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Ethnic Differences in Obesity, Diet and Physical Activity - A Literature review

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In England around a quarter of all adults are classified as obese and this is estimated to rise dramatically in the future (Department of Health, 2008; McPherson et al, 2007). Physical activity and healthy eating habits are widely acknowledged as two of the major ways of preventing obesity - the Department of Health has set recommended levels for both and has launched various public education campaigns to encourage the population to meet those levels. Intervention strategies for physical activity and healthy eating need to recognize cultural and gender differences both between and within ethnic groups. This paper provides a literature review of obesity, diet and physical activity among ethnic groups.

ETHNIC DIFFERENCES IN OBESITY, DIET AND PHYSICAL ACTIVITY – A LITERATURE REVIEW

(i) Obesity in England

The World Health Organisation estimates that there are approximately 1.2 billion people in the world who are overweight, of which at least 300 million are obese (Department of Health, 2008). In England around a quarter of all adults are classified as obese (Craig & Mindell, 2008 Vol 1) and it is estimated that around 60% of the UK adult population could be obese by 2050 (McPherson et al, 2007). Obesity is a well established risk factor in many health problems, including arthritis, stroke, heart disease, cancer and diabetes (Lee et al, 1999; Stevens et al, 2004, Kopelman, 2000; Gensini et al 1998; Jonsson et al 2002). A recent House of Commons Select Committee report estimated that overweight and obesity costs the NHS £1 billion per year and it has been forecast that this could rise to almost £10 billion per year by 2050 (House of Commons Health Select Committee 2004; Department of Health, 2008). The Government have published a new £372 million strategy *Healthy Weight, Healthy Lives (2008)* designed to help the population lead healthier lives by maintaining healthy weights. The strategy covers children, diet, physical activity, incentives for better health and treatment and support for people who are overweight or obese (Department of Health and the Department for Children, Schools and Families, 2008)

Childhood obesity is a major cause for concern. The prevalence of obesity among children aged 2-15 years within England increased from 11% in 1995 to 16% in 2006 (Craig & Mindell, 2008) and it has been estimated that by 2050 around a quarter of all people under age 20 could be obese (Department of Health 2008). Obese children are more likely to become obese adults (Guo & Chumlea, 1999) and there is evidence to suggest that obesity is linked to type 2 diabetes in childhood (Savage et al 1979; Ehtisham et al 2000; Drake et al 2002; Ehtisham et al 2004). The Government's latest target for childhood obesity is to have reduced the proportion of overweight and obese children to 2000 levels by 2020 (Department of Health and the Department for Children, Schools and Families, 2008).

(ii) The measurement of obesity

The internationally recognised measurement of obesity and overweight is the Body Mass Index (BMI). The World Health Organisation's (WHO) International Obesity Task Force has devised cut-off points to classify people with a BMI of over 30 as obese and those with a BMI of 25-30 as overweight (WHO, 1989). BMI generally highly correlates with adiposity but sometimes it can lead to misclassification, for example athletes are often classified as obese because they have high muscle mass which weighs more than fat (International Diabetes Institute, 2001). However, the BMI measurement is generally used as an indicator of adiposity and is widely used in epidemiological studies and clinical settings. There is much debate about whether BMI cut-off points should be adjusted for ethnicity because, for example, people of South Asian origin have a higher percentage of body fat for any given BMI while those of Black Caribbean origin have a lower percentage body fat for any given BMI, (McKeigue et al, 1991; Prentice & Jebb, 2001; International Diabetes Institute, 2000; Deurenberg et al, 1999; Deurenberg-Yap & van Staveren, 1998; Snehalatha et al, 2003; Rush et al, 2007; Misra, 2003; Misra et al, 2005). A WHO expert consultation recognised this problem but agreed that the general WHO BMI cut-offs should be retained as international classifications; no attempt was made to redefine cut-off points for Asians separately because available data indicated that cut-offs vary in different Asian populations (WHO, 2004).

