

**noo**

National Obesity  
Observatory



# Obesity and ethnicity

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## **Executive summary**

There is no straightforward relationship between obesity and ethnicity, with a complex interplay of factors affecting health in minority ethnic communities in the UK.

Apart from Health Survey for England (HSE) data from 2004, there is little nationally representative data on obesity prevalence in adults from minority ethnic groups in the UK. Data are scarce or non-existent for many smaller ethnic groups and only a few qualitative studies have focused on these communities.

There is continuing debate about the validity of using current definitions of obesity for non-white ethnic groups, for both adults and children. Different ethnic groups are associated with a range of different body shapes, and different physiological responses to fat storage. Revised Body Mass Index (BMI) thresholds and waist circumference measures have been recommended for South Asian populations who are at risk of chronic diseases and mortality at lower levels than European populations. In terms of public health action, it is particularly important for South Asian populations in the UK to be aware of the health risks of increased BMI and waist circumference.

The prevalence of obesity-related conditions such as cardiovascular disease and type 2 diabetes varies by ethnic group. Health behaviours also differ according to different religious, cultural and socioeconomic factors, as well as by geography. Whilst many people from minority ethnic groups have healthier eating patterns than the White population, unhealthy diets and low levels of physical activity are known to be of concern in some minority ethnic groups, in particular those of South Asian origin. Members of minority ethnic groups in the UK often have lower socioeconomic status, which is in turn associated with a greater risk of obesity in women and children. People from minority ethnic groups may experience elevated levels of obesity-related stigma.

## **Introduction**

This paper provides an overview of the current evidence on the relationship between obesity and ethnicity for adults and children in the UK, in the context of what is known about obesity in the general population. It highlights gaps and weaknesses in the current evidence base and summarises evidence concerning:

- variations in obesity prevalence between and within minority ethnic groups
- differences in obesity-related disease prevalence between minority ethnic groups, with particular reference to cardiovascular disease and type 2 diabetes
- measures of obesity including the issue of central adiposity and the use of BMI
- the role of potential determinants of obesity for minority ethnic groups such as migration, cultural variations in diet, socioeconomic status, local area characteristics and physical activity levels

The topic is highly complex. This paper highlights key areas of importance and notes where findings are still unclear. It focuses, for the most part, on evidence from and relating to, the UK. It does not address global issues relating to obesity, development, nationality and ethnicity.

## Defining ethnicity

The concept of 'ethnicity' or 'ethnic group' is difficult to define as it is a multi-dimensional concept which is not fixed in time. Dimensions of ethnicity might include, amongst other things, colour, national identity, citizenship, religion, language, country of birth and culture. When a person identifies with a particular ethnic group, it may imply shared origins, social background, culture, or traditions which are distinctive and maintained between generations.<sup>1</sup> Furthermore, in a world of migration and mixing, these cultures and societies are highly dynamic.<sup>2</sup> It is virtually impossible to create single, mutually exclusive categories of ethnicity which invite identification from respondents and are conceptually coherent.<sup>3</sup>

However, to allow data to be collected and analysed on a large scale, ethnicity is often treated as a fixed characteristic. In epidemiological studies, ethnicity is usually self-defined. Minority ethnic groups are usually classified by the methods used in the UK Census, which asks people to indicate to which of 16 ethnic groups they feel they belong.<sup>4</sup> Care is needed when drawing conclusions on ethnicity because the data are often collected by self-report, and are, thus, affected by varying perceptions of ethnic identity.<sup>5</sup> Definitions of ethnic group differ between studies and ethnic classification of datasets can change over time. For example, different ethnic classifications are used in the 1991 and 2001 censuses. Country of birth is sometimes used as a proxy for ethnicity, but this is clearly limited as it does not distinguish between people of different ethnic groups who were born in the UK. In addition, broader terms such as 'South Asian' are often quoted in research, but they can mask the heterogeneous nature of the population being described.

## Population overview

Data from the 2001 Census show that the majority of the UK population is White (92%). The remaining 8% belong to other ethnic groups of which the largest is Indian, followed by Pakistani, Mixed, Black Caribbean, Black African and Bangladeshi. The remaining minority ethnic groups are classed as 'other' and each account for less than 0.5% of the UK population and added together account for 1.4%. Over half of the groups in this category consist of people born in the Far East, in particular, the Philippines, Japan, Thailand and Vietnam.<sup>6</sup> Most minority ethnic groups have a younger age structure than the White British population, with the Mixed, Black African, Other Black, Bangladeshi and Pakistani groups having the youngest age profiles.

The UK population is growing, ageing and becoming more diverse. The minority ethnic population is continuing to grow as a proportion of the population with the main driver being natural growth (i.e. more births than deaths) due to the young age structure of minority populations emigrating to the UK.<sup>7</sup> According to Census data, the UK's population increased by 4% in the 1990s. Of this growth, 73% came from minority ethnic groups, which grew by about 1.6 million people compared with 600,000 in the White population. The fastest growing group was Black African, which more than doubled during the decade. Bangladeshi, Pakistani and Chinese groups also saw rapid growth. In 2006, 21% of births in the UK were to mothers themselves born outside the UK, compared to 15% in 2001. In 2006, 5% of these births were to mothers born in Pakistan, India and Bangladesh, and 4% to mothers born in EU countries other than the UK and the Republic of Ireland.<sup>8</sup>

It has been predicted that by 2051, minority ethnic communities will make up 20% of the UK population (compared to 8% in 2001), with far less segregation as ethnic groups disperse throughout the country. White British and Irish groups are expected to be very slow-growing, while the 'Other White' group is projected to grow the fastest, driven by immigration from Europe, the US and Australasia. Groups of South Asian origin (India, Pakistan and Bangladesh) will also grow rapidly in size.<sup>9</sup>

There is an uneven distribution of people from minority ethnic groups in the UK, skewed heavily towards the inner areas of London and certain other cities and towns such as Slough, Leicester, Luton and Birmingham. Nearly half (45%) of these communities live in the London region, where they comprise 29% of all residents.<sup>10</sup> London's largest migrant populations are from India, Bangladesh and Ireland, followed by Jamaica, Nigeria and Poland.<sup>11</sup>

Whilst a very high proportion of Black African, Black Caribbean and Bangladeshi households live in London, (80%, 60% and 55% respectively) compared to 10% for White British,<sup>4</sup> other minority ethnic groups are more dispersed. For example, there are significant Somali communities in Birmingham, Bolton, Hull, Liverpool, London, Leicester, Manchester and Sheffield. Over a quarter of the population in Leicester is of Indian origin, whilst Birmingham has large populations of Punjabi, Pakistani (and/or Kashmiri) and Caribbean backgrounds.

## Prevalence, trends and measures of obesity

### Key points

- Obesity prevalence varies substantially between ethnic groups for both adults and children in the UK
  - Estimates of adult obesity prevalence by ethnic group seem to differ according to the measurement used (for example, BMI, waist-to-hip ratio and waist circumference):
    - Black African women have the highest obesity prevalence when using waist circumference as a measure, and Bangladeshi women when using waist-to-hip ratio; and
    - Chinese men and women appear to have the lowest obesity prevalence whichever measure is used
- There is continuing debate about the applicability of definitions of obesity across ethnic groups for adults and children
- Different ethnic groups have different physiological responses to fat storage
- Data from the National Child Measurement Programme (NCMP) show that obesity appears to be increasing for Bangladeshi boys
- Revised BMI thresholds have been recommended for the South Asian population who are at risk of chronic diseases and mortality at lower BMI levels than the European population

- Following International Diabetes Federation (IDF) guidelines, lower waist circumference thresholds of 90cm (men) and 80cm (women) for the South Asian population compared to the general population are in common use
- Similarly, a recommendation has been made to reduce the healthy waist circumference threshold for men from Chinese ethnic groups from 94cm to 90cm, to indicate increased risk
- In terms of public health action it is particularly important for South Asian populations in the UK to be aware of the health risks of increased BMI and waist circumference

## Adults

### *Measures of obesity*

- Body mass index (BMI)

The most common measure of weight status is BMI, defined as weight in kilograms divided by the square of height in metres. Conventional adult BMI classifications relating to excess weight are 'overweight' (25.0–29.9kg/m<sup>2</sup>) and 'obese' (30.0kg/m<sup>2</sup> and above). These thresholds were originally derived primarily for European populations to correspond to risk thresholds for a wide range of chronic diseases and mortality.

