NICE National Institute for Health and Care Excellence

NICE guideline

BMI: preventing ill health and premature death in black, Asian and other minority ethnic groups

Public health guideline
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September 2022: The recommendations in this guideline have been replaced by NICE's guidelines on obesity: identification, assessment and management and obesity prevention.

Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

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This guideline is replaced by CG189.

Overview

September 2022: The recommendations in this guideline have been replaced by NICE's guidelines on obesity: identification, assessment and management and obesity prevention.

This guideline covers the link between body mass index (BMI) and waist circumference and the risk of disease among adults from black, Asian and other minority ethnic groups in the UK. The aim was to determine whether lower cut-off points should be used for these groups as a trigger for lifestyle interventions to prevent conditions such as diabetes, myocardial infarction or stroke.

The guideline did not include women who are pregnant.

NICE has also produced guidelines on preventing type 2 diabetes (this guideline extends those recommendations to black African and African-Caribbean groups) and obesity.

Who is it for?

- Healthcare and health improvement professionals
- Exercise referral practitioners
- Directors and managers of public health, local authority, voluntary and non-government organisations
- Providers of lifestyle weight management services
- People from black, Asian and other minority ethnic groups and other members of the public

Introduction: scope and purpose of this guidance

What is this guidance about?

This guidance assesses how body mass index (BMI) and waist circumference among adults from black, Asian and other minority ethnic groups in the UK links to the risk of a range of non-communicable diseases. The aim was to determine whether lower cut-off points or thresholds should be used for these groups, compared to those used for the white population, as a trigger for lifestyle interventions to prevent conditions such as diabetes, myocardial infarction or stroke.

The guidance did not assess interventions (lifestyle or clinical). In addition, the guidance does not include women who are pregnant.

See about this guidance for details of how the guidance was developed and its current status.

Who is this guidance for?

This guidance is aimed at commissioners, managers and practitioners with public health as part of their remit working within the NHS, local authorities and the wider public, private, voluntary and community sectors, in particular:

- GPs, practice nurses, community pharmacists, dietitians and other health professionals in primary and secondary care and community venues (This includes those delivering the 'Health Checks' programme).
- Exercise referral practitioners, health improvement practitioners and health trainers employed by local government and the voluntary sector.
- Directors of public health, health and wellbeing boards, managers of adult social, residential and community services and local authority leisure services.

- Managers of voluntary, not-for-profit and non-government organisations (This includes faith and community groups, and relevant support groups and charities, for example, for cardiac rehabilitation or diabetes.)
- Providers of lifestyle weight management services.

It may also be of interest to people from black, Asian and other minority ethnic groups living in England and other members of the public.

1 Recommendations

The evidence statements underpinning the recommended approaches are listed in the evidence section.

See also the evidence reviews and expert reports and the sections on recommendations for research and gaps in the evidence.

Background

WHO recommendations

In 2004, the World Health Organization (WHO) assessed whether the international body-mass index (BMI) cut-off points for determining if someone is overweight (BMI 25 kg/m^2) or obese (BMI 30 kg/m^2) were appropriate for Asian populations.

WHO concluded that these thresholds were probably not appropriate, as there is a high risk of type 2 diabetes and cardiovascular disease among Asian groups at a BMI lower than 25 kg/m^2.

Due to lack of data in 2004, it was not possible to redefine thresholds for all Asian groups and WHO recommended that the current thresholds (BMI 25 kg/m^2 and 30 kg/m^2) should be retained as international classifications. At the same time, it suggested a number of public health action points should be used in relation to BMI and Asian populations (see box 1). WHO did not attempt to assess this issue for black or other minority ethnic groups.

Definitions

The Public Health Interventions Advisory Committee (PHIAC) considered black and other minority ethnic groups, as well as Asian groups, when developing this guidance.

For the purpose of this guidance black, Asian and other minority ethnic groups are defined as follows:

- South Asian people are immigrants and descendants from Bangladesh, Bhutan, India, Indian-Caribbean (immigrants of South Asian family origin), Maldives, Nepal, Pakistan and Sri Lanka. (Source: South Asian Public Health Association (2011) FAQ: Who is considered South Asian?)
- African-Caribbean/black Caribbean people are immigrants and descendants from the Caribbean islands (people of black Caribbean family origin may also be described as African-American).
- Black African people are immigrants and descendants from African nations. In some cases, they may also be described as sub-Saharan African or African-American.
- 'Other minority ethnic groups' includes people of Chinese, Middle-Eastern and mixed family origin, as follows:
  - Chinese people are immigrants and descendants from China, Taiwan, Singapore and Hong Kong.
  - Middle-Eastern people are immigrants and descendants from Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates and Yemen.
  - people of mixed family origin have parents of 2 or more different ethnic groups.

Conclusions

The evidence gathered does confirm that people from these groups are at an equivalent risk of diabetes, other health conditions or mortality at a lower BMI than the white European population.

However, the Committee did not consider the evidence sufficient to make recommendations on the use of new BMI and waist circumference thresholds to classify whether members of these groups are overweight or obese. There was also insufficient evidence to make recommendations on the full range of health conditions considered, or all-cause mortality (most of the evidence came from diabetes studies).

Thus, this guidance supports previously published NICE recommendations on diabetes prevention. It also highlights recommendations from NICE and other sources in relation to awareness raising, BMI measurement and thresholds that can be used as a trigger for intervening.

