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Centre for Evidence in Ethnicity, Health & Diversity (CEEHD)

REPORT ON

South Asians: Grey Literature Review of Health Promotion Interventions to Reduce risk of Diabetes (SAGRED)

Prepared by CEEHD (Warwick Medical School with Mary Seacole Research Centre, De Montfort University)

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1 INTRODUCTION

The Centre for Evidence in Ethnicity Health & Diversity (CEEHD) has been commissioned by NIHR CLAHRC Nottinghamshire, Derbyshire and Lincolnshire to undertake a rapid review of the 'grey literature' on *Health Promotion Interventions to Reduce Diabetes Risk in South Asians.*

This will complement a review of the published quantitative evidence on the effectiveness of *Interventions Aimed at Influencing Weight and Physical Activity in South Asians* currently being undertaken by NIHR CLARHC Nottinghamshire.

2 AIM

To identify and review evidence available in the 'grey' literature relevant to the effectiveness of health promotion interventions aimed at reducing diabetes risk in a South Asian population. By definition so called "grey literature" does not include studies published in peer-reviewed academic journals with evidenced outcomes, but it may include project reports, unpublished reviews, discussion papers and materials available via websites.

Within this aim, there were five main objectives:

- To identify evidence relevant to such health promotion interventions in the *grey literature*;
- To identify relevant *research in progress* and its likely date of reporting;
- To *map key findings* from the grey literature *against the published evidence base,* including factors influencing success;
- To produce a *summary* of the available evidence on interventions, their effectiveness and populations targeted;
- To identify which interventions reported in the grey literature may be *ready for widespread implementation*, and which require further research.

3 REVIEW PROCESS

The review consisted of three stages: (1) development of a review framework; (2) grey literature identification and selection of relevant materials; (3) data extraction, quality assessment and evidence synthesis.

3.1 Development of Review Framework

As an initial stage, a framework was developed for use in the review. This framework was designed to enable a wide range of materials extracted from the grey literature to be compared and integrated into a final review.

3.1.1 DEFINITIONS

As a first step, the review group agreed the following definitions:

- *'South Asian':* A collective term used to describe those born in or with a line of descent from India, Pakistan or Bangladesh. As a description it is preferable to 'Asian' since it differentiates other Asian nationalities such as the Chinese. However, it is an artificial category which obscures not only the cultural and religious differences which exist between the national and sub-national groups, but also their widely-differing social and economic circumstances and demographic patterns (1). All these variables might impinge upon dietary and other practices, which themselves vary between groups.

- *Health promotion interventions to reduce risk of diabetes:* This term was limited to interventions focused on: (i) raising awareness (patients and professionals); and/or (ii) improving early recognition (including self-identification) of at-risk individuals; and/or (iii) producing behaviour change in at risk individuals (e.g. through education, diet, exercise etc). Evidence on drug treatments aimed at preventing or delaying diabetes onset in people who already have impaired glucose tolerance (e.g. metformin) were excluded, although not if combined with lifestyle change. Interventions including vitamin supplementation were not excluded.

- *Risk factors for diabetes:* Risk factors for developing type 2 diabetes were limited to those which can be influenced via health promotion interventions e.g. obesity, physical inactivity etc. These may overlap with risk factors for cardiovascular disease (CVD). Risk thresholds for the South Asian population may differ from the White majority population.

- *Diabetes prevention:* People who develop diabetes go through a period when they have "pre-diabetes". In clinical settings, overweight adults with pre-diabetes who reduce their weight by 5-10% can reduce their risk of developing diabetes by 55-60%.

- *Pre-diabetes:* A term referring to raised (but not diabetic) blood glucose levels (also known as non-diabetic hyperglycaemia). This can be identified via impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) (2). People with pre-diabetes are at increased risk of a range of conditions, including cardiovascular disease, as well as progression to type 2 diabetes.

3.1.2 FRAMEWORK

Because our experience shows that the grey literature is likely to contain a wide variety of materials (ranging from controlled trials to discussion papers), the review framework was formulated to encapsulate these different types of material. An initial framework was produced and refined through an iterative process as the study progressed. The final framework underpinned the data extraction process and reflected the key comparisons to be made in the review. Where appropriate the review also aimed to draw on recent thinking on assessing equity (e.g. race/ethnicity) in reviews (3, 4), and the 2011 Joseph Rowntree Foundation report on ethical and scientific rigour in social research in the area of ethnic diversity and inequality (5).

3.2 Search Strategy and Selection of Materials

Building on the framework, we conducted a systematic search to identify relevant grey literature from various sources as illustrated in Figure 1 below.

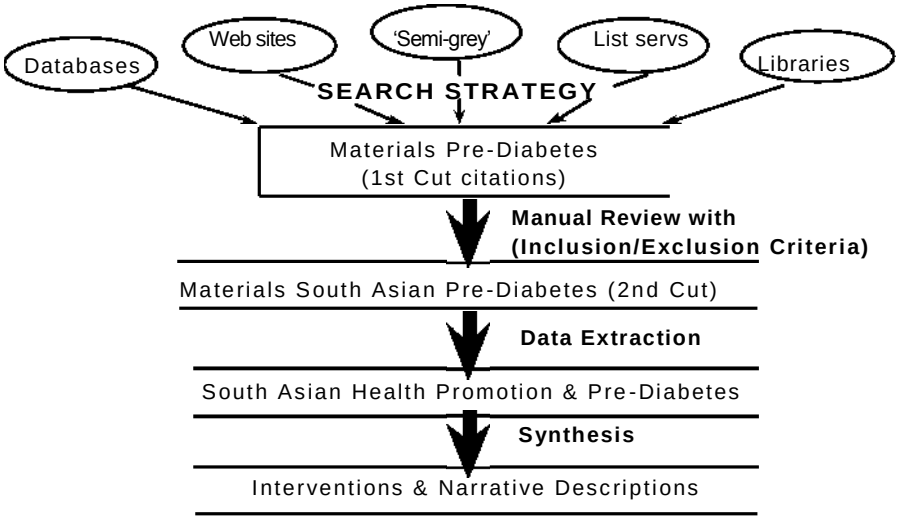

Figure 1: Overview of Review Process

3.2.1 LITERATURE SEARCHES AND INITIAL RETRIEVAL

An initial phase consisted of the development, testing and validation of search strategies to retrieve citations from these sources. Searches focused on identifying materials in the public domain but not recorded in recognised peer-reviewed literature sources. All searches were conducted by trained information scientists using systematic search strategies.