It is now generally accepted that South Asian populations are at greater risk of ill health at lower BMI levels than European populations. A lower threshold of 23kg/m<sup>2</sup> for classification as overweight in British South Asians, derived from long standing statements from the World Health Organization (WHO), has been recommended by the South Asian Health Foundation in the UK.<sup>12</sup> However, in the absence of universal agreement, the National Institute for Health and Clinical Excellence (NICE) continues to advise that the same thresholds as for the general population should be used to classify overweight and obesity in all ethnic groups in the UK.<sup>13</sup>

The Chinese population has also been highlighted at particular risk with elevated blood pressure levels at significantly lower BMI values compared to European populations,<sup>14</sup> although no specific BMI thresholds for the Chinese ethnic group have yet been agreed.

Some countries have adopted their own thresholds for their own populations. For example, in Singapore, the BMI thresholds for public health action and clinical interventions were revised in 2005 with an emphasis on health risk for cardiovascular diseases and diabetes. Low risk was defined as between 18.5 and 22.9kg/m<sup>2</sup>; moderate risk as between 23 and 27.4kg/m<sup>2</sup>; and high risk as 27.5kg/m<sup>2</sup> and above.<sup>15</sup> In 2008, The Union Health Ministry of India reduced the diagnostic thresholds for BMI to 23kg/m<sup>2</sup> and the standard waist circumference to 90cm for Indian men and 80cm for Indian women.<sup>16</sup>

- Waist circumference (WC)

WC is a measure of the accumulation of body fat around the waist (central or abdominal adiposity) and may present a higher risk to health than fat deposited in other parts of the body. High levels of central adiposity in adults are known to be associated with increased risk of obesity-related conditions

including type 2 diabetes, hypertension and heart disease. Although measures of central adiposity are closely correlated with BMI, they have been shown to predict future ill health independently of BMI.<sup>17</sup> Current WC thresholds for increased risk of obesity-related health problems among White populations are 94cm or more in men, and 80cm or more in women. The equivalent thresholds for greatly increased risk are 102cm for men and 88cm for women.

There is evidence that people of South Asian origin have a more centralised distribution of body fat without necessarily developing generalised obesity and show raised obesity-related risk at lower waist circumference levels.<sup>18,19</sup> The International Diabetes Federation and South Asian Health Foundation are in agreement that the healthy WC threshold for men from South Asian and Chinese ethnic groups should be reduced from 94cm to 90cm, to indicate increased risk. No change from 80cm has been recommended for women.<sup>20,12</sup>

A recent literature review concluded that optimal WC threshold values vary across different ethnicities and there is no universal optimal value that can be applied worldwide, although country or region-specific threshold values could be considered.<sup>21</sup>

As there are no globally applicable WC thresholds as yet, NICE does not recommend separate WC thresholds for different ethnic groups in the UK.<sup>13</sup>

- **Waist-height ratio (WHTR)**

The waist-height ratio (WHTR) has been proposed as a good measurement for use across all ethnic groups. It has been suggested that even in populations with low rates of obesity and moderate BMIs such as Japan and China, raised WHTR could be an important early indicator of lifestyle-related disorders and its measurement could be an important part of a public health approach to preventing diabetes and coronary heart disease (CHD). However, further validation of the suggested boundary values of 0.5 and 0.6 to indicate different levels of risk is required.<sup>22</sup>

## ***Prevalence***

The Health Survey for England (HSE) 2004 contained a boosted sample of individuals from minority ethnic groups and gives the most recent robust data on adult obesity prevalence by ethnic group. When using BMI as a measure, findings suggest that compared to the general population, obesity prevalence is lower among men from Black African, Indian, Pakistani, and, most markedly, Bangladeshi and Chinese communities. Among women, obesity prevalence appears to be higher for those from Black African, Black Caribbean and Pakistani groups than for women in the general population and lower for women from the Chinese ethnic group.

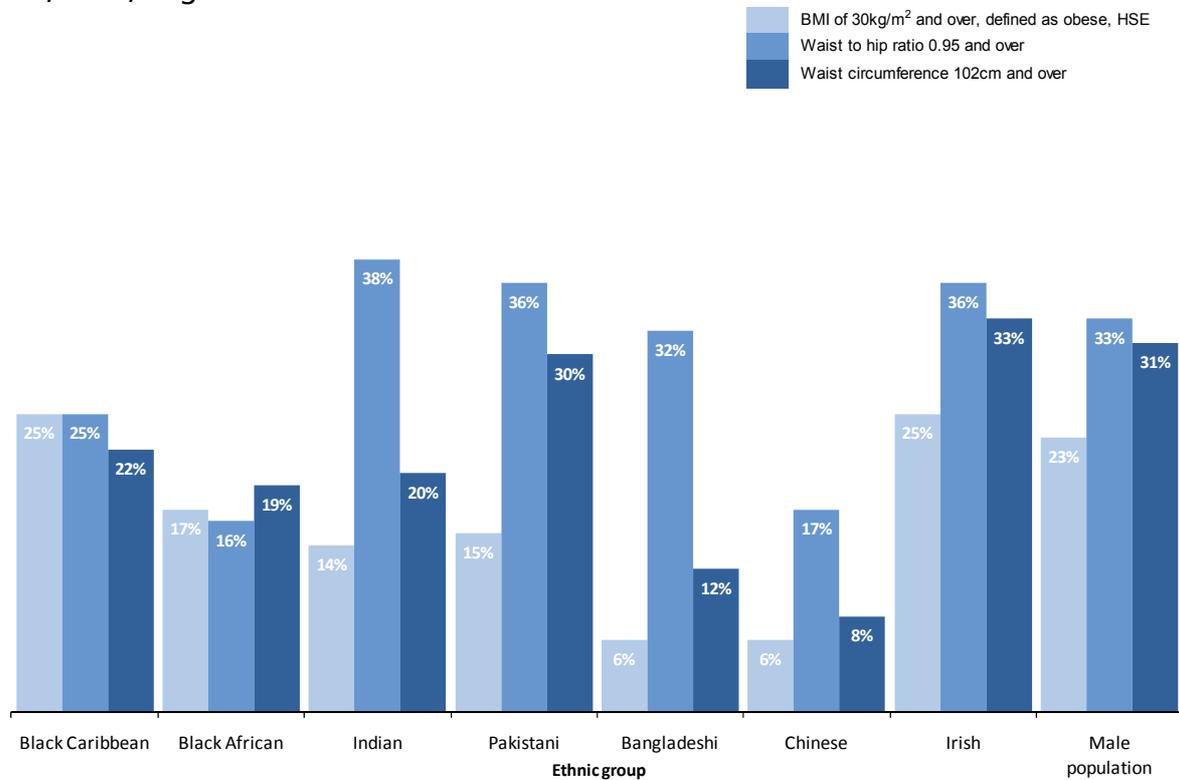
Analysis by the British Heart Foundation found that this pattern changes when other measurements of overweight and obesity are used. Whilst men from Irish, Pakistani, Indian and Bangladeshi groups have similar prevalence of raised waist-to-hip ratio,<sup>a</sup> compared to men in the general population, those from Black Caribbean, Black African and Chinese communities are less likely to have a raised waist-to-hip ratio (Figure 1).