Who should take action?

A wide range of individuals and groups should implement the recommendations. This includes: commissioners, managers and practitioners working in the NHS, local authorities and the wider public, private, voluntary and community sectors. For a detailed list see who is this guidance for?

Recommendation 1 Preventing type 2 diabetes

Follow recommendations 1.2.1 to 1.2.16 and 1.2.20 to 1.2.29 in NICE's guideline on obesity: identification, assessment and management.

And sections 1.1 to 1.18 in NICE's guideline on type 2 diabetes: prevention in people at high risk.

Recommendation 2 BMI assessment, multi-component interventions and best practice standards

Follow the recommendations on BMI assessment, and how to intervene, in NICE's guidelines on obesity: prevention, weight management: lifestyle services for overweight or obese adults and obesity: identification, assessment and management.

Recommendation 3 General awareness raising

These recommendations have been incorporated into NICE's guideline on obesity: identification, assessment and management, as recommendations 1.2.17 to 1.2.19. The committee discussions and evidence for these recommendations are contained in this guideline and in the supporting expert reports and evidence review for PH46.

- Ensure practitioners are aware that members of black, Asian and other minority ethnic groups are at an increased risk of chronic health conditions at a lower BMI than the white population (below BMI 25 kg/m^2).
- Ensure members of black, Asian and other minority ethnic groups are aware that they face an increased risk of chronic health conditions at a lower BMI than the white population (below BMI 25 kg/m^2).
- Use existing local black and other minority ethnic information networks to disseminate information on the increased risks these groups face at a lower BMI.

Also follow the recommendations on awareness raising in NICE's guideline on obesity: working with local communities. In particular:

- Recommendation 5 outlines how to communicate sensitively with the public.
- Recommendation 6 provides advice on how to get local communities involved in identifying local priorities and raising awareness of local obesity prevention initiatives.

And recommendation 6 on conveying messages to the local population in NICE's guideline on type 2 diabetes prevention: population and community-level interventions. In particular:

- Ensure the material used to raise public awareness does not stigmatise people, for example, by implying they are classified as overweight or obese.

And the recommendations on working with local communities in areas of identified need in the stopping use of smokeless tobacco section of NICE's guideline on tobacco.

Box 1: International guidance on BMI/waist circumference thresholds

WHO advice on BMI public health action points for Asian populations (World Health Organization 2004)		
White European populations	**Asian populations**	**Description**
Less than 18.5 kg/m^2	Less than 18.5 kg/m^2	underweight

18.5 to 24.9 kg/m²	18.5 to 23 kg/m²	increasing but acceptable risk
25 to 29.9 kg/m²	23 to 27.5 kg/m	increased risk
30 kg/m² or higher	27.5 kg/m² or higher	high risk
International Diabetes Federation guidance on waist circumference thresholds as a measure of central obesity (Alberti et al. 2007)		
European	Men	≥ 94 cm (37 inches)
	Women	≥ 80 cm (31.5 inches)
South Asians	Men	≥ 90 cm (35 inches)
	Women	≥ 80 cm (31.5 inches)
Chinese	Men	≥ 90 cm (35 inches)
	Women	≥ 80 cm (31.5 inches)
Japanese	Men	≥ 90 cm (35 inches)
	Women	≥ 80 cm (31.5 inches)
Ethnic south and central Americans	Use south Asian recommendations until more specific data are available	
Sub-Saharan Africans	Use European data until more specific data are available	

South Asian Health Foundation position statement on BMI and waist circumference (Kumar et al. 2010) recommends lower thresholds for advising South Asians to adopt a healthier lifestyle and avoid further weight gain. States that South Asians should be targeted as a special group for raising awareness of the risks of obesity. The Foundation supports a lower threshold of 23 kg/m^2 for classification as overweight in British South Asians, as suggested by other expert groups. It acknowledges that more research is needed to establish appropriate thresholds for waist circumference in different sub-groups. In the meantime, it suggests that men with a waist circumference greater than 90 cm (35 inches) and women with a waist greater than 80 cm (31.5 inches) should be considered overweight.

Other guidance is available from:

- Scottish Intercollegiate Guidelines Network (2010)
- Ministry of Health India (Misra et al. 2009)
- Ministry of Health Singapore (Health Promotion Board Singapore 2005)
- Obesity in Asia Collaboration (2007)
- Cooperative meta-analysis group of the working group on obesity in China (Zhou 2002)

2 Public health need and practice

Minority ethnic groups living in England and the UK

Between 2005 and 2008, 9.3% of all babies born in England were of South Asian origin (defined as 'Bangladeshi, Indian, Pakistani and any other Asian background' with the exception of Chinese people). A further 5.3% were of black family origin (defined as 'African, Caribbean and any other black background') (Office for National Statistics 2011a).

According to the 2011 census, 7.9 million people in the UK belonged to a black, Asian or other minority ethnic group, representing 14% of the total population (Office for National Statistics 2012). People of Indian family origin were the largest minority ethnic group, followed by people of Pakistani family origin, those of mixed ethnic family origin and people of black African, black Caribbean and Chinese family origin (Office for National Statistics 2011b).

In England and Wales, London was the most ethnically diverse area, with the highest proportion of minority ethnic groups and the lowest proportion of white population, at 59.8% (Office for National Statistics 2012).