Abdominal fat is closely associated with diseases such as diabetes, heart disease and cancer (Sjostrom, 1997, National Institutes for Health, 2001; National Institute for Health and Clinical Excellence, 2006). McCarthy et al (2003) shows that abdominal fatness has increased in children in the UK to a greater extent than BMI over the past 10-20 years, suggesting that obesity prevalence may be underestimated when measured by BMI alone. The WHO now encourages the use of measures of abdominal fat such as waist circumference and waist-hip-ratio and the National Institute for Health and Clinical Excellence recently recommended a combination of BMI and waist circumference to classify health risks from obesity in adults (WHO, 2000, National Institute for Health and Clinical Excellence, 2006). It is argued that

waist circumference and waist-hip-ratio are better measures of body fat for South Asians because this group tend to have a more centralised distribution of body fat without developing generalised obesity (Yusuf et al, 2005; International Diabetes Institute, 2000; Mellin-Olsen & Wandel, 2005). Also, South Asians have increased risks of the cardiovascular risk factors of the Metabolic Syndrome¹ including Type 2 Diabetes which, as stated above, are associated with abdominal body fat (McKeigue et al, 1991; McKeigue et al, 1993).

(iii) Obesity and Ethnicity

The prevalence of overweight and obesity varies between and within ethnic groups. The 2004 Health Survey for England reported that the prevalence of overweight including obesity (measured by Body Mass Index) was higher for Black Caribbean, Black African and Pakistani women than those in the general population and the prevalence was markedly lower for Chinese women. Different patterns were seen in men; the prevalence of overweight including obesity for Black Caribbean and Black African men was not significantly different from the general population while Chinese men and South Asian men (Pakistani, Bangladeshi and Indian) were less likely to be overweight (including obesity) than the general population. (Sproston & Mindell, 2006, Vol 1). Women had a higher BMI than men in each of the ethnic groups except the Chinese and the Irish groups. The largest difference in the prevalence of obesity between men and women was for the Black African group, where women's obesity prevalence was more than double that in men (38% compared with 17%) and the Bangladeshi group (17% compared with 6%) (Sproston et al, 2006, Vol 1). The prevalence of overweight including obesity generally increased with age in all ethnic groups but the increase was particularly marked among Black Caribbean, Black African and Indian women (Sproston & Mindell, 2006, Vol 1).

The 2004 Health Survey for England reported increased risks of raised waist hip ratio (WHR) for Pakistani and Bangladeshi men compared with men in the general population. This is an interesting result because Pakistani and Bangladeshi men were less likely to be overweight or obese than the general population when BMI was used (Sproston & Mindell, 2006). Among women, risk ratios for raised WHR were significantly higher than the general population for those in each minority ethnic group but Bangladeshi women had a markedly higher risk than the other minority ethnic groups (as for men, this group is not identified as at risk of obesity when using the BMI measurement alone).

A number of studies have shown that ethnicity is independently associated with childhood overweight and obesity and this is particularly problematic for Black African and Black Caribbean girls (Saxena et al, 2004; Wardle et al, 2006; Taylor et al, 2005; Harding et al, 2008; Sproston & Mindell, 2006). South Asian children are also a high-risk group with Pakistani girls at an increased risk of obesity and Indian and Pakistani boys at increased risks of overweight and obesity (Saxena et al, 2004). In addition, Duncan et al (2003) suggests that the percentage body fat of Asian boys is of particular cause for concern. These ethnic differences are important for the health of future generations of South Asian, Black Caribbean and Black African people because of the increased susceptibility of these ethnic groups to obesity related diseases such as diabetes and heart disease. Parental overweight is a predictor of childhood obesity (Mamun et al, 2005). A recent study by Harding et al (2008) has shown that parental characteristics can influence obesity in children and that parental behaviours are generally more adverse in 'White UK' and 'White Other' groups than in Black African, Black Caribbean, South Asian or Mixed ethnic groups.

Migration may have an effect on obesity prevalence within ethnic groups. A study by Jackson et al (2007) examined overweight and obesity among populations of African origin in Cameroon, Jamaica and the UK and reported that levels of overweight and obesity were higher in those who had migrated to the UK than those who live in Cameroon or Jamaica. Similarly Patel et al (2005) found that British Gujeratis had higher mean BMIs than Gujeratis

¹ The Metabolic Syndrome is a set of health risks that increase the chance of developing heart disease, stroke and diabetes.

in India. Migration to a more affluent society may result in a change of lifestyle which may lead to increased body weight (Goel et al, 2004; Mellin-Olsen & Wandel, 2005).