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a Waist-to-hip ratio (WHR) is defined as mean waist circumference divided by mean hip circumference. It is a less commonly used measure of central adiposity than waist circumference, because both waist and hip can decrease with weight reduction and so WHR changes very little. Although there is no consensus about appropriate WHR thresholds, a raised WHR is commonly taken to be 1.0 or more in men, and 0.85 or more in women.<sup>23</sup>

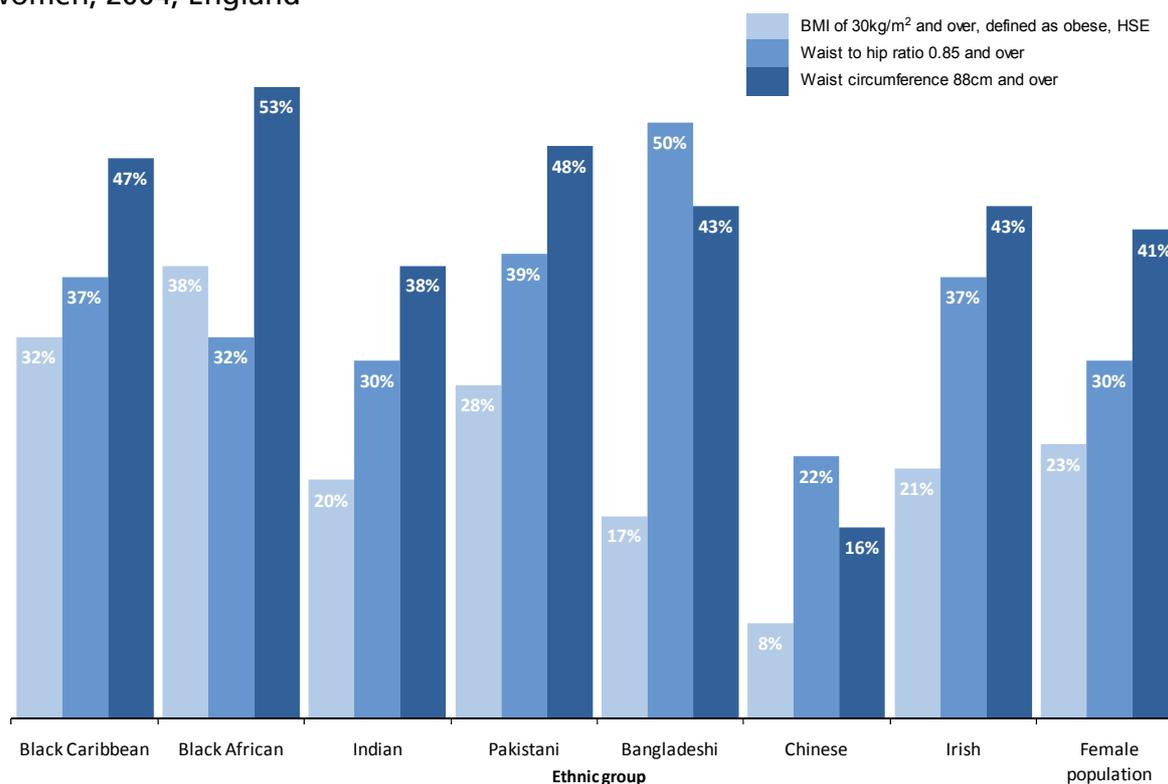
Women from Bangladeshi, Black Caribbean, Pakistani and Irish groups are more likely to have a raised waist-to-hip ratio compared to women in the general population, with Bangladeshi women nearly twice as likely (Figure 2).<sup>24</sup>

**Figure 1:** Body mass index, waist-to-hip ratio and waist circumference by ethnic group, men, 2004, England



Source: Joint Health Surveys Unit (2005) Health Survey for England 2004. The Health of Minority Ethnic Groups. Department of Health: London.

**Figure 2:** Body mass index, waist-to-hip ratio and waist circumference by ethnic group, women, 2004, England



Source: Joint Health Surveys Unit (2005) Health Survey for England 2004. The Health of Minority Ethnic Groups. Department of Health: London.

## Children

### *Measures of obesity*

For children, the picture is more complicated than it is for adults. There is not a worldwide-accepted definition of obesity for children and there are no ethnically adapted definitions. The relationship between fatness and BMI varies with age and sex, so definitions of obesity and overweight need to take these two variables into account. Children's BMI measures are, therefore, usually compared to a growth reference in order to determine a child's weight status. Internationally, a number of different child growth references and associated thresholds are currently in use.<sup>25</sup>

The most commonly used growth reference charts in the UK are the British 1990 Growth Reference (UK90) and the International Obesity Task Force (IOTF) growth reference. For data relating to the HSE and the National Child Measurement Programme (NCMP), the UK90 is used to determine BMI status according to a child's age and sex. Children whose BMI is between the 85<sup>th</sup> and less than the 95<sup>th</sup> centile are classified as overweight, and those at or above the 95<sup>th</sup> centile are classified as obese. This definition is commonly used in the UK for population monitoring rather than clinical purposes. The Millennium Cohort Study uses the IOTF growth reference to determine weight status according to a child's age and sex. The difference between this and the UK90 is the reference population: the UK90 uses growth curves based on UK children, while the IOTF is based on pooled data from a number of countries.

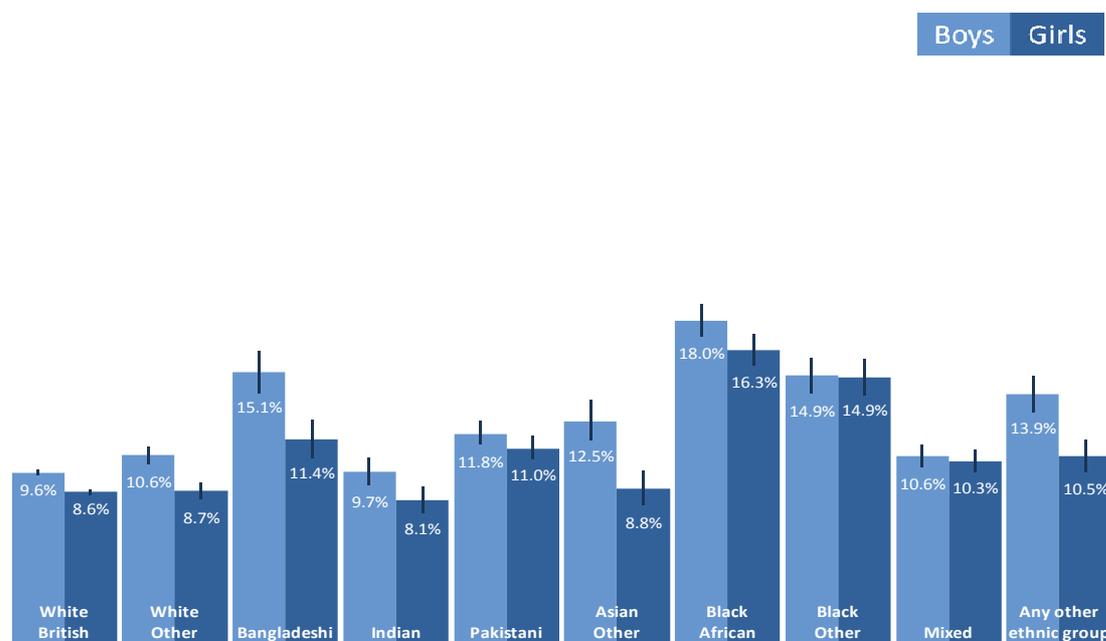
Re-evaluation of adult obesity thresholds for some ethnic groups has led to the questioning of child obesity thresholds. An expert group held at University College London's Institute of Child Health in London was convened in January 2009 to examine the representativeness of childhood obesity definitions, evidence for ethnic differences in body composition in UK children, and the extent of misclassification of adiposity by current BMI thresholds in South Asian and Black groups. The group concluded that current IOTF thresholds<sup>b</sup> remained the most appropriate for use in the UK, but further research was needed on the relationship between body shape, fat mass, metabolic markers and ethnicity in children and adolescents.<sup>27</sup>

The International Diabetes Federation (IDF) recommends using waist measurement rather than BMI to define obesity because of the link between diabetes and abdominal obesity. For adults, the IDF's definition has been adapted for ethnicity. However, this is not the case for the IDF's definitions for children: their definition of obesity as a waist circumference at or above the 90<sup>th</sup> centile (based on USA-specific growth curves)<sup>28</sup> applies to all ethnicities. The IDF advocates the use of ethnicity-specific centile charts where these are available.