Measuring excess body fat

Body mass index (BMI) is a useful indicator of overall body fat. A 'raised' waist circumference is a useful indicator of excess abdominal adiposity.

According to the World Health Organization criteria, adults of white European origin with a BMI of 30 kg/m^2 or more are described as obese. Those with a BMI from 25 to 29.9 kg/m^2 are considered overweight.

A 'raised' waist circumference is defined as above 102 cm (40 inches) for men and above 88 cm (35 inches) for women. However, the International Diabetes Federation has suggested lower cut-off points (of 94 cm (37 inches) in men and 80 cm (31.5 inches) in women) for measuring metabolic syndrome (Alberti et al. 2005, 2007).

The BMI cut-off points identified above correspond to the risk of a range of chronic diseases and mortality among Europeans (World Health Organization 1998). However, these thresholds do not account for the wide variation in body fat distribution – and may not correspond to the same degree of associated health risk – for different ethnic groups (World Health Organization 2000).

A recent report stressed: 'there is no straightforward relationship between obesity and ethnicity, with a complex interplay of factors affecting health in minority ethnic communities in the UK'. It added that the validity of using current definitions of obesity for non-white minority ethnic groups is debatable (National Obesity Observatory 2011).

In response to a World Health Organization report (2004), the NHS Health Checks programme uses a BMI of 27.5 kg/m^2 as the trigger for preventive action among people of South Asian origin. NICE's guideline on obesity: prevention did not consider there to be sufficient evidence to set separate cut-off points for the BMI or waist circumference of this group. However, waist circumference cut-off points of ≥90 cm (35 inches) for men and ≥80cm (31.5 inches) for women for South Asian and Chinese populations have subsequently been proposed in the International Diabetes Federation (IDF) statement on type 2 diabetes prevention (Alberti et al. 2005, 2007).

The IDF proposal is in line with general World Health Organization (2004) guidance, which recognises the increased risk of type 2 diabetes and cardiovascular disease at a lower BMI among people from Asian populations, in comparison to people from white populations. (This relates to all South Asian and Chinese populations as described above plus other Asian populations for example Japanese, Korean, Indonesian, Filipino and Thai.)

Obesity: links to chronic health conditions and ethnicity

Excess body fat contributes to around 58% of cases of type 2 diabetes, 21% of heart disease and between 8% and 42% of certain cancers (breast, colon and endometrial) (DH 2003). However, the point at which the level of body fat becomes risky to health varies between ethnic groups.

In addition, the prevalence of some of these health conditions is far greater among black, Asian and other minority ethnic groups – despite the fact that rates of obesity among these groups are similar to (or lower than) the rate among the white population (World

Health Organization 2004).

However, rates of myocardial infarctions are higher among South Asian groups at an earlier age – and death rates from cardiovascular disease are approximately 50% higher (Allender et al. 2007). In addition, the prevalence of diabetes is up to 6 times higher among South Asian groups, it tends to develop at a younger age and disease progression is faster (Khunti et al. 2009).

In the UK, people of black African and African-Caribbean origin are 3 times more likely to have type 2 diabetes than the white population (DH 2001). Type 2 diabetes is also more common among Chinese people (DH 2001). In addition, people from all of these groups are more at risk of stroke (National Obesity Observatory 2011).

Type 2 diabetes is also more prevalent among black Caribbean, Indian, Pakistani and Bangladeshi men aged 35 to 54 than the general UK population. With the exception of black African men, it is also more prevalent among those aged 55 and over from these groups (NHS Information Centre 2005).

Among women, type 2 diabetes is more common among Indian, Pakistani and Bangladeshi groups (aged 35 and over) and black Caribbeans (aged 55 and over) in the UK (NHS Information Centre 2005).

People from black, Asian and other minority ethnic groups also tend to progress from impaired glucose tolerance (IGT) to diabetes much more quickly than average (more than twice the rate of white populations) (Ramachandran et al. 2006).

Compared to white Europeans, people of South Asian origin living in England tend to have a higher percentage of body fat at a given BMI. They also tend to have more features of the metabolic syndrome at a given waist circumference (for example, higher triglycerides and lower high-density lipoproteins in women and higher serum glucose in men). (For details, see NICE's guideline obesity prevention.)

It has been suggested that this increased risk may be due to South Asian people accumulating more fat in the abdomen and around the waist, compared to white European populations. Fat distributed in this region of the body is considered to be more metabolically active. It is also closely associated with insulin resistance, pre-diabetes and type 2 diabetes (Banerji et al. 1999; McKeigue et al. 1991, 1992, 1993).

3 Considerations

The Public Health Interventions Advisory Committee (PHIAC) took account of a number of factors and issues when developing the recommendations, as follows. Please note: this section does not contain recommendations. (See recommendations.)

Health inequalities

Evidence suggests that people from black, Asian and other minority ethnic groups are at an equivalent risk of diabetes and other health conditions at a lower body mass index (BMI) than white populations. However, they are not necessarily receiving health promotion advice when their BMI has reached these lower thresholds. PHIAC noted that this may create a significant health inequality. However, the Committee considered that the evidence was insufficient to justify the development of new BMI or waist circumference thresholds to classify whether people in these groups in England are overweight or obese.