Culture is an important determinant of attitudes to fatness and body shape. In less affluent societies there is often a positive relationship between body weight and socio-economic status whereas the opposite is true in many affluent societies where a lower body weight is the ideal (Tovee et al, 2006). In some traditional, non-Western societies body fat is deemed an indicator of wealth, prosperity, femininity and sexual capacity (McGarvey 1991; Ghannam, 1997; Nasser, 1988). Tovee et al (2006) highlighted the striking differences in the attractiveness preferences of South African Zulus and UK Caucasians - the South African Zulu group demonstrated attractiveness preferences for people with higher BMI values compared with a preference for those with mid-range BMI values in the UK group. Cross-cultural studies indicate that young women from culturally English backgrounds dislike body fat compared to peers from Black-Caribbean and Black African backgrounds (Furnham & Alibhai 1983; Furnham & Baguma 1994; Wardle & Marsland, 1990). There are also ethnic differences in the association of childhood obesity and self-esteem - with higher self-esteem among obese Black African girls than other obese girls (Viner et al, 2006). Additionally, Duncan et al (2006) found that body dissatisfaction of children differed across ethnic groups; with each percentage increase in body fat there is a greater increase in body dissatisfaction for Asian children compared to Black and White children.

In general, there is a well established association between unhealthy life-styles and factors such as social class, education, deprivation, income (Marmot et al 1991; Pill et al, 1995; Wardle & Steptoe, 2003). However, there is evidence to suggest that this relationship is either not present for minority ethnic groups or is much more complicated (Saxena et al, 2004; Dawson et al, 2005).

(iv) Diet and Ethnicity

Diet plays an important part in obesity and an unhealthy diet is associated independently with life-threatening conditions such as cardio-vascular disease and certain cancers (WHO, 2003; Department of Health, 2004, Ness & Powles, 1997). Over the past decade the UK Government has set recommended guidelines and a series of action plans to encourage the population to eat a healthier diet of more fruit and vegetables, less saturated fat and less salt and sugar. The recent *Health Weight, Healthy Lives* strategy lays out further plans to promote healthier food choices (Department of Health and the Department for Children, Schools and Families, 2008). Yet still only around a third of all adults in England are meeting the recommended guidelines of eating 5 portions of fruit or vegetables per day (Craig & Mindell, 2008)

Research has shown that diet varies among different sub-groups of the population and that healthy eating is associated with age, gender, social class and education (Shelton, 2005; Pratala et al, 2003; Hunt et al, 2000). There is also evidence of considerable variation in eating habits between different ethnic groups. Evidence from the 1999 and 2004 Health Surveys for England shows that males and females from the Indian and Chinese groups are more likely to eat 5 portions of fruit and vegetables per day and have lower fat intakes than the general population. In fact, fat intake among men from *all* minority ethnic groups was lower than that of the general population (with Indian, Chinese and Black African men showing the lowest fat intakes) and women in most minority ethnic groups (except the Irish and Pakistani groups) had lower fat scores than the general population (Sproston & Mindell, 2006, Vol 1; Erens et al, 2001, Vol 1). Similarly, the Expenditure and Food Survey for 2004/05 found that the percentage of food energy derived from total fat was lower in Chinese people than in any other ethnic group and that the intake of saturated fat in Asian, Black and Chinese people was much lower than for White people. Vegetable consumption was highest among Asian and Chinese populations while fruit consumption was highest among Mixed and Black/British populations. Salt consumption was below the target of 6g/day for all ethnic groups except the White population (Gibbens & Julian, 2006). Thus, many minority ethnic sub-groups show healthier eating patterns than the population as a whole.