### Prevalence

As with adults, child obesity prevalence has been shown to vary substantially between ethnic groups, with obesity prevalence generally lower in children of White British ethnicity. The NCMP records height and weight measurements annually of children in Reception (aged 4–5 years) and Year 6 (aged 10–11 years) attending state-maintained primary schools in England. It is the most robust dataset on childhood obesity in the UK and has been run annually since the 2006/07 school year. The most recent findings (Figures 3 and 4) show:

**Figure 3:** Prevalence of obesity (with 95% confidence limits) by ethnic group and sex, Reception, 2009/10

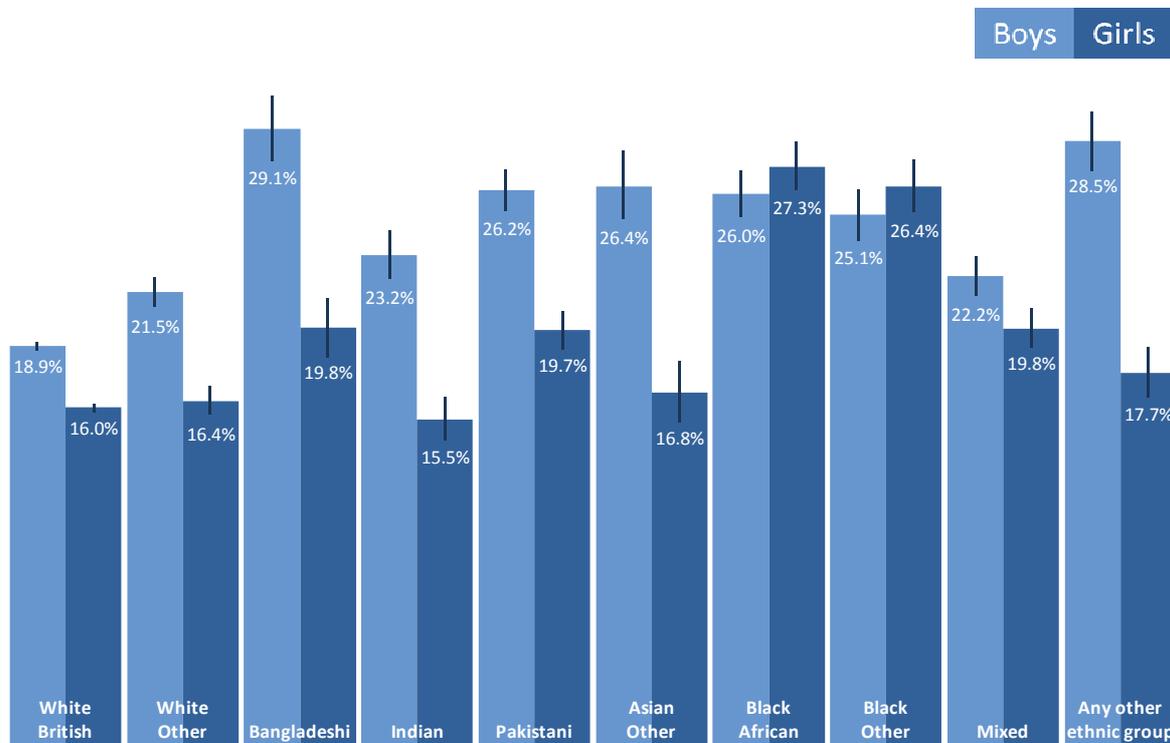


Source: National Child Measurement Programme (NCMP), 2009/10. The NHS Information Centre for health and social care

<sup>b</sup> The IOTF thresholds are based on international data and provide age and sex specific thresholds from 2–18 years.<sup>26</sup> These points pass through BMI of 25 and 30kg/m<sup>2</sup> (the widely accepted thresholds for adult overweight and obesity) at age 18.

- in Reception, obesity prevalence is especially high for children of both sexes from Black African and Black Other ethnic groups, and boys from the Bangladeshi ethnic group<sup>29</sup>
- for girls in Year 6, the pattern is broadly similar to that observed for girls in Reception<sup>29</sup>
- for boys in Year 6, all ethnic groups report significantly higher prevalence of obesity than the White British ethnic group, with boys of Bangladeshi ethnicity having the highest prevalence<sup>29</sup>
- the prevalence of obesity in some Asian groups, particularly children of Bangladeshi, Asian Other and Pakistani ethnicity, is as high or higher, than that for the Black African and Black Other ethnic groups despite a general perception that the latter groups have the highest obesity prevalence<sup>29</sup>

**Figure 4:** Prevalence of obesity (with 95% confidence limits) by ethnic group and sex, Year 6, 2009/10



Source: National Child Measurement Programme (NCMP), 2009/10. The NHS Information Centre for health and social care

The HSE 2004 Health of minority ethnic groups report provides data on children aged 2–15 by ethnic group.<sup>30</sup> For boys, the proportions found to be obese ranged from 14% from Indian and Chinese ethnic groups to 31% from the Black African group. For girls, the proportions ranged from 12% from the Chinese ethnic group to 27% from the Black Caribbean and Black African groups. However, the prevalence of obesity in most minority ethnic groups was not significantly different from the general population, with only boys from the Black African group more likely to be obese than boys in the general population (31% and 16% respectively). In interpreting the findings, it should be remembered that the sample sizes for each minority ethnic group were quite small and the data were not standardised by age.

The UK-wide Millennium Cohort Study is a nationwide longitudinal survey of a sample of children born between September 2000 and August 2001. Current findings report on children aged between three and five, using overweight and obesity as a measure, rather than 'obesity only' as reported in the HSE and NCMP analyses. The results showed that Black children were at the most risk of being overweight and this increased between age three and age five (30% were overweight at age three compared to 36% at age five). Those least likely to be overweight at age three were children of Indian ethnicity (10%), and at age five, children of Pakistani ethnicity (17%).<sup>31</sup> Children from the Bangladeshi ethnic group were found to be almost twice as likely as White children to experience rapid weight gain between three and five years old.<sup>32</sup>

Two longitudinal studies based in London examined the relationship between obesity and ethnicity in adolescents aged between 11 and 16. The Health and Behaviour in Teenagers Study (HABITS), a five-year longitudinal study on health and behaviour in teenagers, found strong evidence for ethnic differences in adiposity, with the prevalence of overweight and obesity in Black girls almost double that of White girls.<sup>33</sup> The MRC Determinants of Adolescent well-being and Health (DASH) study found that overweight was more prevalent among Black Caribbean and Black African girls, and obesity more prevalent among Black Caribbean girls.<sup>34</sup>

### ***Trends***

An analysis of trends in obesity prevalence by ethnic group using NCMP data found a clear trend of rising obesity prevalence for both boys and girls of Bangladeshi ethnicity, with no significant changes in any other ethnic groups. In the 2006/07 data, obesity prevalence for children of Bangladeshi ethnicity was broadly in line with that for children from Pakistani and Asian Other ethnic groups. However, by the 2008/09 dataset, prevalence of obesity for Bangladeshi boys and girls in Reception, and boys in Year 6, was significantly higher than for Pakistani and Asian Other children.<sup>29</sup> The HSE 2004 found that between 1999 and 2004, the prevalence of obesity among boys of Bangladeshi ethnicity increased from 12% to 22% and for girls, from 13% to 20%.

### **Gaps in knowledge**

- There is ongoing debate as to whether the current criteria for defining obesity in both adults and children are appropriate for non-European populations.
- BMI is not always an accurate predictor of body fat or fat distribution in individuals. Research has shown that for the same level of BMI, people of African ethnicity appear likely to carry less fat and people of South Asian ethnicity more fat than the general population. This may have led to an overestimation of obesity among African and an underestimation among South Asian groups.<sup>35</sup>
- Ethnic groups are heterogeneous by nationality and religion, and thresholds for overweight and obesity may vary by sub-group.
- The estimated burden of obesity-related disease among minority ethnic groups may be greatly underestimated. Using revised thresholds for some ethnic groups could greatly increase these estimates.