PHIAC noted that evidence of risk equivalence and the need to intervene at a lower BMI may not be the same as evidence on 'equivalence of response' to interventions. In other words, people from black, Asian and other minority ethnic groups may have the same risk of mortality and diabetes at a lower BMI, compared with white populations. However, they may not respond in the same way to behaviour-change interventions as white populations. Or, if they do lose weight, they may not gain the same benefit as someone who is white. The evidence considered did not allow for a prediction of response to behavioural interventions, as this was beyond the scope of the guidance.

The lack of precise BMI and waist thresholds, whereby the risk of a range of health conditions could be identified for black, Asian and minority ethnic groups, could result in widening inequalities in health.

PHIAC noted that there are recognised differences in terms of health outcomes within ethnic groups and it is important to note that these groups are not homogeneous (Nazroo 2004).

Evidence

No single threshold on BMI and waist circumference for all minority ethnic groups, across a range of conditions, was found in the evidence. However, the evidence did clearly show that black and Asian populations suffer from adverse health outcomes at a lower BMI than people of white ethnicity – although the precise cut-off points were uncertain and most evidence related to diabetes.

The evidence supports use of the World Health Organization's (WHO's) public health action points for intervening to prevent diabetes. It also supports the recommendations made in NICE's guideline on type 2 diabetes: prevention in people at high risk for Asian populations. In addition, the evidence indicated that the threshold range for Asian populations may be extended to black populations. However, it was equivocal (or non-existent) in relation to the question of where to set BMI and waist circumference thresholds as a marker of general health risks or mortality for black, Asian and other minority ethnic groups.

NICE's guideline on obesity prevention, published in 2006, did not make a recommendation on specific BMI and waist circumference cut-off points for different minority ethnic groups. However, it did note that: '...some other population groups, such as Asians and older people, have comorbidity risk factors that would be of concern at different BMIs (lower for Asian adults and higher for older people).' It also advised that healthcare professionals should '...use clinical judgement when considering risk factors in these groups, even in people not classified as overweight or obese using the classification in recommendation 1.2.2.7.' PHIAC considered that the evidence accumulated since 2006 is still insufficient to make specific recommendations about BMI and waist circumference thresholds for classifying whether a person in these groups is overweight or obese.

Some studies included in the evidence review used self-reported measures of waist circumference, BMI and health outcomes (for example, on diabetes). PHIAC noted that this may have introduced measurement error, and bias.

The relationship between ethnicity and obesity is complex and not all studies were adjusted for the same potentially confounding factors.

Any estimate of equivalence will include a degree of uncertainty, irrespective of the method used. Some of the equivalence thresholds discussed by PHIAC were particularly likely to be imprecise, as they were derived post-hoc by the evidence reviewers without

the original data. This was done by using figures found in the published literature and drawing a horizontal line that intersects the incidence or prevalence rates to estimate risk equivalence between white and black, South Asian or Chinese populations.

PHIAC recognised that ongoing UK studies may provide published evidence on BMI thresholds in the future. These include the 'Southall and Brent revisited' (SABRE) cohort and the Leicester cohort of the 'Anglo-Danish-Dutch study of intensive treatment in people with screen detected diabetes in primary care' (ADDITION). This evidence was available as non-peer reviewed expert testimony at the post-consultation PHIAC meeting in March 2013. It was undergoing peer review, in preparation for publication as an academic paper, when this guidance was published.

Being classified as obese at a lower BMI or waist circumference threshold has a number of potential disadvantages. For example, someone might feel labelled, stigmatised or may, in some other way, be harmed psychologically. Any potential harm may be made worse if they gain little benefit from being offered a lifestyle intervention at a lower BMI threshold. However, PHIAC noted that if people are at equivalent risk at a lower BMI, then the benefits of offering behavioural support at a lower threshold are likely to outweigh any ill effects.

Current practice

Patient notes do not always include BMI or waist circumference measures. Waist circumference, in particular, is rarely noted by GPs. In addition, information on ethnicity is often not recorded.

Health professionals may be unaware of the disproportionate risks and burden of disease that black, Asian or other minority ethnic groups face when classified as overweight or obese using BMI thresholds that may be more appropriate for white European populations.

Factors beyond the scope of the guidance

Other approaches to anthropometric measurement, such as waist-to-hip and waist-to-height ratio, were not assessed. This should not be taken as a judgement on whether or not these approaches are effective.

PHIAC did not consider evidence on the effectiveness or cost effectiveness of intervening

at different BMI and waist circumference thresholds for different black, Asian and other minority ethnic groups. This was not part of the scope of the guidance.

4 Recommendations for research

The Public Health Interventions Advisory Committee (PHIAC) recommends that the following research questions should be addressed.

What are the cut-off points for body mass index (BMI) among adults from black, Asian and other minority ethnic groups living in the UK that can be used to classify overweight and obesity or are risk equivalent to the current thresholds in relation to mortality, cancer, type 2 diabetes, stroke and myocardial infarction set for white European populations? Ideally, prospective cohort studies should be used. Studies should use objectively measured height and weight and consider incidence as well as prevalence. Estimates should be adjusted for potential confounders.

What are the cut-off points for waist circumference among adults from black, Asian and other minority ethnic groups living in the UK that are 'risk equivalent' to the current thresholds in relation to mortality, cancer, type 2 diabetes, stroke and myocardial infarction set for white European populations? Ideally, prospective cohort studies should be used. Studies should use objectively measured waist circumference and consider incidence as well as prevalence. Estimates should be adjusted for potential confounders.