(i) PhD/ MD theses

A search was undertaken of all theses with abstracts accepted for higher degrees by universities in the United Kingdom and Ireland up to 14 January 2011 using the terms **asian* and diabet***. 42 documents of potential interest were identified (see **Annex 1** for details). On closer examination, 3 were judged as potentially relevant (Nos. 12, 18, 19). Some others (e.g. No. 25, Bhabatu 1990), although interesting, were considered too dated. Full text copies of the theses selected were examined.

(ii) Grey literature in bibliographies of published reviews

A search of bibliographies in key reviews was undertaken to identify grey literature references. An initial search strategy (see **Annex 2**) was devised to identify published reviews on South Asians, diabetes and health promotion. Sixty-six reviews published between 2000 and 2010 were extracted (see **Annex 3**). Abstracts were examined and twelve reviews of potential interest identified.

Bibliographies in these articles were examined and a list of grey literature references identified (see **Annex 3**).

(iii) 'Semi-Grey' publications

Published reviews to date have limited their searches to Western search engines. This leaves a category of '*semi-grey*' literature which may be excluded. Two South Asian search engines, Indian Pub Med (IndMED) and the Pakistani equivalent (Pakmedinet), were used to extract 'semi-grey' literature papers using the search strategy. Eleven Indian and Pakistani journals were identified as sources of such 'semi-grey' literature (see **Annex 4**). Twenty one items of potential interest were identified from these sources.

(iv)_Websites and other electronic sources

Electronic sources searched included the following plus our own personal collections:

- *NHS Evidence* searched for (i) **'***Asian' plus* obesity; diet; exercise; physical activity; metabolic syndrome; impaired glucose tolerance; health promotion and (ii) *'Tool kit' (not limited to Asian) plus* obesity; diet; exercise etc.
- *JiscMail Archive* searched for obesity; diet; exercise; physical activity; metabolic syndrome; impaired glucose tolerance; health promotion.
- *A variety of Websites* (see **Annex 5 (i)**) were searched using similar approaches, including health, health policy, evidence-based medicine, health services research and other web sites.

Items identified included reviews/ guidance, intervention projects (see **Annex 8**), and examples of toolkits, CDs, DVDs etc (see **Annex 5 (ii)).**

(v) Research in Progress

The websites of research funding bodies were searched to identify in-progress projects or those which have been completed but not yet published. Sources included the following:

- UK Research Funders, including Charities (e.g. Diabetes UK) & HTA/ SDO/ MRC/ ESRC/ NIHR programmes (e.g. Research for Patients Benefit, NIHR Trials).
- mRCT: MetaRegister of Controlled Trials (www.controlled-trials.com).
- CLRN portfolio adopted studies via UK Clinical Research Network (UKCRN) Study Portfolio website (http://public.ukcrn.org.uk/search/).

Searches identified 24 projects of potential interest including 3 trials underway in the USA (see **Annex 6**).

(vi) Contacting Experts

A questionnaire was developed for circulation to experts (see **Annex 7**). This aimed to identify any additional grey literature such as reports on projects, research in progress, and resources or toolkits for diabetes professionals.

The questionnaire was sent to relevant organisations (e.g. SAHF, National Resource Centre on Ethnic Minorities) for circulation to members. It was also administered opportunistically to experts in the field attending meetings during March/ April 2011 e.g. **UK** **A**sian **D**iabetes **S**tudy (UKADS) team meeting,

Improving **D**elivery of **E**thnically **A**ppropriate **S**ervices (IDEAS) group workshop etc. Finally, an email request was posted onto specialist academic ethnicity e-mail discussion lists (e.g. JiscMail).

All items identified through this strategy were checked against those already retrieved from other sources to eliminate any duplicate citations.

3.2.2 SELECTION OF RELEVANT MATERIALS

Items were short-listed based on their potential relevance. Selection criteria were developed as follows:

***Inclusion criteria*:**

- Material mentioning specific South Asian sub-groups (e.g. Bangladeshi, Indian, Muslim, Sikh), the South Asian population (meta-category) or ethnic minority population more generally (in areas with a South Asian population) **and** reducing diabetes risk.
- Material which considers risk reducing behaviours (e.g. dietary intake or physical activity) and factors influencing behaviour change.
- For **patient lifestyle interventions** (individual, family or community), projects that focus on achieving/ maintaining a healthy weight, improving dietary intake, increasing physical activity **or** raising patient awareness about the risk factors for pre-diabetes.
- For **staff interventions**, projects aimed at raising professional awareness (e.g. cultural education) to identify more people with pre-diabetes or metabolic syndrome among UK South Asians.

Exclusion criterion

- Material limited to improved management of **patients already diagnosed with type 2 diabetes**. Interventions might be acceptable if they include a focus on other family members who may be at risk of developing diabetes.
- The population studied, or findings, not likely to be relevant to UK South Asian population.

The material included was broader than that identified by the NICE review of interventions to reduce risk factors for pre-diabetes among UK adults from black and minority ethnic groups (6). In particular, material included children as well as adults.

3.3 Data Extraction and Synthesis

All items retrieved through the search strategies were assessed against set criteria for their relevance and short-listed for inclusion in the review by two researchers. Selected references were input into EndNote citation management software which enabled elimination of any duplicate citations retrieved.

