and consequences; and, most importantly, to provide pragmatic advice concerning the initiation and ongoing provision of weight management services in a 'real-life' clinical situation. Drawing on our own clinical experience, and learning from the experience and evidence of others, we believe this book will equip health professionals with the skills to move from simply reacting to disease, to being able to prevent it. It discusses weight management in its broadest sense, and the realistic application of lifestyle change, involvement of commercial interests and self-help strategies, the use of pharmacotherapy, and surgery. It may be read 'from cover to cover' but also provides a bookshelf resource for occasional reference.

Treating obesity in practice is never easy. It requires skill, patience, empathy and determination. The authors hope that by writing this book they are able to help other clinicians agree that the treatment of obesity is both necessary and possible; and although inevitably they will not be able to help everyone, when patients do respond to treatment it can be profoundly beneficial to the patient, and extremely rewarding for the clinician.

We would like to express our gratitude to the Directors and the secretariat of the National Obesity Forum for their steadfast support over the years, and to all those experts in the field, in the UK and internationally – too many to mention – who have guided us and allowed us to benefit from their experience in drawing together the detail required to write this book.

IWC & DH

How to use this book

The *Your Questions Answered* series aims to meet the information needs of GPs and other primary care professionals who care for patients with chronic conditions. It is designed to help them work with patients and their families, providing effective, evidence-based care and management.

The books are in an accessible question and answer format, with detailed contents lists at the beginning of every chapter and a complete index to help find specific information.

ICONS

Icons are used in the book to identify particular types of information:



highlights important information



highlights side-effect information.

PATIENT QUESTIONS

At the end of relevant chapters there are sections of frequently asked patient questions, with easy-to-understand answers aimed at the non-medical reader. These questions are also listed at the end of the book.

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Contents

Preface	vii
How to use this book	ix
1. What is obesity?	1
2. What causes obesity?	13
3. The physical effects of obesity	31
4. The psychological effects of obesity	65
5. The costs of obesity	77
6. Management: lifestyle and behavioural therapy	85
7. Management: pharmacotherapy	121
8. Management: surgery	141
9. Obesity in children	155
10. The weight management clinic	171
11. The role of primary care	179
12. The future	183
13. Useful sources of further information and support	189
Appendix: Guidelines for managing obesity	197
References	213
List of patient questions	223

What is obesity?

1.1	How is obesity defined?	2
1.2	How common is obesity?	2
1.3	How is obesity measured?	3
1.4	What is body mass index?	4
1.5	What level of BMI is 'overweight'?	4
1.6	What are the limitations of BMI?	6
1.7	What is waist circumference?	6
1.8	How do you measure waist circumference?	7
1.9	Can children be obese?	7
1.10	How do you measure obesity in children?	7
1.11	Is the obesity epidemic worldwide?	8
1.12	Do the developing nations have high levels of obesity?	8
1.13	Are there any ethnic differences?	11

1.1 How is obesity defined?

There is a consensus between international organizations and world experts that obesity – excess adiposity – is a disease state of epidemic proportions. A disease can be defined as ‘a human condition that impairs normal function and implies ill-health’. In 1985, a panel of independent experts convened to discuss the implications of excess adiposity and agreed that the evidence supported the concept of obesity as a disease, and that an excess of body weight of more than 20% predetermined a significant rise in obesity-associated disease.

Although just how to define the disease of obesity remains controversial, what is clear is that the state of excess adiposity – which we call obesity – leads to a significantly increased risk of developing associated comorbid disease.

The storage of triglycerides in an average-weight man and woman, with 15% and 25% adipose tissue, respectively, equates to 10 and 15 kg. The role of body fat mass in a healthy functioning human is becoming increasingly well understood and, in addition to its endocrine influences, the fuel source it creates is necessary for tissue repair during exercise and periods of food deprivation.

Obesity is usually defined using the body mass index (BMI; *see Q 1.4* for the calculation of BMI). Generally speaking, a BMI ≥ 30 defines a state of obesity and a BMI ≥ 25 overweight. In an effort to produce alternative diagnostic criteria, researchers have attempted to define obesity by adipocyte cell size, but this has not been shown to be reliable or to have practical applications.