- For children there is no globally accepted approach for defining obesity, nor are there ethnically adapted definitions.
- The most recent data on adult obesity by ethnic group are from the HSE 2004, which included a boost sample to increase the proportion of people from minority ethnic groups.<sup>30</sup> These data are now six years old. Future boosted samples are needed to make it possible to monitor trends over time in these populations.
- Data are scarce or non-existent for many smaller ethnic groups within the UK and only a few qualitative studies have focused on these communities.
- The high odds of children from Black African and Black Other ethnic groups being considered obese may be due to physical characteristics related to ethnicity and, in particular, height.<sup>36, c</sup> Recent surveys show that Black girls and boys are generally taller and boys of Asian ethnicity generally shorter than their White counterparts.<sup>33,34</sup> As BMI is known to be skewed by height, BMI will be higher for some Black ethnic groups, and lower for Asian groups.
- It is unclear as to why an analysis of the HSE 2004 data found that Black boys had the highest prevalence of obesity, whilst data from the NCMP found that children from Asian groups had the highest prevalence. This may be because of the additional breakdown by Asian sub-group available within the NCMP data.
- A number of studies have highlighted a relationship between ethnicity and obesity. However some of these are local studies while others are national studies; the ages of the children varies within each and some of them measure overweight including obesity while others examine obesity only. These details should always be considered when comparing the results in order to compare like with like.

## Obesity-related disease prevalence

Obesity has been identified as a risk factor in a wide range of diseases and illnesses including coronary heart disease, stroke, type 2 diabetes, hypertension, metabolic syndrome, osteoarthritis and cancer.<sup>23</sup> The prevalence of obesity-related conditions varies by ethnic group. Some groups such as South Asian and Chinese groups have been found to suffer from an elevated risk of some of these conditions, particularly type 2 diabetes and hypertension, even if their BMI is low.<sup>14</sup> Minority ethnic groups, as a whole, are more likely to report ill health than the White British population,<sup>30</sup> although some groups, notably Chinese, often report better health.

Patterns of ethnic inequalities in health vary across health conditions, age group, gender and geographic area. These patterns also vary between generations, with rates of ill-health worse among those born in the UK than in first generation migrants.<sup>37</sup> Ethnic group differences in disease prevalence in England are well documented but factors such as the differences between UK-born minority ethnic groups and migrants are often ignored.<sup>38</sup> Research on morbidity has suggested that socioeconomic factors

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c The standard BMI assumes that a body's mass increases as the square of the height. Generally mass increases with the cube of the linear dimensions, so a formula using the square will skew to higher BMIs for tall people.

make a major contribution to ethnic differences in health,<sup>39</sup> as well as other factors such as the area one lives in,<sup>40</sup> and experiences of racism.<sup>41</sup>

The following section covers specific obesity-related conditions where obesity is known to vary by ethnic group.

**Summary table:** Selected obesity-related conditions where prevalence is considered to vary by ethnic group (where data are available)

Disease	Key points relevant to minority ethnic groups
<b>Cardiovascular risk</b>	<p>Highest prevalence in men of Irish ethnicity<sup>30</sup></p> <p>Lowest prevalence in men from Black African ethnic group and women from Bangladeshi ethnic group<sup>30</sup></p> <p>Higher risk at a lower BMI in many Asian groups compared to White population<sup>42</sup></p>
<b>Coronary heart disease</b>	<p>Highest prevalence in men from Indian and Pakistani groups<sup>30</sup></p> <p>Lowest prevalence in men from Black African and Chinese groups<sup>30</sup></p> <p>Mortality rates high for those dying in England and Wales but born in South Asia<sup>24</sup></p>
<b>Hypertension</b>	<p>Prevalence three to four times higher in Black African population than in White population<sup>43</sup></p> <p>Adolescents from Indian ethnic group at greater risk than White adolescents at lower BMI<sup>34</sup></p> <p>South Asian and Chinese populations at elevated risk compared to European populations even if BMI is low<sup>14</sup></p>
<b>Stroke</b>	<p>Chinese and Black populations at increased risk<sup>44</sup></p> <p>Highest prevalence in men of Black Caribbean ethnicity<sup>30</sup></p> <p>Highest prevalence in women from Bangladeshi and Pakistani groups<sup>30</sup></p> <p>Mortality rates lower for Black population than the general population<sup>45</sup></p>
<b>Metabolic syndrome</b>	<p>More prevalent in South Asian and Black African populations<sup>46,47</sup></p>
<b>Type 2 diabetes</b>	<p>Men from Bangladeshi population almost four times as likely as the general population<sup>30</sup></p> <p>Men from Pakistani and Indian populations almost three times as likely as the general population<sup>30</sup></p> <p>Women of Pakistani ethnicity over five times more likely than the general population<sup>30</sup></p> <p>Women from Bangladeshi and Black Caribbean populations over three times more likely than the general population<sup>30</sup></p> <p>South Asians and Chinese populations at elevated risk compared to European populations even if BMI is low<sup>14</sup></p> <p>Children from South Asian and Black African Caribbean ethnic groups at a greater risk than children from White ethnic groups<sup>48</sup></p>

## Cardiovascular disease

*Cardiovascular disease (CVD) is the class of diseases that involve the heart or blood vessels. It is the leading cause of death in the UK, causing almost 170,000 deaths (around a third of all deaths) in England and Wales in every year.<sup>24</sup>*

Self-reported data from the HSE 2004 suggest that men of Irish ethnicity have the highest prevalence of any CVD condition<sup>d</sup> (14.5%), while men of Black African ethnicity have the lowest (2.3%). Women from the general population have the highest prevalence of any CVD condition (13.0%), and women from the Bangladeshi ethnic group have the lowest (4.8%). Men of Black African ethnicity are one quarter as likely, and Bangladeshi women over half as likely, to have any CVD condition, compared with the general population. The proportion with any CVD condition increases with age in both sexes, and is markedly higher in the oldest age group (55 and over).

Prevalence of cardiovascular disease increased significantly between 1999 to 2004 in men of Pakistani ethnicity (from 4.8% to 9.1%) and women of Indian ethnicity (from 2.3% to 4.2%). CVD risk is higher at a lower BMI in many Asian groups compared with the general population and central adiposity is higher at similar BMI levels.<sup>42</sup>

### **Coronary heart disease (CHD)**

*The two main forms of CHD are heart attack (myocardial infarction) and angina. CHD alone is the most common cause of death in England and Wales, accounting for 15% of all deaths.<sup>24</sup>*

Data from the HSE 2004 show that the prevalence of CHD is highest in men from Pakistani (8%) or Indian (6%) ethnic groups, and lowest in men from Black African (1%) or Chinese (1%) ethnic groups. In women, CHD is lower for all minority ethnic groups than for the general population, with the prevalence lowest for women from Black African and Chinese ethnic groups (1%). Among men living in the UK, those born in South Asia and Eastern Europe have a higher premature death rate from CHD than the average for England and Wales, whilst those born in the Caribbean and West Africa have the lowest. Among women, those born in South Asia have a higher premature death rate from CHD than the average for England and Wales and those born in Italy have the lowest.<sup>24</sup> Data from 2003 show that the death rate among Bangladeshi men living in England is 112% higher, and the death rate among Pakistani women living in England 146% higher, than the average for England and Wales.<sup>49</sup>

### **Stroke**

*The burden of stroke is substantial, and it is estimated that it is the third leading cause of death in England and Wales with over 67,000 deaths each year.<sup>50</sup> The impact of stroke over the coming decades is likely to increase due to the ageing population.*

People from Chinese and Black ethnic groups are at a particular risk of stroke, with hypertension as a predominant risk factor.<sup>44</sup> The HSE 2004 found that stroke prevalence was highest among those aged 55 and over. Amongst men in this age group, those from the Black Caribbean ethnic group had the highest prevalence

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<sup>d</sup> The HSE report notes that informants are classified as having any CVD condition if they reported having any of the following conditions confirmed by a doctor: angina, heart attack, stroke, heart murmur, irregular heart rhythm, 'other heart trouble'. High blood pressure and diabetes are not included in this definition, since they are risk factors for CVD and are dealt with separately.

