TOOL E3 Measurement and assessment of overweight and obesity – ADULTS

For:	All healthcare professionals measuring and assessing overweight and obese children
About:	This tool contains detailed information on the measurement and assessment of overweight and obesity in adults. It provides details on how to measure overweight and obesity using Body Mass Index (BMI); how to measure waist circumference; how to assess overweight and obesity using BMI and waist circumference; how to assess the risks from overweight and obesity; and how to assess overweight and obesity using the height and weight chart. It provides specific details on Asian populations and brief details on the waist-hip ratio. This tool is consistent with NICE guidance and Department of Health recommendations.
Purpose:	To provide an understanding of how adults are measured and assessed.
Use:	To be used as background information when in consultation with an overweight or obese patient.
Resource:	*Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children.*[6] www.nice.org.uk *Measuring childhood obesity. Guidance to primary care trusts.*[207] www.dh.gov.uk

Measuring overweight and obesity using Body Mass Index

Adults

The National Institute for Health and Clinical Excellence (NICE) recommends that overweight and obesity are assessed using Body Mass Index (BMI).[6] It is used because, for most people, BMI correlates with their proportion of body fat.

BMI is defined as the person's weight in kilograms divided by the square of their height in metres (kg/m^2). For example, to calculate the BMI of a person who weighs 95kg and is 180cm tall:

$$\text{BMI} = \frac{95}{(1.80 \times 1.80)} = \frac{95}{3.24} = 29.32 kg/m^2$$

Thus their BMI would be approximately $29kg/m^2$.

NICE classifies 'overweight' as a BMI of 25 to $29.9kg/m^2$ and 'obesity' as a BMI of $30kg/m^2$ or more.[6] This classification accords with that recommended by the World Health Organization (WHO).[21] Further classifications linked with morbidity are shown on the next page. These cut-off points are based on epidemiological evidence of the link between mortality and BMI in adults.[21]

Classification of overweight and obesity among adults

Classification	BMI (kg/m²)	Risk of co-morbidities*
Underweight	Less than 18.5	Low (but risk of other clinical problems increased)
Healthy weight	18.5–24.9	Average
Overweight (or pre-obese)	25–29.9	Increased
Obesity, class I	30–34.9	Moderate
Obesity, class II	35–39.9	Severe
Obesity, class III (severely or morbidly obese)	40 or more	Very severe

Note: NICE recommends that the BMI measurement should be interpreted with caution because it is not a direct measure of adiposity (amount of body fat).[6]
*Co-morbidities are the health risks associated with obesity, ie type 2 diabetes, hypertension (high blood pressure), stroke, coronary heart disease, cancer, osteoarthritis and dyslipidaemia (imbalance of fatty substances in the blood).

Source: National Institute for Health and Clinical Excellence, 2006,[6] adapted from World Health Organization, 2000[21]

Adults of Asian origin

The concept of different cut-offs for different ethnic groups has been proposed by the WHO* because some ethnic groups have higher cardiovascular and metabolic risks at lower BMIs. This may be because of differences in body shape and fat distribution. Asian populations, in particular, have a higher proportion of body fat compared with people of the same age, gender and BMI in the general UK population. Thus, the proportion of Asian people with a high risk of type 2 diabetes and cardiovascular disease is substantial even at BMIs lower than the existing WHO cut-off point for overweight.

However, levels of morbidity vary between different Asian populations and for this reason it is difficult to identify one clear BMI cut-off point.[209] Thus in the absence of worldwide agreement, NICE recommends that the current universal cut-off points for the general adult population (see table above) be retained for **all** population groups.[6] This is in agreement with the WHO expert consultation group which also recommends trigger points for public health action for adults of Asian origin – 23kg/m² for increased risk and 27.5kg/m² for high risk.[210] NICE has recommended that healthcare professionals should use clinical judgement when considering risk factors in Asian population groups, even in people not classified as overweight or obese using the current BMI classification.[6] This approach is supported by the Department of Health and the Food Standards Agency.