What are the corresponding cut-off points for waist circumference among adult males and females from black, Asian and other minority ethnic groups living in the UK, based on overweight and obesity BMI classifications?

Is the risk of ill health the same for first, second and third generation immigrants from black, Asian and other minority ethnic groups at the same BMI and waist circumference thresholds?

What are the risks and benefits of developing single-figure cut-off points on BMI and waist circumference for black, Asian and other minority ethnic groups to help prevent diabetes and other conditions?

Are black, Asian and other minority ethnic groups aware that they are at the same risk of type 2 diabetes and mortality at a lower BMI, compared to the white population?

Are clinicians, practitioners and weight management service providers aware that black, Asian and other minority ethnic groups are at the same risk of type 2 diabetes and

mortality at a lower BMI compared to the white population. If so do they intervene at lower BMI and waist circumference thresholds?

How effective and cost effective are lifestyle interventions for people from black, Asian and other minority ethnic groups at different BMI and waist circumference thresholds, compared to the general population? Ideally this evidence should come from randomised controlled trials.

More detail identified during development of this guidance is provided in gaps in the evidence.

5 Glossary

Body mass index (BMI)

Defined as weight in kilograms divided by the square of height in metres.

Excess abdominal adiposity

Abdominal obesity refers to the presence of excess fat in the abdominal area (also known as excess abdominal adiposity). Its presence indicates a higher likelihood of developing a range of diseases including cardiovascular disease, cancer and diabetes.

Waist circumference is the most practical marker of abdominal fat. (Many people understand this concept as the 'apple' versus 'pear'-shaped body.) A waist circumference greater than 88 cm (more than 35 inches) in women and 102cm (more than 40 inches) in men indicates an increased risk of cardiovascular disease. (NICE's guideline on obesity prevention.)

Diabetes

Diabetes is a group of disorders with a number of common features characterised by raised blood glucose. In England the 4 commonest types of diabetes are:

- type 1 diabetes
- type 2 diabetes (this accounts for more than 85% of all incidences of diabetes)
- secondary diabetes (from pancreatic damage, hepatic cirrhosis, endocrinological disease/therapy, or anti-viral/anti-psychotic therapy)
- gestational diabetes (diabetes during pregnancy).

Diabetes is caused when there is too much glucose in the blood and the body cannot use it as 'fuel'. This can happen because the pancreas does not produce any (or sufficient) insulin to help it to enter the body's cells. Or the problems may be caused because the insulin produced does not work properly (insulin resistance).

Lifestyle interventions

For the purpose of this guidance, 'lifestyle interventions' refers specifically to activities encouraging physical activity and a healthy diet, as described in NICE's guideline on type 2 diabetes: prevention in people at high risk recommendations 7 to 14.

Metabolically active

'Metabolically active' fat (also known as visceral fat adipose tissue) is associated with a variety of physiological responses including insulin resistance, pre-diabetes and type 2 diabetes (Banerji et al. 1999; McKeigue et al. 1991, 1992, 1993; Nesto 2005). This type of fat can also impair the functioning of blood vessels (Nesto 2005).

Metabolic syndrome

A cluster of metabolic risk factors including: insulin resistance, hypertension (high blood pressure), cholesterol abnormalities and an increased risk for clotting. People with all of these factors are usually overweight or obese. The syndrome is associated with an increased risk of diabetes mellitus and cardiovascular disease.

Public health action points

BMIs of 23 kg/m^2, 27.5 kg/m^2, 32.5 kg/m^2 and 37.5 kg/m^2 are recommended as 'public health action points' by the World Health Organization. These are the triggers for health professionals to intervene to help Asian people manage their weight through, for example, physical activity and healthy eating. The categories WHO suggests for people from Asian groups are: 18.5 to 22.9 kg/m^2 (increasing but acceptable risk); 23 to 27.4 kg/m^2 (increased risk); and 27.5 kg/m^2 or higher (high risk of developing chronic health conditions).

Risk equivalence

The point at which people in each of the groups being compared are equally likely to experience the same outcome (for example, myocardial infarction).

Secondary care

Secondary care is healthcare provided in hospitals. It includes accident and emergency departments, outpatient departments, antenatal services, genitourinary medicine and sexual health clinics, as well as admission to a hospital ward.

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Zhou BF (2002) Predictive values of body mass index and waist circumference for risk factors of certain related diseases in Chinese adults – study on optimal cut-off points of body mass index and waist circumference in Chinese adults. Biomedical and Environmental Sciences 15: 83 to 95

7 Summary of the methods used to develop this guidance

Introduction

The review includes full details of the methods used to select the evidence (including search strategies), assess its quality and summarise it.

The minutes of the Public Health Interventions Advisory Committee (PHIAC) meetings provide further detail about the Committee's interpretation of the evidence and development of recommendations.

All supporting documents are listed in about this guidance.

Referral

The referral received from the Department of Health on 6 July 2011 stated the need for guidance on:

'Assessing BMI and waist circumference in adults in BME groups in the UK (in relation to the risk of health problems)'.

Usually the Public Health Interventions Advisory Committee (PHIAC) examines public health interventions to see which are effective and cost effective in terms of improving a particular health condition or outcome, such as obesity.

This referral, however, was about determining whether there may be a need to intervene with some groups at lower thresholds than is usual practice for the general population. The aim was to ensure prevention advice and guidance is given to everyone at the point when they face the same level of risk.