A number of small-scale studies have also shown that the diet of UK South Asians is generally healthier than that of their white counterparts (McKeigue et al, 1985, McKeigue & Chaturvedi, 1996, Williams et al, 1994). Wyke & Landman (1997) note that the traditional South Asian diet comprises a little meat, fish or dairy products and large amounts of chapattis or rice, pulses, fruit and vegetables, providing a diet that is high in fibre and carbohydrates and low in fat. However, this diet varies with religious and cultural background and qualitative studies have noted that the UK South Asian population is not a homogenous group and that there are dietary differences between and within ethnic groups. Williams et al (1994) studied the diet of South Asians (mainly Punjabi) in Scotland and found large differences in the diets of South Asian Muslim and non-Muslim groups, with Muslims more likely to eat meat and less likely to eat fruit and cooked vegetables than non-Muslims. Smith et al (1995) found that Asian men in Bradford ate a greater variety of vegetables, less sugar and more fibre than Caucasians. This was particularly evident in Hindus (probably due to their vegetarianism) but the study also found that Hindus had the highest total fat intake. Wyke & Landman (1997) reported gender differences in the South Asian group they studied in Scotland, with men more likely to prefer meat and women preferring vegetables. It must also be noted that some studies have reported high consumption of fats within Asian diets, for example Lip et al (1995) found a higher quantity of fat in foods bought per week by the Asian population than in the white and black groups, with butter, egg, milk and ghee consumption and use of frying greater among 'Asians'.

A number of studies have been carried out to examine the diet of Afro-Caribbeans in the UK (Sharma et al, 1998; Sharma & Cruickshank, 2001; Sharma et al, 2002; Miller et al 1998; Dowler & Calvert, 1995; Lip et al, 1995). However it should be noted that (as with South Asians in the UK) people of Caribbean origin come from a number of territories which influences their food habits and cultural practices. The studies show that Afro-Caribbeans consume less energy from fat, particularly saturated fat, and more from carbohydrates than whites (Sharma et al, 1998; Miller et al 1988; Dowler & Calvert, 1995; Lip et al, 1995). Fruit and green vegetable intakes are also higher in the Afro-Caribbean group (Sharma et al, 1998; Sharma & Cruickshank, 2001). Sharma & Cruickshank (2001) note that a typical West Indian diet is high in carbohydrate foods such as rice, potatoes, yams and green bananas as part of a meal accompanied by meat, chicken or fish. A variety of pulses are eaten with rice to form the Jamaican and Barbadian dish 'rice and peas'. The traditional Caribbean diet is generally regarded as high quality but some studies suggest that the quantities consumed are too great for the level of energy expenditure (Sharma et al, 2002; Scott, 1998).

Cultural beliefs and traditions play an important role in dietary habits as culture is often expressed through food. Food is a cultural symbol learnt in childhood and eating habits formed in childhood continue into adulthood (Videon & Manning, 2003; Kemm, 1987; Edles, 2004). Children's eating patterns are also influenced by mealtime structures such as whether the family eat together (Patrick and Nicklas 2005; Videon & Manning 2003; Neumark-Sztainer et al, 1998; Neumark-Sztainer et al; Neumark-Sztainer et al, 1999; Neumark-Sztainer et al, 2000; Neumark-Sztainer et al, 2003; Pesa & Turner, 2001; Gillman et al, 2000; Rockett, 2007; Cason, 2006, Reinarts et al, 2007; Larson et al, 2007). Parental eating behaviours are also important in the transmission of attitudes and values towards health eating (Boutelle et al, 2007). Thus one might expect to see ethnic differences in the significance given to preparing fresh food and eating together as a family. A study of Sikh and Muslim migrant women in Glasgow found that great importance was placed on the main evening meal which usually consisted of home-made dishes of South Asian food (Anderson et al, 1995). Another study of Gujarati immigrants in Harrow revealed the importance of eating a main meal in the evening so that all family members can eat together (Kalka, 1988). Bush et al (1998) looked at obligatory patterns of food intake in South Asians (Punjabi Muslim) in the west of Scotland and found that traditional family hospitality meals play a more important part in the life of migrant South Asians than they do in White and British born South Asians, which may result in high energy intake. The emphasis of food in the life of South Asian women was illustrated by the fact that both the migrant and British groups spent more time cooking than the white groups. South Asians also had more frequent hospitality visits than Whites. Culture, tradition, habit and respect for guests' preferences are common considerations in choosing meals for