Until recently, the precise measurement of body fat mass was possible only by specialist physicians with access to expensive equipment, and so the concept of body fat mass as a diagnostic tool has not yet been clearly developed or accepted. Recent advances in body fat mass assessment technology are likely to promote more widespread use of this measurement as a diagnostic tool. However, at present, the accepted definition of obesity is a BMI ≥ 30 .

1.2 How common is obesity?

Severe obesity was rare in the first half of the twentieth century and was more commonly associated with the affluent classes, although some unfortunate obese individuals were displayed in ‘freak shows’ by travelling circuses.

Since the beginning of the twentieth century there has been a linear increase in the average BMI of the population, although in the past 50 years the prevalence of obesity has increased so rapidly that in many developed nations to be overweight is to be in the majority, and to be obese is no

longer unusual. In the UK between 1980 and 1997, levels of overweight in men increased from 39 to 62%, and in women from 32 to 53%. In the same time period, obesity in men increased three-fold from 6 to 17%, and in women levels rose from 8 to 20%. Recent UK figures put obesity levels at 22% for men and women. Similar patterns have been observed in the majority of developing nations. In the US current estimates put the prevalence of overweight in adults at 61%, and of obesity at 26%.

What is clear is that levels of obesity have been escalating rapidly and have reached epidemic proportions in many nations and throughout the world in general. If this was solely a cosmetic problem we would have little to fear. However, with the increasing prevalence of overweight and obesity has come a dramatic increase in obesity-related disease. Type 2 diabetes is the most commonly associated health risk and in the UK the current number of around 1.5 million type 2 diabetics is expected to double to 3 million over the next 10 years. We are therefore faced with a disease of epidemic proportions, with hugely significant implications for individuals, health services and national economies.

1.3 How is obesity measured?

The methods of assessment that are most relevant to non-research-based clinicians are BMI, waist circumference and bioimpedance analysis. These three forms of analysis are discussed in detail below.

Many different techniques exist to measure levels of body fat mass. Some of these, including potassium-40 counting and in vivo neutron-activation analysis, are of interest only to scientific researchers because they do not currently have any real practical applications. Others, such as computed tomography (CT) or magnetic resonance image (MRI) scanning, have useful clinical applications. In particular, they offer accurate results and can capture specific organ adiposity levels. However, access is limited to a few specialist centres and these techniques have little relevance to the majority of clinicians at the current time. They do, however, have an added use in helping to calibrate other more accessible methods of fat mass assessment. Of these, hydrometry – using isotope-labelled water – is the most accurate method of assessment in the very obese (>200 kg). Underwater weighing systems have been used for more than 100 years and are cheap to build, although the requirement for a large water tank – big enough for the very overweight – makes them an unlikely piece of equipment in the doctor's office! Dual-energy X-ray absorptiometry (DEXA) scans have proved useful in body composition analysis. They are safe and accurate and, although expensive, their application in several different medical fields makes them an attractive addition to some hospital centres.

Bioimpedance analysis is gaining acceptance as an accurate and inexpensive technique to measure body fat mass, and is usually very

acceptable to patients. Other simpler clinical measurements include skinfold thickness and the waist:hip ratio. Selected skinfold thickness provides an estimate of fat distribution, but largely estimates subcutaneous fat. With the development of bioimpedance technology there seems little clinical application for skinfold thickness today. The waist:hip ratio used to be used as an indicator of clinical risk but has been shown to be less accurate than the simpler waist circumference, and so has fallen into disuse.

1.4 What is body mass index?

Traditionally, obesity has been measured using the BMI. The concept of BMI was developed in Europe in the 1800s and was first used to monitor the trends in overweight populations; it was never intended to be used to determine an individual's status as overweight.

Obesity is a disease entity and it is the body fat mass and – more specifically – visceral, or abdominal, fat mass that leads to the destructive effects of insulin resistance (*see Chapter 3*) and the development of associated comorbidities.