Determining the scope and finding the evidence

This is not a typical referral, so the usual searches and appraisal of studies of

effectiveness and cost effectiveness were not appropriate.

The referral itself was broad, in terms of aiming to address the 'risk of health problems' relating to health conditions associated with BMI and waist circumference in the populations of interest.

Following consultation on the scope, the CPHE project team honed the research questions and developed criteria for sifting the literature in terms of:

- the black, Asian and other minority ethnic groups of interest in the UK
- health outcomes of particular importance to these groups
- study, analysis type and questions to answer the referral
- understanding the breadth and depth of evidence available
- summarising the search and obtaining confirmation of its completeness.

Diabetes, stroke and myocardial infarction were considered the most important conditions related to obesity and, where relevant, were most likely to have study data available. Other measures of adiposity (that is, waist to hip and waist to height ratio) were also suggested during public consultation on the scope. However, a decision was made to focus only on the 2 measures described in the DH referral.

It was decided that the focus should be on South Asian, Chinese, black, Middle Eastern and mixed-ethnicity populations worldwide, based on the prevalence of these groups within the UK. Studies of Japanese, Aboriginal and Hispanic populations were thus excluded.

Questions

Question 1: How accurate are body mass index (BMI) and waist circumference in predicting the future risk of type 2 diabetes, fatal/non-fatal myocardial infarction or stroke and overall mortality among adults from black, Asian and other minority ethnic groups living in the UK, compared to the white or general UK population?

Question 2: What are the BMI and waist circumference cut-off points indicating a healthy range for these measures among adults from different black, Asian and other minority

ethnic groups living in the UK?

Question 3: What are the BMI and waist circumference cut-off points that indicate an increased risk of type 2 diabetes, fatal/non-fatal myocardial infarction and stroke and the need for preventive action among adults from different black, Asian and other minority ethnic groups living in the UK?

Question 4: What are the cut-off points for BMI and waist circumference among adults from black, Asian and other minority ethnic groups living in the UK that are risk equivalent to the current thresholds set for white European populations?

Developing the evidence base

Identifying evidence and selection criteria

A trial search of standard literature databases conducted by the Centre for Public Health Excellence project team at NICE yielded a high volume of results (approximately 12,000), many of which were irrelevant.

A Google scholar 'cited by' search was then conducted using 46 key papers identified by a small number of topic experts and the project team. This produced approximately 4000 results. These were sifted by a CPHE analyst using selection criteria developed following the expert panel meeting.

An external contractor, Bazian, used the identified literature to answer the 4 questions in the final scope.

Following this, PHIAC decided that only evidence relating to question 4 would be required to answer the DH referral. As a result, only evidence relating to question 4 has been considered during development of the draft recommendations.

Quality appraisal

Included papers were assessed for methodological rigour and quality using modified quality assessment checklists based on the tools from appendices G and J of the 'Methods for the development of NICE public health guidance', and appendices G and J of 'The guidelines manual 2009'.

Each study was graded (++, +, –) to reflect the risk of potential bias arising from its design and execution.

Study quality

++ All or most of the checklist criteria have been fulfilled. Where they have not been fulfilled, the conclusions are very unlikely to alter.

+ Some of the checklist criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are unlikely to alter the conclusions.

– Few or no checklist criteria have been fulfilled. The conclusions of the study are likely or very likely to alter.

Given the nature of the review questions and the various settings identified and additional applicability summary score was given. This score rated how well the study results could apply to black, Asian and minority ethnic populations in the UK. It was reported using the same (++) strong, (+) moderate and (–) weak scoring system as the quality summary score. Scores are presented as quality/applicability.

Overall, if a study was rated as having a moderate summary validity score and a weak summary applicability score the following would appear in parentheses (+/–).

Summarising the evidence and making evidence statements

The review data was summarised in evidence tables (see full review).

The findings from the review and expert reports were synthesised and used as the basis for a number of evidence statements relating to each question. The evidence statements were prepared by the external contractors (see about this guidance). The statements reflect their judgement of the strength (quality, quantity and consistency) of evidence and its applicability to the populations and settings in the scope.

Secondary analysis

A team from the Department of Health Sciences at the University of Leicester and a team from The Medical Research Council (MRC) Epidemiology Unit were asked to undertake secondary analysis of UK data they possess. (The MRC worked in collaboration with the

Metabolic Medicine Group at the University of Glasgow and Imperial College.) The aim was to prepare reports to answer the following question:

- What are the cut-off points for body mass index (BMI) and waist circumference among adults from black, Asian and other minority ethnic groups living in the UK that are 'risk equivalent' to the current thresholds set for white European populations?

University of Leicester undertook an analysis of the ADDITION-Leicester Study data. This is a population-based, cross-sectional screening study of white (n=4599), South Asian (n=1310) and black (n=109) participants aged between 40 and 75 years.

The MRC unit undertook an analysis of the Southall and Brent Re-Visited (SABRE) study data. This is a population-based cohort of 4857 white European, South Asian, black African and African-Caribbean populations from north and west London. At baseline (1988 to 1991), 4202 were non-diabetic.

How PHIAC made its decisions

At its meetings in October 2012 and March 2013, the Public Health Interventions Advisory Committee (PHIAC) considered the evidence and expert reports to determine:

- whether there was sufficient evidence (in terms of strength and applicability) to form a judgement
- whether the evidence is applicable to the target groups and context covered by the guidance.