family hospitality among South Asians (health, ease and novelty were occasional considerations). The data confirms the greater importance of the hospitable meal among South Asians and also confirms the greater conformity to the traditional meal and the greater elaboration of cookery too. Greenhalgh et al (1998) also noted that in Bangladeshi society feasts, food and social occasions are common, culturally important and involve eating sweet and rich food. Lawrence et al (2007) noted that Pakistani and Bangladeshi girls learn cooking skills from older generation of females; this process was described as 'natural' by them. Cultural beliefs also play an important role in the diet of the UK Afro-Caribbean population, with meal production and consumption forming an integral part of bonding in the West Indian culture, i.e. dietary traditions are significant in maintaining family and social networks (Scott, 1998). Another food custom is to serve and consume large portions of food thus displaying a healthy appetite, this is of particular importance for serving guests (Douglas 1987; Bush et al, 1997). Brown et al (2007) studied Afro-Caribbeans with diabetes and found that they did not perceive diet as a cause for concern for their condition and that there was an element of mistrust about the advice offered by health professionals.

Migration to the UK plays a significant role in dietary change among ethnic minority populations. Lawrence et al (2007) suggests that on moving to the UK traditional foods are modified, and that a reduction in vegetable intake together with the use of fast foods causes the overall diet to be less healthy. This is supported by other studies which note the adoption of the fast food part of the British diet among South Asian and Afro-Caribbean migrants (Landman & Cruickshank, 2001; Anderson et al, 2005, Simmons & Williams, 1997; Anderson & Lean, 1995). Heald et al (2005) looked at the effect of migration on UK Gujaratis, comparing their nutrient intakes with those of Gujaratis living in the same village of origin in India, and found significantly higher energy and fat intakes among the UK Gujarati group. A study of the eating habits of South Asians in the UK found that length of time since immigration has an effect on diet with an increase in the frequency of consumption of western foods and a decrease in that of traditional foods (Kassam Khamis et al, 1996). There is evidence that traditional foods are likely to be retained at evening meals and at weekends as this is when most of the family is present, but breakfasts and lunches are likely to change (Koctirk, 1991; Mellin-Olsen & Wandel, 2005). Wandel (1993) suggests that migrants tend to retain staple foods from their own culture and introduce new foods from their host culture based on taste (i.e. adopting the sugary and snack foods). Kassam-Khamis et al, (1996) found that having white friends, eating in non-Asian homes and being born in Britain was associated with reduced consumption of traditional foods and increased consumption of western foods among South Asians. Edwards et al, (2006) compared the diets of Pakistani children from Bradford with children living in Pakistan and found that the Bradford children were significantly less likely to eat vegetable, fish, or dairy than those in Pakistan or and they were more likely to eat meat, sugars, fizzy drinks and fast food. Mellin-Olsen & Wandel (2005) identified a number of factors which might influence dietary change after migration including health aspects, childrens' preferences, work schedules, social relations, stress, traditional beliefs, climate, season and access to foods. Numerous studies have shown inter-generational differences with greater signs of acculturation in second generation than in first generation South Asians i.e. British-born South Asians are more likely to eat 'English' foods (Mares et al, 1985; Kalka, 1988, Pironi et al, 2007; Jamal, 1998).

For most minority ethnic groups fruit and vegetable consumption is highest amongst the older age-groups (Sproston & Mindell, 2006, Vol 1). This raises the question of whether older people retain more traditional eating patterns that may not be followed by younger generations. Similarly, a number of studies by Sharma found higher fat intakes among younger age groups of Afro-Caribbean people, reflecting the consumption of less traditional Caribbean food and more European food such as biscuits and cakes (Sharma et al, 1996; Sharma et al, 1998, Sharma & Cruickshank, 2001). Pironi et al (2007) found that older South Asian women had much greater knowledge than younger South Asian women of preparing and cooking traditional South Asian vegetables. Studies of the diets of South Asian children show trends towards the consumption of 'western' foods, with many adopting a mixture of traditional and 'English' diets (Wyke & Landman, 1997; Stone et al, 2007; Lawrence et al, 2007). Stone et al (2007) found a high consumption of 'negative' foods (such as sweets) and