The BMI makes no specific measurement of body fat, instead it measures an individual's total weight, relative to their height. Generally speaking, however, by default it provides a crude estimate of an individual's body fat and has therefore come to be accepted as the international 'gold standard' of obesity measurement. The BMI is calculated by taking an individual's weight (in kg) and dividing it by his or her height (in metres squared):

$$\text{BMI} = \text{weight (kg)} / \text{height (m)}^2$$

1.5 What level of body mass index is overweight?

The World Health Organization (WHO) defined the levels of obesity and associated risk of comorbid disease development by BMI in 1997 (*Box 1.1*).

Although no intermediate classification exists between BMI 30 and 40, the risk of comorbid disease development rises sharply. So although a patient with a BMI of 30 and a patient with a BMI of 39 would be perceived as having the same level of risk, in fact the difference would be quite marked.

Above a BMI of 40 the term 'morbid obesity' is used. 'Severe obesity' or 'grade 3 obesity' would perhaps be better because it would be misleading to convey the idea that risk of comorbid disease exists only above a BMI of 40 (*Fig. 1.1*).

BOX 1.1 Levels of obesity and the related risk of comorbid disease

- Underweight: BMI <18.5 is regarded as being underweight; there is a low risk of comorbid disease
- Normal weight: BMI between 18.5 and 24.9
- Overweight (grade 1 obesity): BMI between 25.0 and 29.9; the risk of disease is regarded as mildly increased
- Obese (grade 2 obesity): BMI of 30 and above is regarded as being obese; the risk of comorbid disease is significantly increased
- Morbid obesity: BMI ≥ 40

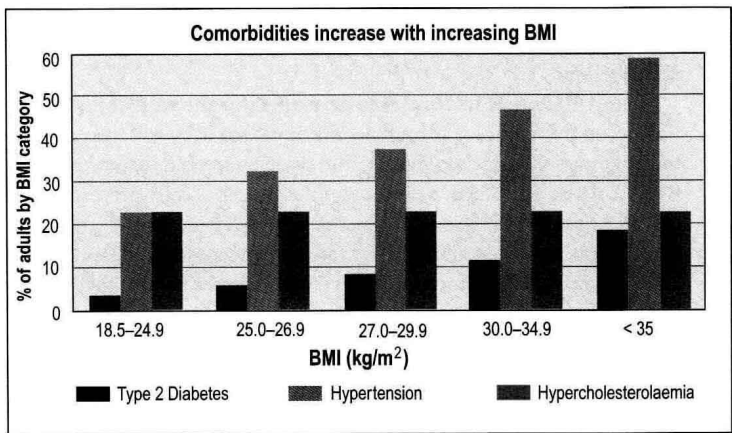


Fig. 1.1 Comorbidities increase with increasing BMI. *Tested fasting plasma glucose ≥ 126 mg/dL or self-reported as having responded positively to the question 'Have you ever been told by a doctor that you have diabetes or sugar diabetes?'. Excludes gestational and type 1 diabetes. *Tested blood pressure ≥ 140 mmHg systolic or 90 mmHg diastolic or self-reported as having responded positively to the question 'Have you ever been told by a doctor or other health professional that you have hypertension, also called high blood pressure?'. *Tested total cholesterol of 240 mg/dL or self-reported as having responded positively to the question 'Have you ever been told by a doctor or other health professional that your blood cholesterol level was high?' (from National Center for Health Statistics 2003).

1.6 What are the limitations of the body mass index?

As the name suggests, the BMI measures body mass, not body fat. It is possible for an individual to have a high BMI but a relatively low body fat mass. Typically, this can occur in athletes and very muscular, well-exercised individuals who have developed a high lean muscle mass and a low body fat mass. Even individuals undergoing weight management, particularly those who embrace intense and frequent exercise as part of their programme, may find that although they are losing fat their weight remains the same – because they lose body fat but gain muscle mass their BMI will appear relatively unchanged. The former New Zealand international rugby player Jonah Lomu is a case in point. At his peak, his height was 196 cm, his weight 118 kg, and therefore his BMI was 31, and within the range for obesity. He does, however, have an extremely well-developed muscle mass and his body fat mass is reputed to be only 9%. He is not therefore at any increased risk of comorbid disease. The BMI on this occasion is a misleading measurement.