(11.5%), whilst amongst women, those from Bangladeshi (11.9%) or Pakistani (10.1%) ethnic groups had the highest prevalence.

An investigation of ethnic differences in the natural course of stroke using the South London Stroke Register (SLSR) found that whilst Black people were at an increased risk of stroke, the Black-White gap in stroke incidence had decreased over a 10-year period.<sup>51</sup> The investigation also found that Black people with good mobility before a stroke and older Black people also appear to have a substantial survival advantage over equivalent White people.<sup>45</sup>

### **Hypertension**

*The British Hypertension Society defines Hypertension as the presence of raised systolic or diastolic blood pressure (above 140mmHg or above 90mmHg, respectively). Approximately 30% of adults in England have hypertension or are being treated for high blood pressure.<sup>52</sup>*

A systematic review of variations in blood pressure in children of UK ethnic minority populations found that blood pressure across all groups was similar.<sup>53</sup> This contrasted with those in the corresponding UK adult populations, where blood pressure was found to be comparatively high in those of Black African ethnicity (three to four times higher than the UK population<sup>54</sup>), and comparatively low in those of Bangladeshi and Pakistani descent.<sup>55</sup>

Recent analysis of the MRC DASH study, which covered children aged 11–16 in London, found an age-related increase in blood pressure in children of Black African ethnicity.<sup>56</sup> Although adolescents from the Indian ethnic group are less likely to be overweight or obese than White adolescents, the effect of excess weight on diastolic blood pressure appears to be greater.<sup>34</sup>

### **Metabolic syndrome**

*Metabolic syndrome in adults is defined as a cluster of risk factors for cardiovascular disease and type 2 diabetes. These are dyslipidaemia, glucose intolerance and hypertension as well as abdominal obesity. The presence of three or more components significantly increases a person's risk of cardiovascular disease and type 2 diabetes.<sup>57</sup>*

Metabolic syndrome is especially prevalent amongst people of South Asian and Black African origin.<sup>58,46</sup> For South Asian populations, a lower WC tends to be associated with more features of metabolic syndrome than is the case for the White population.<sup>23</sup>

### **Type 2 diabetes**

*Diabetes UK estimate that there are approximately 2.8 million people diagnosed with type 2 diabetes in the UK and potentially an additional 850,000 more who are not aware they have it.<sup>59</sup> It is estimated that by 2025, there will be more than four million people with diabetes in the UK.<sup>60</sup> Diabetes is associated with an increased risk of heart disease and stroke, high blood pressure, blindness, kidney disease, nervous system disease and complications during pregnancy.<sup>61</sup>*

Data from the HSE 2004 show that, with the exception of the Irish ethnic group, all minority ethnic groups have a higher standardised risk of having doctor-diagnosed diabetes compared to the general population. Women of Pakistani ethnicity are over

five times more likely, and those of Bangladeshi or Black Caribbean ethnicity over three times more likely, than women in the general population to be diagnosed with diabetes. Bangladeshi men are almost four times more likely, and Pakistani and Indian men almost three times more likely, to have doctor-diagnosed diabetes compared to men in the general population.<sup>30</sup> The 2008/09 National Diabetes Audit confirmed that type 2 diabetes is strongly associated with ethnicity, social deprivation and age. It also showed that the number of people with diagnosed diabetes has increased by 25% over the past six years.<sup>62</sup>

Until recently, type 2 diabetes was only found among adults. However, there are now cases in children and these have been linked to rising levels of obesity. Children of South Asian, Black African and Black Caribbean origin have been found to be at a particular risk of type 2 diabetes compared to children from white ethnic groups.<sup>48</sup> According to Diabetes UK, children of South Asian origin were more than 13 times more likely to have type 2 diabetes than White children in 2004.<sup>63</sup> In a study of healthy 14–17 year olds in Birmingham, South Asian adolescents were found to be more insulin resistant, with higher body fat levels that were more centrally distributed than White European adolescents, which may contribute to their increased risk of developing type 2 diabetes.<sup>64</sup>

### **Gaps in knowledge**

- As with obesity prevalence, much of the most recent information about disease prevalence for minority ethnic groups was drawn from the HSE 2004.<sup>30</sup>
- The role of genes in obesity-related disease risk is not clear. Some genes have been found to predispose adults of South Asian origin to type 2 diabetes without a clear correlation with BMI, whilst others have been reported to have a relationship to insulin resistance and type 2 diabetes (but not necessarily BMI).<sup>65</sup>
- The causes of the excess stroke morbidity and the lower CHD burden among populations of African descent are not yet understood. Similarly, there are no clear answers as to why hypertension is more common in these groups, with speculation including genetics and environmental factors.<sup>43</sup>
- Some researchers suggest that obesity could be an important risk factor for asthma, with BMI found to be positively associated with asthma incidence in American Black African women.<sup>66</sup> The MRC DASH study also reported a strong association between BMI and asthma in Black African boys.<sup>67</sup> It remains unclear as to whether there is a direct causal link or whether this relationship may be explained by shared risk factors including behavioural, environmental and genetic factors.

### **Range of potential determinants of obesity**

#### **Key points**

- Health behaviours of minority ethnic groups within the UK may vary widely according to different religious, cultural and socioeconomic factors, as well as geography

- There is considerable variation in physical activity and dietary behaviours across minority ethnic groups, with particular issues affecting those of South Asian origin
- Minority ethnic groups in the UK often experience lower socioeconomic status, which is independently associated with an elevated risk of obesity in women and children
- People from minority ethnic groups may experience increased levels of obesity-related stigma

Every culture encompasses a spectrum of people, and regional and individual expressions of that culture may vary widely. Below are reported research findings relating to lifestyle, culture, attitudes and socioeconomic environment in relation to different minority ethnic groups. It should be kept in mind, however, that these findings are not relevant to every person from those communities. For example, in terms of culture, not every person will subscribe to all that particular community's cultural values, and the degree of influence these principles wield will vary from person to person.

## **Lifestyle**

Health behaviours, both across and within minority ethnic groups within the UK, vary widely<sup>68</sup> according to different religious, cultural and socioeconomic factors, as well as geography.

### ***Physical activity levels***

Physical activity levels are a major influence on obesity and its determinants.<sup>69,70</sup> A number of studies have shown low levels of physical activity among minority ethnic groups in the UK. This is particularly true for South Asian populations,<sup>71</sup> where markedly lower levels of physical activity compared to the White population have been found to remain significant even after controlling for age, sex, education, adiposity and self-reported health variations.<sup>72</sup> Further analysis of separate South Asian groups suggests that people from the Bangladeshi community have markedly lower levels of physical activity than other South Asian groups, while those of Indian ethnicity have the highest levels, although still lower than the White population.<sup>73</sup>

Similar conclusions were made in a detailed analysis of the HSE 2004 to examine the odds of meeting the physical activity guidelines of at least five days per week of moderate intensity exercise lasting 30 minutes per day. Data for men and women were analysed separately. For men, only Bangladeshi and Pakistani groups were found to have lower odds than the White population. These odds decreased with age and were lower for unemployed, retired or economically inactive men compared to employed men. In women, the odds were lower for South Asian and Chinese groups compared to the White population and were lower for retired or economically inactive women compared to employed women.<sup>74</sup>

A recent systematic review of the literature on participation in sport and recreation by black and minority ethnic communities confirms the relatively low levels of participation in sport among these communities compared with White groups, with greater gender disparity. People from Bangladeshi and Pakistani groups were least likely to participate, with Bangladeshi and Pakistani women's participation rates

consistently below those of White and other minority ethnic groups. However, the 'mixed' ethnic groups showed consistently higher levels of participation than any other group including White British. In addition, when individual sports were examined, relatively high proportions of Pakistani and Bangladeshi men were seen to play football and cricket, for example. Even these figures were not quite what they seemed as the higher participation might in large part be explained by the younger age profile of minority ethnic communities.<sup>75</sup>

South Asian children also appear to have lower levels of physical activity than their White European contemporaries.<sup>76</sup> The Child Heart and Health Study in England (CHASE) reported lower physical activity level in British South Asian children compared to White European, Black African or Black Caribbean children, with girls less active than boys.<sup>77</sup> HABITS found that physical activity declines and sedentary behaviours become more common during adolescence, with Asian girls showing a faster decrease in activity than White girls.<sup>78</sup>