PHIAC developed recommendations through informal consensus, based on the following criteria:

- Strength (type, quality, quantity and consistency) of the evidence.
- The applicability of the evidence to the populations/settings referred to in the scope.
- Effect size and potential impact on the target population's health.
- Impact on inequalities in health between different groups of the population.
- Equality and diversity legislation.

- Ethical issues and social value judgements.
- Balance of harms and benefits.
- Ease of implementation and any anticipated changes in practice.

8 The evidence

This section lists the evidence statements from 1 review provided by external contractors and 2 expert reports. The evidence statements are short summaries of the evidence in the review (see what evidence is the guidance based on?). (See summary of the methods used to develop this guidance for the key to quality assessments.)

The evidence statements are short summaries of evidence, in a review, report or paper (provided by an expert in the topic area). Each statement has a short code indicating which document the evidence has come from. The letter(s) in the code refer to the type of document the statement is from, and the numbers refer to the document number, and the number of the evidence statement in the document.

Evidence statement number 4.1a indicates that the statement is numbered **4.1a** in the review. **Evidence statement number ER1** indicates that the statement is from expert report 1; **evidence statement number ER2** indicates that the statement is from expert report 2 and **evidence statement number ER3** indicates that the statement is derived from both expert reports.

See the review and expert reports for PH46.

Evidence statements

Please note that the wording of some evidence statements has been altered slightly from those in the evidence review to make them more consistent with each other and NICE's standard house style.

Evidence statement 4.1a BMI cut-off points indicating 'risk equivalence' for black populations (type 2 diabetes) from UK or western countries

Strong evidence was found from 3 cohort studies (2 [+] and 1 [++]) in Canada and the US (Chiu 2011; Stevens 2008; Stevens 2002) and 3 cross-sectional studies (2 [+] and 1 [++]) in the US (Stommel 2010; Taylor 2010; Pan 2004) that for a body mass index (BMI) of around 30 kg/m^2 in white populations, the equivalent diabetes risk in black populations is at BMI values 0.1 to 4 units lower (26 to 29.9 kg/m^2). For a BMI of 25 kg/m^2 in white

populations, the equivalent diabetes risk in black populations was found at BMI values 2 to 4 units lower (21 to 23 kg/m^2).

These studies had moderate applicability to the UK.

Evidence statement 4.2 BMI cut-off points indicating 'risk equivalence' for black populations (myocardial infarction, stroke or mortality) from UK or western countries

Limited evidence was found from 1 (++) cohort study (Stevens 2002) that, at a BMI of 20 kg/m^2, black populations have an equivalent mortality risk to that seen in white populations at 30 kg/m^2. This study has moderate applicability to the UK.

No evidence was found relevant to risk-equivalent BMI cut-points for myocardial infarction or stroke in black populations.

Evidence statement 4.5a BMI cut-off points indicating 'risk equivalence' for South Asian populations (type 2 diabetes) from UK or western countries

Limited evidence was found from 1 (+) cohort study in Canada (Chiu 2011) that, for a BMI of 30 kg/m^2 in white populations, the equivalent incident diabetes risk in South Asian populations was found at BMI values 6 units lower (24 kg/m^2). No equivalent value to a BMI of 25 kg/m^2 was reported.

This study had moderate applicability to the UK.

Evidence statement 4.5b BMI cut-off points indicating 'risk equivalence' for South Asian populations (type 2 diabetes) from other countries

Limited graphical evidence was found from 1 (+) review (Nyamdorj 2010b) related to diabetes risk across BMI values, indicating a risk equivalence at 19 to 20 kg/m^2 among South Asian men and 30 kg/m^2 among European men. No risk equivalence points were identified for women at this BMI cut-off point, and no values were identified for either men or women equivalent to the risk seen among white Europeans at 25 kg/m^2.

This study had moderate applicability to the UK.

Evidence statement 4.13a BMI cut-off points indicating 'risk equivalence' for Chinese populations (type 2 diabetes) from UK or western countries

Limited evidence was found from 2 (+) cohorts (Chiu 2011; Stevens 2008) that, for a BMI of around 30 kg/m^2 in white populations, the equivalent incident diabetes risk in Chinese populations was found at BMI values 2.5 to 5 units lower. In 1 study (Stevens 2008), for a BMI of around 25 kg/m^2 in white populations, the equivalent incident diabetes risk in Chinese populations was found at BMI values 2 units lower.

These studies have moderate applicability to the UK.

Evidence statement 4.13b BMI cut-off points indicating 'risk equivalence' for Chinese populations (type 2 diabetes) from other countries

One (+) review of studies (Nyamdorj 2010b) provides limited evidence that, for a BMI of around 30 kg/m^2 in white populations, the equivalent incident diabetes risk in Chinese men occurs at BMI values 5 kg/m^2 lower for Chinese men and 8 kg/m^2 lower for Chinese women.

This review had moderate applicability to the UK.

Evidence statement ER 1 BMI cut-off points indicating 'risk equivalence' for South Asian (type 2 diabetes) from the UK

Evidence was found from 1 cross-sectional study in the UK (Morris et al. 2013) that for a BMI of 30 kg/m^2 in white populations, the equivalent diabetes risk in South Asian populations is at BMI values 7 units lower (23 kg/m^2).

This study had high applicability to the UK.