For all reports of **interventions** data were extracted onto a customised data extraction sheet (see **Annex 8**). The methodological quality of any intervention study was assessed using an approach adapted from NICE to reflect the risk of

potential bias arising from its design and execution (7). Materials were categorised as: '*Strong*' (**++**), '*Fit for Purpose*' (**+**) or '*Weak*' (**-**) (see **Annex 9**). Quality appraisal was undertaken by a research fellow and senior researcher. Any disagreements were resolved by discussion and, if necessary, with the involvement of a third reviewer. The review also identified any interventions which are ready for widespread implementation.

For all **other materials**, a description of content was produced and incorporated into a qualitative overview of the evidence. The resulting narrative description of these materials was organised in terms of general grey literature evidence on diet and lifestyle; semi-grey literature from South Asian journals; an overview of intervention project reports; and the scope of research in progress

4 BACKGROUND EVIDENCE

4.1 Extent of the Problem

With continued migration from South Asia, Europe and elsewhere, Britain has an increasingly multi-ethnic population (8). This can present a number of challenges for health care professionals when dealing with health issues linked to diabetes. South Asians currently represent nearly 40 per cent of the UK ethnic minority population, with individuals, or their families, mainly originating from India, Pakistan and Bangladesh. It is widely accepted that type 2 diabetes prevalence rates are 3-4 times higher in South Asian adults and that the disease appears to occur a decade earlier than in the majority White population (9, 10). There is also evidence that dietary habits worsen following migration. For example, second generation Asian offspring of former migrants are reported to adopt British dietary patterns, with increased fat and reduced vegetable, fruit and pulse consumption compared to first generation migrants (11).

A higher likelihood of developing metabolic syndrome/ pre-diabetes and earlier onset of type 2 diabetes both suggest that screening of South Asians is essential (12). Also, although type 2 diabetes used to be a condition affecting adults only, it is now recognised as an increasingly important public health concern in children. The Child Heart and Health Study in England (CHASE) has recently reported that ethnic differences already exist in the precursors of type 2 diabetes among South Asian children aged 9-10 (13).

4.2 Preventive Strategies

The most efficient way to address the problem of type 2 diabetes and its complications is to prevent diabetes from developing. There is good evidence that lifestyle choices such as high energy diet, obesity and lack of physical activity contribute to the onset of diabetes. Changing lifestyle to modify diet, reduce obesity and increase physical activity can either prevent or delay the onset of diabetes. There is good evidence that lifestyle programmes leading to a weight loss of 5–7% of body weight (through reduced energy and fat intake and increased physical activity) could reduce the risk of overweight people with impaired glucose

tolerance developing type 2 diabetes. Two of the largest intervention studies were the Diabetes Prevention Study in Finland (14) and the Diabetes Prevention Program in the USA (15). Both of these used a combination of dietary advice and increased physical activity, setting similar targets and achieved identical results. These results have been replicated in the Indian Diabetes Prevention Programme(16).

Because type 2 diabetes affects South Asians disproportionately in the UK, efficient delivery of preventive services is extremely important in this population (17). As part of this process, there is a need for improved education (for both communities and professionals); for tailored prevention programmes including language-competent resources adapted for specific cultural groups; and for the mobilisation of networks and community-based social enterprise schemes (18). Although the role of public health and preventive care are pivotal in all such lifestyle diseases, the evidence required to identify the most effective and cost-effective interventions is currently lacking.

The NHS Health checks programme, which will be fully implemented in 2012/13, is one of the most ambitious attempts to universally detect and reduce metabolic and vascular risk in the general population. By focusing on prevention rather than treatment, the programme will provide an important opportunity to target people who may otherwise not access healthcare services (19). At the same time, studies have reported a lower rate of response to lifestyle modification advice and a greater gender difference in physical activity among South Asians than in the majority white population. A number of studies published in peer reviewed literature have sought to address this with various culturally adapted strategies (20).

4.3 Identifying Risk Levels

Identifying appropriate risk thresholds for the South Asian population is extremely important in terms of preventing progression from metabolic syndrome (or 'pre-diabetes') to type 2 diabetes.

In 2004, the WHO introduced a differential risk threshold for South Asians; cut-offs were reduced to BMI>23 kg/m^2 for overweight and BMI > 25 kg/m^2 for obese (21, 22). If professionals are unaware of risk threshold differences they may under-estimate the risk associated with a particular BMI in South Asian patients (10). It is now strongly encouraged that Asian-specific BMI and waist circumference (WC) cut-offs should be used to evaluate diabetes risk (23). The South Asian Health Foundation (SAHF) has strongly recommended the use of revised BMI cut-offs for British South Asians (24), although this has not yet been formally adopted by the NHS or researchers. However, the Indian Health Ministry has recently announced a national adjustment to criteria for defining obesity in their country (25). Although obesity also places young people at increased risk, there is no agreed international definition for children "at risk" of developing diabetes (26, 27).

Rather surprisingly, an expert paper commissioned by the NICE Programme Development Group for 'Type 2 diabetes: prevention of pre diabetes in high risk groups' in 2010 from the Food Standards Agency was still able to report that

dietary surveys (including the low income diet survey) had shown no significant differences in mean BMI between ethnic groups for adults or children, only commenting that the sample sizes were small (28).

4.4 Evidence on Diabetes Health Promotion Interventions

Although this review excludes interventions focused on patients in whom diabetes has been diagnosed, some evidence from this population may be relevant. Public Health Draft Guidance prepared by NICE in 2010 on *Type 2 diabetes: preventing pre-diabetes among adults in high-risk groups* indicates that, since pre-diabetes and type 2 diabetes share the same risk factors (the main one being obesity), evidence from diabetes patients may also be relevant to helping prevent type 2 diabetes (2).