Using the BMI measurement in isolation

Although BMI is an acceptable approximation of total body fat at the population level and can be used to estimate the relative risk of disease in most people, it is not always an accurate predictor of body fat or fat distribution, particularly in muscular individuals, because of differences in body-fat proportions and distribution. Some other population groups, such as Asians and older people, have co-morbidity risk factors that would be of concern at different BMIs (lower for Asian adults as detailed above and higher for older people). Therefore, NICE recommends that waist circumference should be used in addition to BMI to measure central obesity and disease risk in individuals with a BMI less than 35kg/m².[6] (See *Measuring BMI and waist circumference in adults to assess health risks* on page 206.)

* The proposed cut-offs are 18.5-22.9kg/m² (healthy weight), 23kg/m² or more (overweight), 23-24.9kg/m² (at risk), 25-29.9kg/m² (obesity I), 30kg/m² or more (obesity II). [208]

Measuring waist circumference

Adults

Waist circumference has been shown to be positively, although not perfectly, correlated to disease risk, and is the most practical measurement to assess a patient's abdominal fat content or 'central' fat distribution.[125] Central obesity is linked to a higher risk of type 2 diabetes and coronary heart disease.

NICE recommends that waist circumference can be used, in addition to BMI, to assess risk in adults with a BMI of less than 35kg/m^2.[6] However, where BMI is greater than 35kg/m^2, waist circumference adds little to the absolute measure of risk provided by BMI.[6, 126] This is because patients who have a BMI of 35kg/m^2 will exceed the waist circumference cut-off points (detailed below) used to identify people at risk of the metabolic syndrome.[125]

Waist circumference thresholds used to assess health risks in the general population

At increased risk	Male	Female
Increased risk	94cm (37 inches) or more	80cm (31 inches) or more
Greatly increased risk	102cm (40 inches) or more	88cm (35 inches) or more

Source: National Institute for Health and Clinical Excellence, 2006, [6] International Diabetes Federation (2005),[210] WHO/IASO/IOTF (2000),[208] World Health Organization (2000) [21]

Adults of Asian origin

Different waist circumference cut-offs for different ethnic groups have been proposed by the World Health Organization[208] and the International Diabetes Federation.[210] * This is because ethnic populations have higher cardiovascular risk factors at lower waist circumferences than Western populations.[211] For example, in South Asians (of Pakistani, Bangladeshi and Indian origin) living in England, a given waist circumference tends to be associated with more features of the metabolic syndrome than in Europeans.[6]

However, a unique threshold for all Asian populations may not be appropriate because different Asian populations differ in the level of risk associated with a particular waist circumference. For example, a study evaluating the average waist circumference of more than 30,000 individuals from East Asia (China, Hong Kong, Korea, and Taiwan), South Asia (India and Pakistan) and South-east Asia (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) found that there were major differences between regions. Thus, the researchers concluded that the impact of obesity may begin at different thresholds in different Asian populations.[212]

Because a globally applicable grading system of waist circumference for ethnic populations has not yet been developed, NICE does not recommend separate waist circumference cut-offs for different ethnic groups in the UK.[6]

Using the waist circumference measurement in isolation

Waist circumference should never be used in isolation, as a proportion of subjects who require weight management may not be identified.[126] Thus NICE recommends the use of the table on the next page to assess the level of weight management required.[6]

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* The International Diabetes Federation (IDF) and the World Health Organization have proposed separate waist circumference thresholds for adults of Asian origin of 90cm (35 inches) or more for men, and 80cm (31 inches) or more for women. Note that the IDF definition is for South Asians and Chinese populations only.[21, 208, 210]

NICE states that: "The level of intervention should be higher for patients with comorbidities, regardless of their waist circumference."[6]

Assessing the level of weight management: a guide

BMI classification	Waist circumference			Co-morbidities present
	Low	High	Very high	
Overweight				
Obesity I				
Obesity II				
Obesity III				

General advice on healthy weight and lifestyle

Diet and physical activity

Diet and physical activity; consider drugs

Diet and physical activity; consider drugs; consider surgery

Source: National Institute for Health and Clinical Excellence, 2006[6]

Measuring BMI and waist circumference in adults to assess health risks

The World Health Organization (WHO) has recommended that an individual's relative health risk could be more accurately classified using both BMI and waist circumference.[21] This is shown below for the general adult population.