a low consumption of 'positive' foods (such as fruit) in South Asian school-children, however, these poor dietary habits were evident in the white children too. Sheikh & Thomas (1994) noted a varying degree of adherence to religiously-prescribed food practices in a study of school pupils in Harrow. Some children reported different opinions to those of parents regarding religious influences on daily life while others followed their parents' examples of dietary restrictions. However, in contrast to these studies Parsons et al (1999) found minimal dietary differences between the children of first and second generation Pakistani mothers and Anderson et al (2005) reported that the poor dietary habits adopted by first generation South Asian migrants in Scotland are modified in subsequent generations.

(v) Physical Activity and Ethnicity

Physical activity forms another important aspect of concerns about 'healthy living' as it is associated with an increased risk of many conditions such as obesity, cardio-vascular disease, diabetes and certain cancers (Hohl, 2001; Lynch et al, 1996; Thune & Furberg, 2001; Shephard & Fitcher, 1997; The Chief Medical Officer, 2004). The World Health Organisation rated physical inactivity as one of the leading causes of death in developed countries and it is now recognized as one of the major environmental factors in the prevention of obesity (WHO, 2002). The UK Government's physical activity recommendations are that on at least five days a week adults should participate in moderate or vigorous intensity activity for at least 30 minutes per day either in one session or through a number of shorter sessions of 10 minutes or longer (The Chief Medical Officer, 2004). However, recent statistics show that only 40% of men and 28% of women in England are meeting these recommendations (Craig & Mindell, 2008). The recent *Healthy Weight, Healthy Lives* strategy lays out a series of plans to build more physical activity into the lives of the UK population (Department of Health and the Department for Children, Schools and Families, 2008).

The 2004 Health Survey for England shows significant differences in physical activity between ethnic groups. Both men and women in the South Asian and Chinese groups have lower levels of activity than the population as a whole and are the most cause for concern when it comes to meeting the recommended guidelines. Bangladeshi and Pakistani women had particularly low rates (Sproston & Mindell, 2006, Vol 1). A number of other smaller scale studies in the UK have shown similar findings of low levels of physical activity among South Asians (Hayes et al, 2002; Dhawan & Bray, 1997; Pomerleau et al, 1999; Williams et al, 1994; Johnson, 2002; Chambers et al, 2006 Carrington et al, 1987; Lean et al, 2001). Fischbacher et al (2004) report that the consistent findings in these studies are not closely related to the method of measurement, definition of physical activity or geographical location. Some of these studies also provide comparative information on separate South Asian groups and support the HSE findings that Bangladeshis have markedly lower levels of physical activity than other South Asian groups, while Indians have the highest levels (Rudat, 1994; Hayes et al, 2002). The HSE shows that the low levels of physical activity among Bangladeshi and Pakistani men and women extends to sports as well as other forms of activity such as walking (Sproston & Mindell, 2006, Vol 1). Similarly, Pomerleau et al (1999) found UK South Asian women were less likely than White European women to walk outside the workplace, to cycle or take part in sport. However, they were more likely to be active at work than the White European group. Hayes et al (2002) found that South Asian groups, generally, participated in a more restricted range of sporting and leisure activities than white 'Europeans'. Among South Asian men football and rugby were the most popular form of activity and recent literature dispels the myth that Asians do not play football and argues that football is an increasingly popular leisure-time activity for many young male British Asians (Burdsey, 2006).

The 2004 HSE reported that Pakistani Boys and Irish boys and girls were as likely as the general population to have exercised at the levels recommended by the government (at least one hour every day). However, all children from all other ethnic minority groups were less likely than those in the general population to have done so. Among girls, the groups with the lowest levels were Pakistani, Black African, Chinese, Indian and Bangladeshi. Among boys, the lowest levels were recorded among the Chinese, Indian, Black African and Bangladeshi groups. A number of smaller studies in the UK show that South Asian children and young