Clearly, a potentially valuable tool in helping patients manage their disease or reduce their risk of diabetes is education. However, evidence on the value of patient education *per se* in improving diabetes outcomes is limited. A Cochrane review of the effectiveness of self-management education programmes by lay leaders for people with various chronic conditions could identify only limited impact in the general population (29). Another Cochrane review similarly found no significant differences in HbA1c levels between individual patient education and usual care for a general population with type 2 diabetes (30).

However, there does appear to be some evidence of the effectiveness of culturally appropriate health education programmes **targeted at ethnic minority populations with type 2 diabetes** (31-33). A further Cochrane review has concluded that educational programmes can provide some improvement in glycaemic control in the short to medium term in South Asian populations (32, 34). There is also evidence that such education sessions are better received if they take place in an informal, relaxed, community environment that allows participants to freely explore topics and questions (35). Incorporation of familiar music, clothing, and language has also been shown to be effective in educating minorities with respect to health issues (36). The use of diabetes awareness days, cooking events, guided shopping, and educational plays are reported to be effective means for providing information to people and the community as a whole. More recently, it has also been reported that a tailored (Ramadan-focused) education programme can be effective in empowering patients to change their lifestyle while minimising the risk of hypoglycaemic events during this period (37). At the same time, a systematic review of educational intervention studies in South Asians has highlighted the difficulty of designing and assessing such programmes (38).

Similarly, the value of service-led lifestyle interventions targeted at people with increased risk of diseases such as diabetes is promising, but not conclusive. The UK Asian Diabetes Study (**UKADS**), a large cluster RCT which evaluated the use of link workers to encourage dietary and lifestyle changes in **South Asians with diabetes**, recorded significant improvements at two years in diastolic and mean arterial blood pressure but not in HbA1c (39, 40). The impact on longer-term outcomes and quality of life (EQ-5D) is currently being analysed (41). A primary care intervention pilot (**Khush Dil**) for **South Asians** attending health visitor-led screening clinics in Edinburgh similarly recorded a positive impact (based on self-

report) for CVD indicators, but the authors concluded that a controlled trial would be necessary to confirm evidence of effectiveness (42).

NICE has recently highlighted prevention of progression from 'pre-diabetes' to type 2 diabetes as an important public health aim. As a result, guidance on preventing type 2 diabetes is currently being developed. This will include two strands:

1. The *Guidance on population and community-level interventions in high-risk groups and the general population* is due for publication in May 2011 (http://guidance.nice.org.uk/PHG/Wave19/6).

2. General *Guidance on Type 2 diabetes - preventing the progression from pre-diabetes* (http://guidance.nice.org.uk/PHG/Wave19/62) has an expected date of issue of May 2012.

The present review of evidence from the grey literature relevant to health promotion interventions to reduce diabetes risk in South Asians is therefore timely.

A 2007 systematic review has compared evidence on the effectiveness of lifestyle and pharmacological interventions in reducing the rate of progression to type 2 diabetes in people with impaired glucose tolerance (43). The authors concluded that lifestyle interventions, particularly a combination of dietary modification and increased physical activity, seem to be at least as effective as drug treatment. Other authors have also concluded that they are more cost-effective (44).

5 GREY LITERATURE FINDINGS

5.1 General Literature

5.1.1 DIET & PHYSICAL ACTIVITY

Diet can make a substantial contribution to obesity and to the subsequent development of type 2 diabetes. Historical data on dietary intakes of South Asian adults generally are few because of the concentration in the past on specific groups perceived to be particularly at risk of nutritional *deficiencies*. This bias determined that the literature concentrated on issues such as diet in pregnancy, birthweight, and iron and vitamin D deficiency, with less attention being paid to CHD, diabetes and obesity (45).

The nutrition and diet of ethnic minorities in Great Britain is still covered very unevenly in the published literature, with more material available in grey literature form (45). Historically, and to this day, the presence of diet-related conditions in South Asian groups is frequently viewed as a consequence of cultural differences, with socioeconomic disadvantage less often considered (45). However, low income may be a barrier to a good diet and to other aspects of lifestyle improvement]. Also, it should be remembered that the diet of ethnic minority groups can vary widely, and the question of whether certain aspects of the South Asian diet predispose individuals to glucose intolerance remains largely unanswered (10).

For UK South Asians, a culture of multiple meals, large portion sizes and snacking between meals all contribute adversely to weight control, but these may differ between populations (46). For example, Bangladeshi and Pakistani families might eat two traditional meals in the course of the same evening, with children eating a meal both before and after attending religious classes. In contrast, in Gujarati Hindu and Punjabi Sikh households smaller portion sizes, fewer multiple evening meals and more control of children's snacking have been reported. Surveys of diet in other Muslim communities report similar factors limiting the effectiveness of dietary interventions (47). These include the fact that recipes tend to be handed down from previous generations, that ingredients are not measured out (which can make advice to reduce added fat, sugar and salt difficult to implement); that typical meals can be heavily based on carbohydrate, with families tending to adopt a mix of Western and traditional eating habits; that various factors can make portion control difficult; and that there is a culture of hospitality in which food occupies a central role, especially during cultural festivities. There is also reported to be limited awareness of the link between dietary behaviour and the higher prevalence of conditions such as diabetes and CVD.

Qualitative research on beliefs about diet indicates that British South Asians may consider their family's diet is healthy because cultural dishes are 'prepared from scratch' (46). Research in a Bangladeshi population with diabetes has also highlighted the importance of beliefs about 'beneficial foodstuffs' which can adversely affect diabetes management (48). In Edinburgh, a study among Bangladeshi, Pakistani and Indian communities similarly concluded that successful CHD prevention initiatives need to identify deep-rooted influences on health-behaviour (49). Religious observance can also affect nutrient intake and therefore diabetes control. For Muslim populations, such as those from Pakistan and Bangladesh, there are certain religious fasting requirements which individuals are expected to meet (46).