Combining BMI and waist measurement to assess obesity and the risk of type 2 diabetes and cardiovascular disease – general adult population[21, 6, 126]

Classification	BMI (kg/m²)	Waist circumference and risk of co-morbidities	
		Men: 94–102cm	Men: More than 102cm
		Women: 80-88cm	Women: More than 88cm
Underweight	Less than 18.5	–	–
Healthy weight	18.5–24.9	–	Increased
Overweight (or pre-obese)	25–29.9	Increased	High
Obesity	30 or more	High	Very high

Source: National Institute for Health and Clinical Excellence, 2006[6]

Measuring waist-hip ratio

Adults

Waist-hip ratio is another measure of body fat distribution. The waist-hip measurement is defined as waist circumference divided by hip circumference, ie waist girth (in metres) divided by hip girth (in metres). Although there is no consensus about appropriate waist-hip ratio thresholds, a raised waist-hip ratio is commonly taken to be 1.0 or more in men, and 0.85 or more in women.[6, 208] However, neither NICE nor the Department of Health recommends the use of waist-hip ratio as a standard measure of overweight or obesity.

Assessment

Assessment of overweight and obesity using BMI and waist circumference

Management should begin with the assessment of overweight and obesity in the patient. BMI should be used to classify the degree of obesity, and waist circumference may be used in people with a BMI less than 35kg/m^2 to determine the presence of central obesity. NICE recommends that the assessment of health risks associated with overweight and obesity in adults should be based on BMI and waist circumference as shown below.[6]

Assessing risks from overweight and obesity

BMI classification	Waist circumference		
	Low	High	Very high
Overweight	No increased risk	Increased risk	High risk
Obesity I	Increased risk	High risk	Very high risk
For men, waist circumference of less than 94cm is low, 94–102cm is high and more than 102cm is very high. For women, waist circumference of less than 80cm is low, 80–88cm is high, and more than 88cm is very high.			

Source: National Institute for Health and Clinical Excellence, 2006 [6]

Assessments also need to include holistic aspects focusing on psychological, social and environmental issues. There is a need for training for professionals who carry out assessments due to the sensitive and multifaceted nature of overweight and obesity. Professionals need to be aware of patients' motivations and expectations. Effective assessment and intervention require support, understanding and a non-judgemental approach.

Assessing and classifying overweight and obesity in adults

NICE recommends the following approach to assessing and classifying overweight and obesity in adults.

Determine degree of overweight or obesity

- Use clinical judgement to decide when to measure weight and height
- Use BMI to classify degree of obesity ... but use clinical judgement:
  - BMI may be less accurate in highly muscular people
  - for Asian adults, risk factors may be of concern at lower BMI
  - for older people, risk factors may become important at higher BMIs
- Use waist circumference in people with a BMI less than 35kg/m^2 to assess health risks
- Bioimpedance is not recommended as a substitute for BMI
- Tell the person their classification, and how this affects their risk of long-term health problems.

Assess lifestyle, comorbidities and willingness to change, including:

- presenting symptoms and underlying causes of overweight or obesity
- eating behaviour
- comorbidities (such as type 2 diabetes, hypertension, cardiovascular disease, osteoarthritis, dyslipidaemia and sleep apnoea) and risk factors, using the following tests – lipid profile and blood glucose (both preferably fasting) and blood pressure measurement
- lifestyle – diet and physical activity
- psychosocial distress and lifestyle, environmental, social and family factors – including family history of overweight and obesity and comorbidities
- willingness and motivation to change
- potential of weight loss to improve health
- psychological problems
- medical problems and medication.

Source: Reproduced from National Institute for Health and Clinical Excellence, 2006[6]

Assessment of overweight and obesity using the height and weight chart

The height and weight chart shown on the next page can be used as a crude assessment of overweight and obesity. To use the chart follow the simple instructions at the top of the chart.