The WHO range for BMI was developed for the study of white, Caucasian populations. It has become apparent in recent years that some racial groups do not demonstrate the same comorbid disease risk at a given BMI. Chinese and Asian peoples seem to be genetically predisposed to higher comorbid disease with much less body fat. It would seem appropriate to use an alternative model when assessing these patients, and perhaps the threshold for intervention should be changed to a lower BMI level.

1.7 What is waist circumference?



Waist circumference has been recognized as a useful measure of obesity. In 1998, Professor Mike Lean, of Glasgow University, showed that a waist circumference in men of ≥ 102 cm, and in women ≥ 88 cm carried the same risk of developing cardiovascular disease as a BMI of 30. This is because waist circumference is a measure of visceral, or abdominal, fat mass – independent of height and muscle mass. It is therefore a very useful indicator of excess body fat and increased health risk.

During a weight-loss programme, a 1-cm reduction in waist equates to a 1-kg body fat loss. Men can find the concept of ‘waist loss’ particularly appealing, often measuring their success in weight management in terms of their reduction in belt size, rather than weight loss alone.

1.8 How do you measure waist circumference?



Waist circumference is easily measured using a simple measuring tape. Some are specially designed and carry coloured sections to indicate levels of increased risk. The patient should be standing and relaxed, and shirt or blouse should be raised. The tape is passed around the waist, either by asking the patient to hold one end and the clinician walking around the patient, or by asking the patient to pass the tape around the waist. The tape should be placed laterally at the midpoint between the lowest part of the ribs and the highest point of the iliac crest, and centrally positioned 1 cm below the umbilicus. The patient should have exhaled gently. Waist measurement is most reliable if performed by the same clinician each time. It is easily and quickly performed by the patient at home if a regular review of progress is desired.

1.9 Can children be obese?

Children are very susceptible to the same if not more environmental pressures as adults. The past 30 years have seen a very rapid escalation in the numbers of overweight and obese children. In one UK study, between 1989 and 1998 the prevalence of overweight in inner city children under the age of 5 years increased from 14.7% to 23.6%, and the prevalence of obesity from 5.4% to 9.2%. Similar findings were reported between 1974 and 1994, with levels of overweight in UK children rising from 8–13% in girls. In 1999, 32% of 15-year-olds were reported to be overweight and up to 17% were clinically obese (Reilly & Dorosty, 1999).

Children display the same comorbid disease risk markers as adults. One-third of obese adolescents have at least one additional risk marker and another third have at least two. Once called ‘maturity-onset diabetes’ we are now seeing type 2 diabetes in teenagers in increasing numbers. Hypertension and dyslipidaemia are common. As many as 75% of obese adolescents go on to become obese adults and carry the same risk of comorbid disease into adulthood.

1.10 How do you measure obesity in children?

The BMI is the gold standard of obesity measurement (*see Q 1.1* for the calculation of BMI). However, BMI fluctuates throughout childhood and, in isolation, is therefore not directly applicable to the assessment of childhood overweight.

In 1997 the International Obesity Task Force agreed an international standard for BMI centile charts. The panel of experts agreed thresholds that approximated the 85th and 95th centiles. The lower threshold should be regarded as the level at which a child was to be regarded as being overweight, and the higher threshold equated to obesity. These centiles conveniently correspond to BMI levels of 25 and 30, respectively, in 18-year-olds.

In the US, some concern has been raised about the effect that classifying teenagers as 'obese' has on their willingness to engage in weight-loss programmes. Some authors refer to those above the 95th centile as 'overweight' and those between 85 and 94.5 as being 'at risk of overweight'. Semantics? Maybe, but this surely highlights just one of the many special concerns felt by those involved in managing overweight in children.