In the published literature, the childhood CHASE study has identified that South Asian children have a higher intake of total fat, polyunsaturated fat and protein, and carbohydrates (particularly sugars), with lower vitamin C and D, than the majority population (50). These differences appear to be especially marked for Bangladeshi children. In early infancy, and even before, additional dietary triggers may be associated with increased risk of diabetes. These include excessive maternal weight gain during pregnancy and shorter-than-recommended duration of breast-feeding (51). South Asian populations show worryingly low rates of breast feeding, despite professional encouragement (27).

A new wave of community-based social enterprise schemes is now being established by Britain's South Asian community to meet the needs of local people through tailored lifestyle programmes, including **supervised cooking sessions, shopping tours and educational DVDs for patients and professionals** (52).

Low levels of physical activity in certain ethnic groups mean that strategies to reduce diabetes risk will need to achieve their main impact through dietary interventions in these populations (53, 54). Successful changes to lifestyle require an understanding of cultural beliefs about physical activity, as well as appreciating

that there is a greater gender difference in physical activity among South Asians than in the majority white population diet.

Lower levels of physical activity are now also being recorded in South Asian children (55). For children, lifestyle modifications can be achieved by motivating and empowering parents in the context of the community in which they live. A Cochrane review of obesity intervention programmes concludes that, in general, participatory 'family based lifestyle interventions with a behavioural programme' are most likely to succeed in children (56). In the USA, the 'Let's Move' campaign against childhood obesity launched in 2010 also aims to empower parents and improve access to high-quality foods in all communities (51).

5.1.2 COMMUNICATION

Issues of information and communication are a recurring theme in the literature. It has long been reported that both content and communication of information present potential barriers to good nutritional health (45). The literature highlights the need for health professionals and other service providers to have a sound knowledge of South Asian lifestyles in order to make more appropriate the information and services which they provide. However, this is not a simple task because there are differences in dietary practices between South Asian subgroups which may be important for the promotion of sound nutritional health.

Effective communication of lifestyle messages will depend on the language and literacy profile of the population targeted. In the existing UK South Asian community, the ability to speak English declines with increasing age, is lower for women than men, and is much poorer for those born outside the UK (57). However, there are also variations between sub-groups (57). Thus, South Asian women especially in Muslim cultural groups are the least likely to speak or read English: they may also not be literate in their 'mother tongue'; older people of Bangladeshi origin in particular have a limited ability either to understand spoken English or to read any language; all of which will impact on dietary and other lifestyle advice (58). Even in the early 'middle-age' group (aged 30-49 years), there are significant numbers of Bangladeshi and Pakistani women who will be essentially illiterate in any language, and who also do not speak English. Also, some languages, notably the Sylheti dialect of Bangladesh, do not have an agreed written form. Within a particular ethnic group, there may also be disproportionate effects of age and gender, compared to the majority white population. For example, the older generation of South Asian immigrants has a poorer understanding of health and social care systems than the younger population (59). Over time, communities will become more familiar with services as they need to access them.

A theoretical model of how the South Asian population perceives health and more specifically type 2 diabetes was presented as a poster at the South Asian Health Foundation conference in 2010 by the Surya Foundation (60). Research methods used to develop the model included a Delphi Panel of experts, observations in the home, community, GP practices and hospital clinics and interviews and focus groups. The author identified three groups ('insulars', 'straddlers' and 'progressives') who are increasingly amenable to lifestyle messages. This model

addresses generational issues as barriers or facilitators to lifestyle modifications but not other factors such as gender.

Another unpublished study considers cultural negotiations in health and illness among Gujarati South Asians, with a focus on adult onset diabetes (61). Semi structured interviews were analysed using a grounded theory framework. A resistance to the construction "South Asian Diabetic risk" was identified. Participants used other 'knowledges' (e.g. connections overseas, social networks, familial knowledge of allopathic, traditional and herbal remedies) to empower them to actively negotiate their health and illness states.

5.1.3 LIFESTYLE INTERVENTIONS TARGETED AT PATIENTS

In 1997, a Health Education Authority review of *Opportunities for and barriers to good nutritional health in minority ethnic groups* concluded that dietary interventions in the South Asian population need to focus across the **entire life course** (ranging from pregnancy, through childhood to adulthood) targeted at individuals, the family or the community (45). An Audit Commission report *Testing Times. A review of diabetes services in England and Wales* produced three years later identified various barriers to prevention and slowing of progression of diabetes through diet (62). Examples of barriers include provision of **dietary advice which is inappropriate for the culture**, and which is also not communicated to the cook of the family who may not speak English. However, in 2007 community-based workers and primary health care practitioners still reported that they found it difficult to access quality-assured translated resources (18).

A literature review published in 2008 could identify only two dietary intervention studies in the UK specifically targeted at ethnic minorities to reduce obesity and improve CVD and diabetes outcomes (53). Both focused on the **South Asian community** and both targeted women using either trained community members acting as facilitators and leaders of cookery clubs, or dieticians and fitness instructors to run healthy eating and exercise groups. The results suggested that targeted interventions can be effective, especially if these build on existing community links and involve engagement with **extended family members** and community leaders as recommended by the Department of Health (46).

In 2009, Diabetes UK also identified the need for more research in the area of tailored interventions for South Asians (63). The Charity had produced **advice and resources for diabetes professionals**, including a Toolkit to enable community and religious leaders to host Diabetes Awareness sessions for people from the South Asian Communities (64). It also hosts a 'Diabetes Lifestyle' newsletter providing information and advice specifically for BME communities (65). It includes recipes, and readers are also able to get answers to general health questions from a Diabetes UK Care Advisor in the 'Dear Pav' page. Charities such as the British Heart Foundation have also recently started to deliver **training courses** to improve the knowledge of health trainers in voluntary and community organisations, with some success (66). BHF has a number of free booklets and DVDs on South Asians and heart disease available in English and five other languages (Bengali, Gujarati, Hindi, Punjabi and Urdu) (67). Another resource recently highlighted as especially popular in Scotland is a **bilingual Asian healthy**

eating recipe book designed by a group of community health workers and produced by the Health Education Board for Scotland (68).