Evidence statement ER 2 BMI cut-off points indicating 'risk equivalence' for South Asian populations (type 2 diabetes) from

the UK

Evidence was found from 1 prospective cohort study in the UK (Tillin et al. 2013) that for a BMI of 30 kg/m^2 in white populations, the equivalent diabetes risk in South Asian populations is at BMI values 4 units lower (26 kg/m^2). For a BMI of 25 kg/m^2 in white populations, the equivalent diabetes risk in South Asian populations was found at BMI values 3 to 4 units lower (21 to 22 kg/m^2).

This study had high applicability to the UK.

Evidence statement ER 3 BMI cut-off points indicating 'risk equivalence' for black populations (type 2 diabetes) from the UK

Evidence was found from 1 cross-sectional study in the UK (Morris et al. 2013) and 1 prospective cohort study in the UK (Tillin et al. 2013) that for a BMI of 30 kg/m^2 in white populations, the equivalent diabetes risk in black populations is at BMI values 3 units lower (27 kg/m^2). For a BMI of 25 kg/m^2 in white populations, the equivalent diabetes risk in black populations was found at BMI values 2 to 4 units lower (21 to 23 kg/m^2).

These studies have high applicability to the UK.

9 Gaps in the evidence

The Public Health Interventions Advisory Committee (PHIAC) identified a number of gaps in the evidence related to the programmes under examination based on an assessment of the evidence. These gaps are set out below.

1. Very few studies (those available were mainly from the US and Canada) directly compared the association between body mass index (BMI) and the risk of type 2 diabetes in people of different ethnic groups.

(Source: evidence review)

2. No large published prospective studies were identified that compared white populations, in terms of health or mortality outcomes associated with BMI, to black, Asian or other minority ethnic groups resident in the UK.

(Source: evidence review)

3. In addition, no suitable studies were identified for Middle Eastern populations.

(Source: evidence review)

4. There was a lack of studies that directly compared the association between BMI and the differential health risks for people of different ethnic groups apart from for diabetes. Other possible health outcomes of interest may include cancer, stroke and myocardial infarction.

(Source: evidence review)

5. There was a lack of studies on health outcomes using waist circumference as the explanatory variable. Possible related health outcomes include cancer, diabetes, stroke and myocardial infarction.

(Source: evidence review)

6. No national or international studies were identified that examined the differential health risk of people of mixed family origin, compared with other ethnic groups, using BMI or waist circumference as the explanatory variable. Possible health outcomes of interest may

include diabetes, stroke, cancer and myocardial infarction.

(Source: evidence review)

7. There was a lack of studies on the ethnically diverse health risk associations between BMI or waist circumference in relation to cancer. In particular, there was a lack of studies of the links between obesity and breast or bowel cancer.

(Source: evidence review)

The Committee made 8 recommendations for research into areas that it believes will be a priority for developing future guidance. These are listed in recommendations for research.

10 Membership of the Public Health Interventions Advisory Committee (PHIAC) and the NICE project team

Public Health Interventions Advisory Committee

NICE has set up a standing committee, the Public Health Interventions Advisory Committee (PHIAC), which reviews the evidence and develops recommendations on public health interventions. Membership of PHIAC is multidisciplinary, comprising public health practitioners, clinicians, local authority officers, teachers, social care professionals, representatives of the public, academics and technical experts as follows.

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11 About this guidance

Why is this guidance being produced?

The Department of Health (DH) asked the National Institute for Health and Care Excellence (NICE) to produce this guidance.

The guidance should be implemented alongside other guidance and regulations.

What evidence is the guidance based on?

The evidence that PHIAC considered included:

- Evidence review:
  - Review 1: 'Body mass index and waist circumference thresholds for intervening to prevent ill health among black, Asian and other minority ethnic groups in the UK' was carried out by Bazian Ltd. The principal authors were: Sarah Caton, Rob Cook and Alicia White.
- Expert reports:
  - Expert report 1: 'What are the cut-off points for body mass index (BMI) and waist circumference among adults from black, Asian and other minority ethnic groups living in the UK that are "risk equivalent" to the current thresholds set for white European populations? Analyses from the ADDITION-Leicester Study'. This was carried out by Danielle Morris and Kamlesh Khunti (Diabetes Research Unit), Laura Gray and Melanie Davies (Department of Health Sciences) at the University of Leicester; and Naveed Sattar at University of Glasgow Institute of Cardiovascular and Medical Sciences.
  - Expert report 2:'Ethnicity-specific obesity cut-off points in the development of incident type 2 diabetes – a prospective study (SABRE) including three ethnic groups in the United Kingdom'. This was carried out by Dr Nita Forouhi, Medical Research Council Epidemiology Unit, Cambridge and Professor Naveed Sattar, Cardiovascular Research Centre, University of Glasgow.

In some cases the evidence was insufficient and PHIAC has made recommendations for future research.

Finding more information and committee details

To find NICE guidance on related topics, including guidance in development, see the NICE topic page on obesity.

For full details of the evidence and the guideline committee's discussions, see the expert reports and evidence review for PH46.

For general help and advice on putting our guidelines into practice, see resources to help you put NICE guidance into practice.

Update information

September 2022: Recommendation 1 was replaced by the update to NICE's guideline on obesity: identification, assessment and management. Recommendation 3 was incorporated into NICE's guideline on obesity: identification, assessment and management, without an update.

March 2015: Recommendation 2 was replaced by NICE's guideline on obesity prevention.

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