Waist circumference in children and adolescents has not been shown to fully represent the same level of excess adiposity as in adults and at the current time does not appear to have direct applicability to childhood obesity assessment.

Similarly, body fat mass analysis does not have direct correlation to BMI centiles and is not generally used. However, in seeking to engage some teenagers who are resistant to being weighed and having their BMI calculated, the author has found that many will be intrigued by body fat analysis, perhaps identifying with the technological approach and are attracted by the 'analysis' and read-out that follows.

1.11 Is the obesity epidemic worldwide?

What at first seemed a disease of the developed world has become a worldwide epidemic, affecting all nations and increasingly the developing countries. The US still tops the league with prevalence rates of obesity approaching 30%. Throughout Europe rates have been rising rapidly, even in those countries traditionally viewed as having healthy 'Mediterranean' diets. The UK has the fastest growing rates of obesity in Europe and obesity currently affects 22% of adults. Recently published prevalence rates for adult obesity are: France 7%, Australia 12% and New Zealand 14%.

1.12 Do the developing nations have high levels of obesity?

Nearly all developing nations have rising rates of obesity. In some of these nations the predominant nutritional concerns are of malnutrition, and rightly so. It is a continuing tragedy that in a world that produces more than enough food for the entire population there are still hugely significant numbers dying of starvation and malnutrition every year, while there are others – predominantly in the developed world – who are literally eating themselves to death (*see Fig. 1.2*).

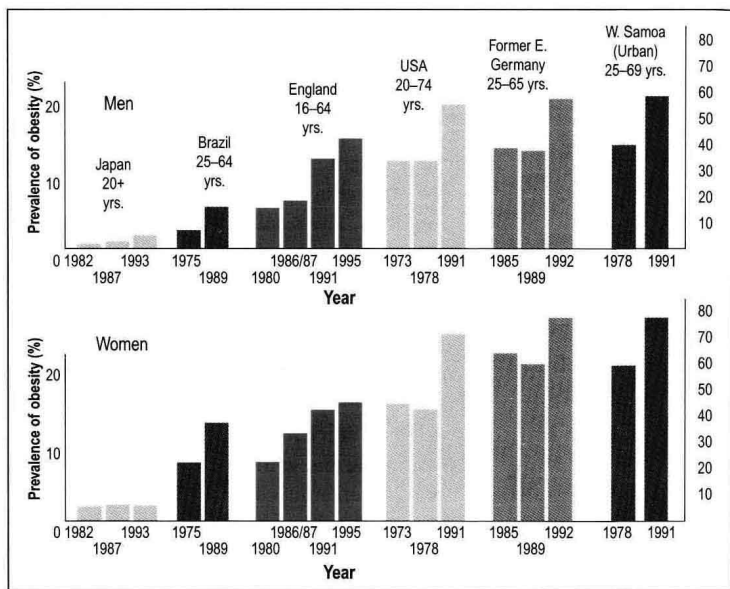


Fig. 1.2 The prevalence of obesity in developing nations (based on data from WHO 1997).

At first glance, obesity levels in many developing countries appear small. Very often data is unavailable or of poor quality. National statistics can mask regional variations and it is often in the cities of developing nations where the greatest problem of obesity is to be found. The pattern of obesity in developing countries mirrors that of Victorian England, when the affluent classes suffered most from the condition.

As Western dietary habits become more accepted the world over, it tends to be the young who abandon traditional dietary habits and indulge in the high-fat, high-sugar foods and drinks that are marketed so aggressively by multinational food manufacturers and retailers. So prevalent are the fast-food outlets that it has been said that the local cost of a McDonalds hamburger is the best indicator of the national economy! Attracted by an image of affluence and 'cool', sales of such foods to teenagers have increased rapidly in many corners of the world.

Nowhere demonstrates this better than South Korea. Fifty years ago, South Korea was a largely rural, agricultural nation. However, the civil war stand-off in 1954 resulted in South Korea depending very heavily on US influence: technological, political and cultural. Over the next 40 years the