In 2010, a review was commissioned by NICE of the evidence on interventions specifically targeted at reducing risk factors for pre-diabetes among UK adults from **BME groups** (6). The authors state that the common beliefs among health professionals that **South Asians** consider a large body size to be healthy and that they are fatalistic in regard to disease are not consistent with the views of South Asian lay people. South Asians appeared to have a high level of knowledge about the role of lifestyle in the development of diabetes and coronary heart disease, although this was not always translated into practice. Also, there is some evidence that a family history of diabetes may be a barrier to preventative health behaviours by fostering fatalistic attitudes to diabetes among some South Asians. In terms of diet, familiar or traditional fruit and vegetables are seen as being too expensive and sometimes less healthy in the UK. Traditional South Asian beliefs regarding the preventive attributes of certain vegetables in terms of ill health are part of a cultural identity. This means that there may be the risk of complacency in terms of other risk factors. This might be taken on board by professionals when discussing health promotion. South Asian populations associated a diet high in fat and meat and low in vegetables with cultural identity, prosperity and generous hospitality, and there was a resistance to changing these traditional norms, especially among first-generation migrants. In terms of physical activity, preferred forms of physical activity are slow walking and swimming, which were regarded as part of everyday life in Bangladesh. There is evidence that swimming is perceived as being easier and more natural in Bangladesh than in the UK due to access and a single-sex cultural norm, whereas gyms may be perceived as playing loud music and inappropriate images on TV screens. Vigorous activity was not acceptable to some South Asian participants, especially women, for whom modesty and single-sex classes were important considerations (6).

A further review commissioned by NICE has modelled the cost-effectiveness of interventions aimed at reducing the incidence of diabetes through reductions in BMI and improvements in health behaviour (69). Effectiveness in terms of QALYs was estimated according to whether an area was “deprived” or “**high Asian**” (sic). The modelling identified that a reduction in risk of diabetes might be achieved in a relatively lean Indian population despite a lack of reduction in weight or waist circumference.

Although **not specifically focused on South Asian populations**, an analysis of intervention projects focused on addressing risk factors for the development of pre-diabetes in adults from black and minority ethnic groups and lower socio-economic groups consistently identified the importance of certain factors (70). These include: finding out what people want and targeting messages that resonate with these needs; using local and other appropriate venues where people meet; and making sure cost, language, different working patterns and education levels are not a barrier to access and participation. Projects found that use of resources that convey simple and consistent messages, and approaches involving active learning rather than learning in an abstract way (“show not tell”), were more successful. But the most important was about focusing on how people can make small but significant changes to their lifestyle that they can maintain for the rest of their lives.

In 2010, the NICE Programme Development Group produced draft guidance for preventing pre-diabetes among adults in high-risk groups (2). This recommends local interventions to identify need and develop and provide programmes for communities at increased risk, as part of an overall prevention strategy. The guidelines also recommend national initiatives to address adverse environmental factors driving the increasing prevalence of type 2 diabetes. Strategies to prevent diabetes should also be linked to programmes/community activities for the prevention of other chronic diseases, including CVD, since healthy eating, increasing physical activity and reducing obesity will have multiple benefits.

Specific comments on supporting **behaviour change** include helping people to:

- feel positive about the benefits and value of health-enhancing behaviours and changing their behaviours;
- plan changes in terms of easy sustainable steps over time;
- understand the short, medium and longer-term consequences of health-related behaviour.
- identify and plan for situations that might undermine the changes people are trying to make and plan explicit 'if-then' coping strategies to prevent relapse

5.1.4 ADAPTATION OF PATIENT LIFESTYLE INTERVENTIONS

In an expert testimony, Michie discusses health promotion interventions for use in UK **ethnic minority** and **low income groups** (71). Evidence is presented indicating that culturally appropriate health education is more effective than 'usual' health education in improving HbA1c and knowledge in the short to medium term for such patients, although it is not possible to draw conclusions on the effects of key elements of interventions or of potential cost-effectiveness. Furthermore, in terms of the evidence on **maximising the cross-cultural validity of health promotion interventions** preliminary findings (reported in a 2010 poster (72)) include the fact that few published studies make ethnic-specific recommendations, that the majority of interventions have been developed for African-Americans, and that working with the community at early stages of intervention development is important. Qualitative interviews with experts suggest that intervention and advice may be tailored to families rather than individuals and that outreach workers with a mix of skills and backgrounds should be involved. Finally, synthesis using 'realistic evaluation' indicates that adaptations may need to target multiple components (individual, family, community) and consider differing contexts (location, age, gender).

Another expert paper by Netto solely focused on adapting health promotion interventions for BME communities highlights a number of principles for adaptation (73). These include: use of community resources to publicise the intervention and increase accessibility; identifying and addressing barriers to access and participation; developing communication strategies sensitive to language use and information requirements; working with cultural or religious values that promote or hinder attitudinal and behavioural change; and accommodating varying degrees of cultural identification.

5.1.5 INTERVENTIONS TARGETED AT PROFESSIONALS

Health professionals can play an important role in identifying UK populations at increased risk of developing pre-diabetes, so **educational interventions targeted at professionals** are equally important to those for patients. An expert paper from Syed considers the evidence on methods of **training health professionals** to practice effectively and confidently with populations from low socio-economic and BME communities The author identified that 'UK interventions whose aims include raising awareness in health professionals and /or assisting health professionals in identifying and advising groups at high risk of pre-diabetes (such as low income and **BME groups**) are lacking rigorous evaluation and dissemination, making it difficult for practice to be evidence-based' (74). At the same time, the author points out that there is evidence from one focus group study of lack of understanding between professional and lay groups in terms of Islamic teaching and its relation to healthy lifestyle practices.