A combination of personal, socioeconomic, cultural and environmental barriers may discourage people from Black and minority ethnic groups from engaging in physical activity. The majority of relevant studies have explored the views of the South Asian population, rather than other minority groups.<sup>79</sup> Particular barriers to physical activity have been reported by South Asian women including dress codes, modesty and lack of single-sex facilities.<sup>75</sup> Other obstacles cited as barriers to regular physical activity include difficulties in identifying suitable and safe walking routes,<sup>80</sup> time constraints, dependent relatives or availability of childcare,<sup>81</sup> and a perceived lack of culturally appropriate exercise services.<sup>82</sup> There were reports from younger generations of South Asian women that negative attitudes to physical activity had been instilled by their parents who had the view that sport and femininity were incompatible.<sup>83</sup>

Research studies have confirmed the presence of racism in sport and PE, and demonstrated its damaging influence on individuals and on participation in sport, with varying assessments of its significance.<sup>75</sup> Ethnic differences by occupation will also affect physical activity. Studies which have included occupational activity have found that those groups more heavily represented in manual work are more likely to be physically active.<sup>74</sup>

### ***Diet***

Many people from minority ethnic groups have healthier eating patterns than the White population. However, there are, of course, considerable variations in dietary patterns across and within ethnic groups. These eating patterns are influenced by many factors including availability of food, level of income, health, food beliefs, dietary laws, religion, cultural patterns and customs. Additional factors include age (and in particular, generation), region of origin and occupation.<sup>84</sup>

A recent systematic review on the nutritional composition of children's diets found appreciable differences by ethnicity. Compared with White Europeans, children from South Asian ethnic groups, and most notably Bangladeshi children, reported higher mean total energy intake. Black African and Black Caribbean children had lower fat intakes, and this was particularly marked among Black African children.<sup>85</sup> The MRC DASH study found that apart from Indians, adolescents from minority ethnic groups were generally more likely to engage in poor dietary behaviours than White adolescents, with those born in the UK and girls being most susceptible. Black

Caribbean and Black African adolescents were the most likely of all groups to skip breakfast and engage in other poor dietary practices.<sup>35</sup>

One qualitative study, examining the food and eating practices of British Pakistanis and Indians with type 2 diabetes, found that many respondents attempted to balance the perceived risk of eating South Asian foodstuffs against those of alienating themselves from their culture and community.<sup>86</sup> Another, focusing on women in the Somali community, found that they were influenced by cultural factors such as the traditional Somali diet of rice, pasta and red meat and an association of fruit and vegetables with poverty. They also lacked information on how to prepare healthy Western food.<sup>87</sup> Focus group discussions with girls and young women from African and South Asian communities found that they tended to assimilate the fast-food aspect of the British diet into their eating habits. In addition, they tended to eat fewer vegetables, due to the expense of familiar vegetables, lack of availability and lack of time to prepare traditional dishes.<sup>88</sup>

## **Migration**

Migration to the UK plays a significant role in influencing dietary change. Adoption of a different diet has been shown to be associated with marked changes in insulin-like growth factor, which in turn has been associated with type 2 diabetes and myocardial infarction.<sup>89</sup> Migration to the UK also appears to affect obesity prevalence in some minority ethnic groups. For example, overweight and obesity among populations of African origin living in Cameroon, Jamaica and the UK have been found to be higher in those who had migrated to the UK than in those who lived in Cameroon and Jamaica.<sup>90</sup> Similarly, Gujaratis living in Britain have been found to have higher mean BMIs than Gujaratis in India.<sup>91</sup>

Migrants may find it difficult to maintain their traditional eating habits after moving country as familiar foods may be hard to find and more expensive than Western equivalents. A systematic review of the changing dietary habits of minority ethnic groups in Europe concluded that the majority of migrants alter their eating habits following migration, combining part of their traditional diet with some of the less healthy elements of the Western diet. Age and generation were two major factors determining the extent to which diets changed, with processed foods more likely to be consumed by younger generations than older generations.<sup>84</sup>

## **Socioeconomic factors**

There is a strong link between obesity prevalence and deprivation among women: most measures show that lower socioeconomic status is associated with a greater risk of obesity. The pattern is less straightforward for men, with only some measures showing a clear relationship between obesity and deprivation.<sup>92</sup>

Obesity is strongly related to socioeconomic status in children, with obesity prevalence increasing with increased levels of deprivation. This pattern of socioeconomic inequalities has been found to be consistent across a variety of different measures of deprivation and different data sources including the NCMP, the HSE 2004 and the Millennium Cohort Study.<sup>93</sup> Recent analysis by the London Health Observatory has found that the increased risk associated with deprivation is greatest for White children, followed by Asian, Other, and Mixed children, whereas it appears to have little effect for Black children.<sup>94</sup>

Minority ethnic groups tend to have higher levels of unemployment, experience less social mobility, have lower incomes and are more likely to live in areas of high deprivation within the UK.<sup>74</sup> For all ages, family type and family work status, people from minority ethnic groups are, on average, much more likely to be in income poverty than White British people.<sup>95</sup> Rates of poverty are highest for people from Bangladeshi, Pakistani and Black African groups, reaching nearly two-thirds for the Bangladeshi community. They are also higher than average for Caribbean, Indian, Chinese and other minority group households. Over half of children from Pakistani, Bangladeshi and Black African groups are growing up in poverty.<sup>96</sup> Some migrant groups are exceptionally deprived (e.g. those born in Somalia, Congo, Eritrea and Afghanistan) and face a high degree of exclusion from the labour market. These are groups which are likely to include a high proportion of refugees and asylum seekers.<sup>97</sup>

Children from African and Asian families have been found to be more likely to be exposed to some of the socioeconomic risk factors associated with obesity such as maternal employment status, maternal hours of work and lone motherhood.<sup>98,99</sup> Obesity prevalence also varies with levels of educational attainment, and there is a general trend of rising obesity prevalence with decreasing level of education. Children of African ethnicity are twice as likely to live in a low-income family where the mother has no qualifications.<sup>100</sup> Children of Bangladeshi, Pakistani, Turkish and Somali ethnicity tend to achieve below-average results in British schools.<sup>101</sup>

### **Perceptions of weight and body image**

Perceptions of weight and body image vary within cultures, families and generations. The Western cultural preference for slenderness has largely been adopted by British minority ethnic communities. Obesity is seen as a symbol of affluence and success in some traditional, non-Western societies. Although this is not commonplace in the UK, it appears to continue to impact on some groups.<sup>81</sup> For example, one qualitative study of young Somali women in England found that, whilst they were aware of what constitutes a healthy body size, they were constrained by older Somalis' cultural attitudes favouring larger body size.<sup>102</sup> Similarly, focus groups with women of Zimbabwean origin suggested that concerns about being overweight were rare in Zimbabwe, but prevalent in the UK.<sup>88</sup>

A recent systematic review on children's views about obesity, body size, shape and weight found that children's ethnicity and socioeconomic status were frequently not stated by the study authors. The only study which explored ethnicity found that children of Asian ethnicity (both boys and girls) were more likely to prefer thinner body shapes than White children.<sup>103</sup> In adolescents, associations between obesity and self-esteem have been found to vary considerably by ethnic group. The Research with East London Adolescence Community Health Survey (RELACHS) study on East London adolescents found that obesity was associated with higher self-esteem among Black African girls, but lower self-esteem among Bangladeshi girls, whilst among boys, overweight and obesity only had a negative impact on White British and Bangladeshi boys.<sup>104</sup>

HABITS, the longitudinal cohort study of adolescent health behaviours in South London, found that an over-estimation of weight was more common in White adolescents and under-estimation of weight was more common in Black adolescents.<sup>105</sup> The RELACHS study concluded that girls of all ethnic groups were more likely than boys

to assess their weight accurately, particularly in the higher BMI ranges. There was no variation between ethnic groups.<sup>104</sup>