people do less physical activity than their white counterparts (Woodfield et al, 2002, Rogers et al, 1997, Williams & Shams, 1998). Broderson et al (2007) carried out a 5-year longitudinal study with children aged 11-12 at the outset in London schools and found that Asian boys and girls and Black girls were less active than their White counterparts and interestingly that these ethnic differences were established at aged 11-12 years of age, i.e. the ethnic differences did not evolve over the 5 year period thus suggesting that attitudes and behaviour are fixed at an early age. This was also the case in a cross-sectional study of 11-15 year olds in Leicester schools by Khunti et al (2007) who noted that sub-optimal diet and activity habits were evident at baseline ages. Khunti also identified the main barrier towards physical activity among South Asian children as the low prioritization of health when making lifestyle choices. A number of authors have focused on young Muslim girls' experiences of physical activity and have suggested that tensions arise between the cultural practices of Islam and physical education within schools, for example dress codes, attitudes towards the body and modesty, extra-curricular activities, fasting during Ramadan, and the lack of consensus in Islam about the value of curriculum subjects of music and dance music (Carroll & Hollinshead, 1993; Parker-Jenkins, 1995; Benn, 1996; Benn, 2000a; Benn, 2000b; Ansari, 2002; McDonald & Hayes, 2003). Williams & Bedward (2001) contests this argument suggesting that stereotypical assumptions about the physical activity interest of particular ethnic groups represent an oversimplification of complex issues, for example in their study modesty and swimming was an issue for all girls, not just South Asian girls. They suggest that diversity with ethnic groups is underestimated. However, Williams & Bedward (2001) do support the findings of Verma & Darby (1994) and Verma et al (1994) that many Asian and Muslim girls define activity outside school as something enjoyed with the family. Dagkas & Benn (2006) also suggested that although the British Asian women they studied had positive attitudes towards physical education in school they were restricted in extra-curricular activities.

As with dietary habits, physical activity may be affected by migration/generation. Williams et al (1996) studied South Asians (Punjabi Muslim) in Glasgow and found that British-born Asians did more exercise than their migrant peers. However, a study by Hayes et al (2002) found little difference in levels of activity between British-born South Asians and those who migrated in later life. Dawson et al (2005) looked at the influences of ethnicity and length of time since immigration to Sweden on physical activity and found that (after controlling for confounding variables) the length of time since immigration had an effect on women but not men; levels of physical activity among women increased with increasing time since immigration to Sweden. The explanations put forward were that immigrant women spend more time exposed to Swedish cultural norms and they adapt their activity patterns accordingly, that financial status may improve with length of time since immigration thus allowing more money and leisure-time for physical activity, that childcare may improve over time as people become more aware of what is available to them, that language skills may improve awareness of local facilities and so on.

A number of qualitative studies have looked at barriers to participation in physical activity among South Asians, particularly women. Scraton et al (1999;2005) suggest that organized sports may conflict with the cultural or traditional norms of some Asian societies, particularly for women. Grace et al, (2007) explored barriers among a Muslim community and found that Islamic law allows women to exercise providing that modesty is maintained but participants agreed that activities such as jogging in public could compromise modesty. Sriskantharajah & Kai (2006) identified language, racial harassment, dress code, modesty and lack of single sex facilities as barriers to physical activity among South Asian women. A study by Leicester City Council (1995) suggested that dancing and swimming were popular among minority women due to the provision of single sex sessions. Johnson et al (2000) discuss that some activities (such as cricket) may be used to express a cultural identity or tradition while others may be prohibited or restricted by religion.

There is also the issue of physical activity as a concept to minority ethnic groups, particularly first generation migrants. Greenhalgh et al, (1998), reports that in the Bangladeshi Sylheti language no phrase exists to describe physical activity as used in English. Sriskantharajah & Kai (2006) emphasised the cultural aspect of being active day to day rather than the western

concept of organized exercise and suggested that the promotion of exercise with socially enjoyable outcomes would encourage participation among South Asian women. Similarly, Farooqi et al (2000) in a study of South Asians highlighted the importance of this group regarding exercise as a lifestyle (e.g. walking) rather than vigorous activity.