A further review has focused on interventions to raise awareness in health professionals and assist them in identification of high risk groups (68). Interventions targeted at BME or low SES groups may involve awareness raising for health professionals, as well as training for lay workers and peer education, which both appear to facilitate health promotion. An analysis of a range of PCT initiatives aimed at preventing diabetes in UK lower socio-economic and **BME groups**, has identified the need for staff delivering programmes to be non judgemental and to have good skills in communication and group facilitation (75).

5.1.6 COMMON THREADS EXTRACTED FROM GREY LITERATURE (I)

Much of the grey literature still uses crude meta-categories like 'South Asian' or 'Muslim'. These are likely to include sub-populations of diverse cultural, linguistic, dietary and other characteristics (76, 77). Few of the items retrieved go into any level of detail, but those which observe some distinctions are more likely to be generalisable, at least within the sub-category identified.

Clearly, the most efficient way to address the problem of diabetes and its complications is to prevent diabetes from developing. Thus, identifying appropriate risk thresholds for the South Asian population is extremely important. However, this requires education of health professionals as well as patients. For example, if professionals are unaware of risk threshold differences they may under-estimate the risk associated with a particular BMI in South Asian patients, resulting in an increased longer-term risk of developing diabetes in the South Asian population

A second common thread is that communication of lifestyle messages must take account of cultural or religious values. This may be as simple as providing separate physical activity sessions for men and women, or as complex as understanding how beliefs and practices about hospitality and food or in relation to body image may influence behaviour change. For South Asians (especially older women) language may not only be a barrier to accessing healthy lifestyle information, but also organised physical activities or shopping facilities outside their neighbourhood. Consideration of mixed messages from health care professionals and their community in relation to diet and physical activity may also be important.

A third thread is that use of community resources is necessary to improve awareness of pre-diabetes, and increase accessibility to dietary and other lifestyle interventions. Involving community organisations and leaders early in the development process, using the media, planning events or making use of festivals specific to a South Asian group, and involving staff who can speak the languages used by the community are all important. Information should not only be provided in different languages but also for varying levels of literacy.

In terms of diet, for South Asians wishing to change their food intake within a close-knit community where social events are common, this may be especially difficult because traditional South Asian cooking is associated with high fat usage, particularly for special occasions (which occur frequently), and there is resistance to changing such traditions. Direct criticism of esteemed cultural values can be counter-productive.

In terms of physical activity, there may be little time for formal or 'separate' sessions, due to work or childcare commitments; older participants may perceive vigorous physical activity as unnecessary in the context of advancing age. For South Asian females, modesty and single-sex classes will be important.

None of the messages above is new. All have been presented in previously published articles and reports.

5.2 UK Intervention Studies Identified in Grey Literature

5.2.1 OVERVIEW OF REPORTED INTERVENTION PROJECTS

As pointed out in section 4 above, there is limited evidence in the peer-reviewed literature on health promotion interventions specifically aimed at **reducing risk of diabetes** in South Asian populations, although there is some overlap with the evidence on health promotion interventions applied later in the disease process, once individuals are identified with diabetes. In fact, an initial review of UK-based population level interventions aimed at raising awareness and / or managing the incidence of pre-diabetes commissioned by NICE makes no specific reference to South Asians (78). Similarly, an overview of published reviews of community- and population-level interventions to prevent pre-diabetes in BME or low socioeconomic groups at higher risk did not identify a single review focused on British South Asians (79).

Strategies for preventing diabetes may fall within primary prevention, with a focus on mitigating risk in the whole population, or secondary prevention which involves case-finding in high risk groups followed by provision of guidance to patients on how to reduce their risk of developing diabetes.

Some intervention projects adopt a primary prevention approach, focusing on **behaviour change for the whole population**. Searches of the grey literature have identified a number of such local initiatives providing varying levels of detail. Interventions were often first identified in grey literature reports, for example a joint Department of Health and British Heart Foundation report on heart disease and

South Asians (80), a report of promotion of physical activity in South Asian Muslim women (81), or a regional Primary Care Trust food and health audit (82). In these cases we have tracked back to the original project where possible. An overview of projects identified, their findings and quality gradings is shown in **Annex 8**.

A selection of interventions is described below and common threads extracted.

In the West Midlands, the **Focus on Asians with Diabetes (FAD)** group has been involved in producing educational material, including a video available in five Asian languages and English (83). The video is aimed at **South Asians** with diabetes and **their families**, and also aims to educate **health care professionals** about Asian culture and how people view their diabetes. The video was made in a soap or "Bollywood" film style. 'Acceptability' was the main outcome measure for project evaluation. The video was apparently well received by patients, their carers and healthcare professionals. A magazine article has appeared, although this is focused on the challenges and dilemmas faced in setting up FAD and not its outcomes (84).

In Warwickshire, a lifestyle project **Apnee Sehat ('Our Health')** used the Temple (Gurdwara) as the focus for delivery of diabetes and general health promotion for the **South Asian Sikh** community (52). The intervention included presentations to the community, an Asian dietician working with a "kitchen committee" to develop healthier recipes, posters on display in the temple, health fair, Apnee Sehat week, a DVD, and Asian women support group. The activity was supported by Warwickshire PCT and other local organisations. A qualitative evaluation was undertaken which included focus groups, individual semi-structured interviews and participant observations (85). In general, most elements of the intervention were well received. Use of the Sikh temple and the enthusiasm of key people were identified as instrumental in maintaining momentum and providing support. Some aspects of the evaluation were subsequently published (86).

In Yorkshire, a project set up as part of the national **Local Exercise Activity Pilot (LEAP)** programme was aimed at increasing physical activity levels in **South Asian girls** (87). A variety of assessment methods were used including focus groups, questionnaires, case studies; triangulation of responses strengthened conclusions. For South Asian women the most successful activity was walking in small groups and with their families, although adherence was a concern. For South Asian girls, parental support was essential for initial participation and adherence, the school setting was most effective and support from staff was important. A national evaluation of LEAP projects has been produced (88). Of the 45 projects listed in this report, the Yorkshire project was the only one which specifically mentioned South Asians. One other project (in Ashton, Wigan & Leigh) was described as an intervention for 'ethnic minorities needs assessment' in adults over 50.