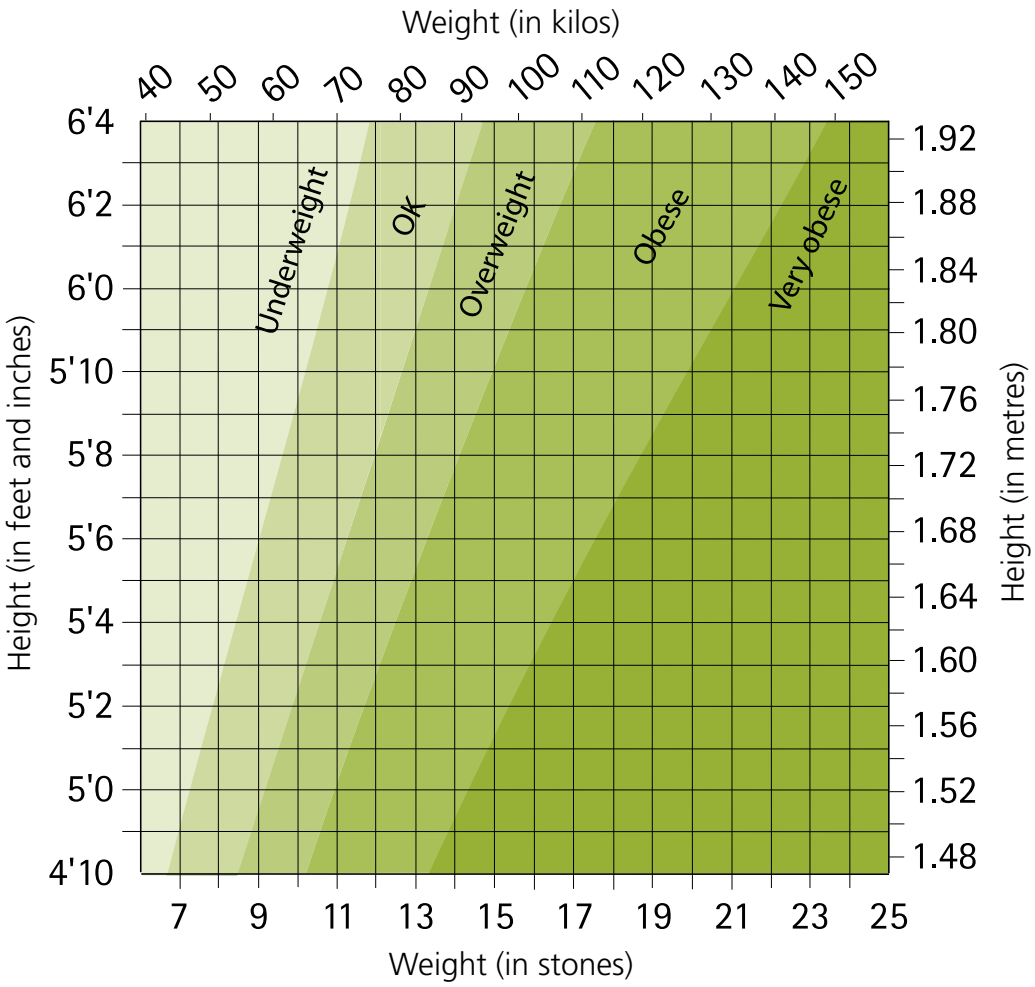
Tool E1 provides further information on NICE and Department of Health guidance for assessing and managing overweight and obesity in a clinical setting.

Note:

The NHS Local Delivery Plan monitoring line on adult obesity status requires general practices to monitor and return data on the obesity status (BMI) of GP-registered adults within the past 15 months.

Height and weight chart

Take a straight line across from the person's height (without shoes), and a line up or down from their weight (without clothes). Put a mark where the two lines meet to find out if the person needs to lose weight.



Underweight (BMI less than 18.5kg/m²)

A more calorie-dense diet may be needed to maintain current activity levels. In cases of very low weight for height, medical advice should be considered.

OK (BMI 18.5 – 24.9kg/m²)

This is the optimal, desirable or 'normal' range. Calorie intake is appropriate for current activity levels.

Overweight (BMI 25 – 29.9kg/m²)

Some loss of weight might be beneficial to health.

Obese (BMI 30 – 39.9kg/m²)

There is an increased risk of ill health and a need to lose weight. Regular health checks are required.

Very obese (BMI 40kg/m² or above)

This is severe or 'morbid' obesity. There is a greatly increased risk of developing complications of obesity and an urgent need to lose weight. Specialist advice should be sought.