Non-cultural issues are also seen as barriers to physical activity. Lawton et al (2006), in addition to cultural barriers (prioritising family, lack of single-sex settings, lack of socialization into certain activities and disease perceptions) identified a variety of complex and interweaving factors influencing physical activity among Pakistanis and Indians – including practical barriers such as lack of time or opportunity and pressures to work long-hours. Farooqi et al (2000) also identified practical barriers such as time and motivation along with cultural barriers such as a lack of information and lack of single-sex facilities. The Health Education Authority published a report in 1999 which suggested that the main barriers among black and minority ethnic groups (including South Asian) were practical constraints such as lack of time, working hours and home responsibilities. Additionally, Williams et al (1996) saw the main barrier among Punjabi Muslim women as time constraints due to childcare rather than any cultural barriers. Sriskantharajah et al (2006) emphasise that principal motivations and attitudes to physical activity are culturally similar to the majority pop so one should avoid the tendency to over-emphasise cultural barriers. Similarly, Johnson (2000), although recognizing a number of cultural barriers, emphasized that one has to be careful not to generalize about the effects of culture and highlighted the importance of personal preference. Rai & Finch (1997), found no cultural or religious reasons prohibiting physical activity but stated that there may be personal constraints in adhering to perceived good cultural behaviour e.g., dress codes and single sex provision. So although, there are clearly some cultural barriers at play here, much of the literature states that these are not the *main* barriers to low levels of physical activity among South Asians.

Although the literature on physical activity among South Asians is abundant there appears to be very little literature on other minority ethnic groups. The HEA report discussed above (HEA 1999) stated that Black Caribbeans do a narrow range of activities and that role-models from their own community are seen as a source of inspiration and encouragement towards physical activity. The lack of literature on Black Caribbeans may be due to the fact that this group has similar levels of physical activity to the general population (Sproston & Mindell, 2006, Vol 1). Although Black Caribbeans are at much greater risk of stroke and hypertension and females in this group are at increased risks of obesity than other ethnic minority or general population females so raised levels of physical activity should be encouraged and more literature is required. Black-African females have high levels of obesity and moderate levels of physical activity so they are a problematic group for which more literature is required. Both Chinese men and women have lower levels of physical activity than the general population but do not have the related health concerns that South Asian and Black-Caribbean have (e.g. higher levels of diabetes or hypertension) so this may explain the lack of literature for this group (Sproston & Mindell, 2006, Vol 1).

(vi) Conclusions

The literature review has highlighted the varying levels of obesity, diet and physical activity between and within minority ethnic groups. Black Caribbean, Black African and Pakistani women have particularly high prevalence rates of both overweight and obesity while South Asian men and women are more susceptible to abdominal obesity and its associated health risks. The literature suggests that the diets of most minority ethnic groups are generally healthier than the general population (with younger generations becoming less healthy) but physical activity is markedly low among South Asian males and females, Black Caribbean females and children from ethnic minority groups. Finally, the literature has highlighted that there may be cultural issues that influence the low levels of physical activity among Pakistani, Bangladeshi and Black Caribbean females.

Our research project will use the Health Survey for England (HSE) ethnic boosts from 1999 and 2004 to look at ethnic differences in obesity, diet and physical exercise, based on factors

such as gender, age, education, social class, religion and length of residence in the UK. The HSE allows us to link information between children and parents and thereby establish relationships between parental behaviour and children's eating patterns and level of physical activity. Data is available for 1999 and 2004 and so we are also able to ask whether there is any observed change of behaviour in response to government campaigns.

Our initial research proposal aimed to use Body Mass Index (BMI) as a measure of obesity but the literature review has highlighted the importance of the Waist-Hip-Ratio (WHR) and Waist Circumference (WC) as measurements of obesity for the South Asian group. In light of this, the research will be extended to include WHR and WC as outcome measures, alongside the BMI measurement.

The literature review has also highlighted some of the complex cultural issues that may influence eating patterns and physical activity practices within some ethnic groups, particularly among Pakistani and Bangladeshi women. As we cannot explore these issues further within the HSE we have decided to conduct a number of focus groups with Pakistani and Bangladeshi women to discuss their own views on eating habits and physical activity and how that may be different from their 1st generation relatives (e.g. mothers or aunts) and from their children.

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