A systematic review on parental perception of overweight status in children found that more than 50% of parents in the general population cannot recognise when their children are overweight.<sup>106</sup> Analysis of the Millennium Cohort Study found some evidence that obesity may not be seen as a problem among some minority ethnic groups, with 54% of African and 40% of South Asian parents unconcerned about their child's weight compared to 31% of White European parents.<sup>100</sup>

### **Race-specific stigma**

The societal preference for leanness in the Western world stigmatises overweight and obesity. Stereotyping of obese people is common, with overweight bodies often linked to socially undesirable behaviours, weakness of will, laziness and greed.<sup>85</sup> Overweight children are not immune from this stigma, experiencing weight-related stereotyping and bias from their peers, educators and parents.<sup>107</sup> The correlation of obesity with other forms of marginalisation, such as poverty, disability, and racial and cultural discrimination, may lead to many people from minority ethnic groups experiencing a 'layering' of stigma. This may mean that they have to cope with multiple stigmas, for example, being poor and from an ethnic group subject to discrimination, as well as being obese.<sup>107</sup> In the USA, public discourses about obesity appear to indicate that people from minority ethnic groups are most likely to be criticised for their obesity on lifestyle grounds.<sup>108</sup>

### **Local area characteristics**

Minority ethnic groups are spatially concentrated in deprived urbanised areas with high crime rates. Research by the Commission for Architecture and the Built Environment (CABE) found that in areas where more than 40% of residents are black or minority ethnic, there is 11 times less green space than in areas where residents are largely white. The spaces that minority ethnic groups do have are also likely to be of a poorer quality,<sup>109</sup> and they face additional barriers to using these spaces, for example, feelings of insecurity due to the fear of personal attack or racism.<sup>110</sup> A lack of facilities combined with worries about safety have been found to influence physical activity in ethnic minority groups.<sup>111,112</sup> There is also a strong link between obesity and the built environment (obesogenic environments with less access to green space and availability of fast-food restaurants).<sup>113</sup>

Areas with a high density of minority ethnic populations have been found to have a 'protective' effect on the psychological outcomes for ethnic minorities living in these areas, with increased social support acting as a buffer against the detrimental effect of racism. However, this protective effect appears to be weaker on physical health outcomes and differs by ethnic group. Black African, Indian and Pakistani people have been found to benefit the most as overall ethnic minority density increases, whilst the effect is most detrimental for Bangladeshi people, whose health deteriorates across all outcomes.<sup>114,115</sup>

### **Gaps in knowledge**

- It is unclear how much of the difference in the prevalence of obesity and associated health risks across ethnic groups is caused by biological

differences, health behaviours, culture, lifestyle, lower socioeconomic status or differential access to health services.<sup>51</sup>

- Perceptions of weight vary according to age, gender and ethnic group and are influenced by a large number of factors. This area needs further exploration.
- There are gaps in understanding regarding the diets, nutritional and health status of smaller migrant groups (for example, from China, Iraq, Somalia and Eastern Europe).<sup>116</sup> There are also many larger migrant groups, such as those from Pakistan and India, where little research is available and where risk factors are high for obesity-related health problems.
- Research that focuses on younger or more deprived children from minority ethnic groups is lacking.
- The low levels of physical activity amongst both women and men from Pakistani and Bangladeshi communities cannot be simply explained by cultural barriers for women.<sup>74</sup>

## Discussion

There is no straightforward relationship between obesity and ethnicity. Much more detailed work is needed to understand the range of ethnic and gender differences in obesity prevalence,<sup>74</sup> and the complex interplay of factors affecting obesity in minority ethnic communities within the UK.

There is a continuing debate about the applicability of definitions of obesity across ethnic groups for adults and children. There is evidence that, for a given BMI, the average proportion of body fat differs between ethnic groups suggesting that ethnic-specific thresholds may be needed. In children, this issue is further complicated by differences between groups in the rate of maturation up to and during adolescence.

Many of the data referred to in this report are based on the HSE 2004 report on the health of minority ethnic groups. This remains the most comprehensive data source available on obesity and ethnicity for the adult population in the UK. Most studies on ethnicity are restricted by small sample sizes and require ethnic groups to be combined in analysis to ensure statistically significant results. The recent NCMP findings, which demonstrate a very high prevalence of obesity among boys of Bangladeshi ethnicity, show the importance of being able to analyse obesity prevalence by ethnic sub-groups and by sex to avoid missing key populations at risk.

Whilst there is much research on obesity-related disease prevalence and the associated risk factors for the South Asian and to a lesser extent Black African and Black Caribbean populations in the UK, very little relates to other minority ethnic communities. Migrants, refugees and asylum-seekers are not included in most studies and these groups may be at the most risk of poor health,<sup>117</sup> as seen with more recent research on the UK Somali community.<sup>87,102</sup>

The difference in prevalence of obesity-related conditions such as cardiovascular disease and type 2 diabetes across ethnic groups can only be explained by a complex and as yet unresolved interplay of genetic susceptibility and environmental factors.<sup>47</sup> It remains unclear as to why the distribution of adipose tissue is an important determinant for

increased risk of these conditions.<sup>12</sup> The burden of obesity-related disease among minority ethnic groups may also be greatly underestimated. Using revised thresholds for some ethnic groups could greatly increase these estimates.

Many minority ethnic groups experience higher rates of poverty and deprivation than the White population. With excess body weight related to a range of major chronic diseases, socioeconomic differences in obesity prevalence can be seen to be disproportionately affecting people from minority ethnic groups.<sup>118</sup>

Migration, racism, discrimination, differences in culture and lifestyles, biological susceptibility, and poor delivery and take-up of health care, all impact on the health of minority ethnic groups in the UK.<sup>37</sup> These groups are also influenced by the same barriers to engaging in a healthy lifestyle as the White population.<sup>81</sup> In addition, research from the USA suggests that people from minority ethnic groups experience a double or even multi-layering of obesity-related stigma compared to the White population.<sup>107</sup>

## Appendix 1

### Useful studies

National Child Measurement Programme (NCMP)	The NCMP weighs and measures the height of children in Reception (aged 4–5 years) and Year 6 (aged 10–11 years). Although the NCMP has only been collecting data since 2006/07 and only covers certain age groups, it includes the majority of children in those year groups. The participation rate in 2008/09 was 90%, equating to just over a million children. The NCMP dataset is now compliant with the Code of Practice for Official Statistics and has therefore been accredited with National Statistic status
Health Survey for England (HSE)	The HSE is a cross-sectional survey which samples a representative proportion of the population. The survey is conducted annually. Data for some of the time series are available from 1993 onwards
The Millennium Cohort Study (MCS)	The MCS is a multidisciplinary longitudinal survey of a sample of children born between September 2000 and August 2001, and the households they live in. Repeat surveys were conducted in 2004/05, 2006 and 2008. The initial sample consisted of nearly 19,000 babies born in England, Wales, Scotland and Northern Ireland
Research with East London Adolescence Community Health Survey (RELACHS)	School based epidemiological study of adolescents in East London (Year 7 and Year 9) that provides insights into many aspects of health and well-being of inner urban British adolescents. Around 73% of the young people in the cohort are from minority ethnic groups, predominantly Bangladeshi, Black African, Black Caribbean, Indian or Pakistani
The Child Heart And Health Study in England (CHASE)	Examined the health of about 5,000 primary school children (Year 5, aged nine to ten) living in London and the Midlands. Data collection started in Summer 2004 and continued until early 2007. Schools were sampled to ensure that a balance of children from different social and ethnic backgrounds (including children of South Asian, African and Caribbean origin) were included in the study
The Determinants of Adolescent Social well-being and Health Study DASH	A study of a multi-ethnic adolescent cohort in London, which investigates social and biological influences on ethnic differences in health and well-being in adolescence. DASH contains over 6,500 pupils recruited from 51 schools across ten inner London boroughs. Pupils were aged 11–13 years old at the start of the study in 2003, and were followed up at ages 14–16 years in 2005/06
The Health and Behaviour in Teenagers Study (HABITS)	A five-year longitudinal survey of the health and behaviour of over 5000 11–16 year olds from South London

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