A **Health Development Service (HDS)** set up in Newcastle aimed to provide support, information and advice in the client's first language, and to work in a proactive way to raise awareness of various health issues (80). The team developed exercise sessions through partnership with local people. Awareness of symptoms and risk factors was raised at group events, for example at the Hindu

Temple and Sikh Gurdwara, and by working with other services, such as community dieticians and leisure services. People were referred to the service by GP surgeries, other health professionals or self-referral. However, there was apparently no evaluation of this intervention. The service is now called a **Health Improvement Service for Ethnic Minorities (HISEM)** and also provides support and advice for refugees and asylum seekers (89).

A survey of English Health Authorities has identified a number of health promotion projects targeted at increasing physical activity in **South Asian Muslim women** (81). Five projects were identified and assessed qualitatively in order to identify their impact and any common barriers to exercise. The projects included: a **Prescription for Exercise** project in West Pennine Health Authority (90); the **Bradford Encouraging Exercising People (BEEP)** (91); an **Active for Life** project in Leicester Health Authority, which was part of the Health Education Authority's national Active for Life programme (92); **Fitness for Life** in East Lancashire Health Authority (93); and an **Exercise on Prescription** project in Birmingham Health Authority (94). Insights about running these schemes and barriers to participation were explored through in-depth interviews with 35 women and 7 South Asian Muslim female instructors. Impact was described in very general terms. The main barriers to exercise were the lack of a culture of exercise, language difficulties, religious requirements (separation of sexes and maintaining dress code), age (with older migrants exhibiting greater cultural differences), and the cost of attendance including transport. Recommendations included: the use of local community facilities; the employment of bilingual and sympathetic staff; costs to women kept as low as possible; and consideration given to provision of childcare facilities.

In another community project, a programme for weight loss has been developed for **Muslim women of mixed South Asian backgrounds** by a UK slimming company(95). The 11-week programme consisted of increased physical activity, including use of a pedometer, and adaptation of cooking to provide healthier meals. An evaluation showed that the women lost weight and sustained this loss over a three month period. Barriers to physical activity were identified. These included family demands on time, lack of childcare, and family disapproval over safety or appropriateness. Walking was acceptable as was swimming (women-only classes). Muslim women also had issues over clothing, and surveillance cameras were of concern. Long-term, durable barriers to dietary changes included social events, family expectations for traditional meals, and pressure to serve sweets to guests.

A Scottish report on multiple and complex needs (96) describes a project (**Action Diabetes**) in Slough to raise awareness of type 2 diabetes in areas with populations most at risk such as **South Asian** groups (97). A mapping exercise was carried out using a tool for health needs mapping analysis (created by Dr Foster and Experian) to understand local media consumption, consumer habits and where and how people shop to find the best ways to provide information about diabetes. The Action Diabetes project then used multilingual leaflets, a video, a campaign bus and a locally customised magazine. The intervention was apparently successful in identifying new diabetes cases and increasing awareness but details of the evaluation are not described. However, the subsequent 4-week

campaign produced a 164 per cent increase in diabetes referrals among the most at-risk communities.

Other intervention projects adopt a secondary prevention approach, first **case-finding in high risk groups** followed by provision of guidance to encourage behaviour change.

In Leicester, the **STAR bus** (Screening for early diagnosis of diabetes) aimed to screen 10,000 people of **South Asian, black or Chinese origin** aged 25 to 75 who may be at risk of developing diabetes (80). At a Diabetes Awareness Roadshow held around the county the height, weight and blood pressure of volunteers were measured and, following a series of questions, people were told if they are at risk of diabetes. The evaluation consisted of recording the numbers screened and the percentage of people diagnosed with diabetes or pre-diabetes who received necessary treatment and advice. Data have recently been published showing that of the 3,225 participants screened, 20% were found to have some form of abnormal glucose tolerance (of whom one in five had type 2 diabetes). After adjusting for confounders, the odds of detecting impaired glucose tolerance were approximately 60% greater in the South Asian population (98).

In Sheffield, an intervention focused on **South Asian taxi drivers** who were known from the local health equity audit to be at high risk for coronary heart disease and diabetes and to struggle with accessing health care (99) This project is cited in the Marmot review Fair Society Healthy Lives (100). A core group of drivers were identified, given a 'one stop' check and provided with advice to improve their health. They were also trained as 'health champions'. A subsequent screening event was attended by 80 drivers, 30 were referred to a GP for further intervention, and 20 attended; all participants were satisfied with the service. A further screening event was attended by 98 taxi drivers. There are no more details provided on any evaluation.

Two MD theses have also considered early detection of type 2 diabetes in an at-risk South Asian population. Tringham reported in 2006 on 3,515 individuals with at least one risk factor screened as part of the STAR study in Leicester (101). The prevalence of diabetes was 6.5% in South Asians and 4.7% in White Europeans, and pre-diabetes prevalence was 19.9% and 15.4% respectively. Interestingly, there was minimal impact of screening on anxiety levels of an individual, but only 60% agreed that diabetes was serious and less than 20% agreed that it would shorten their life. Simple effective stepwise strategies for screening an at risk multi-ethnic population for diabetes are described. Hanif in 2007 presented evidence of a diabetes screening programme for ethnic minorities in the Midlands, linked to UKADS (102). The screening process included a community questionnaire-based risk score, BMI/ anthropometric measurements and oral glucose tolerance tests. People aged 20 – 75 years attending Mosques, Temples, Gurdwaras and public parks were approached. Subjects at highest risk were identified and factors predicting risk analysed. Overall, 20% of subjects tested had diabetes and 28.7% impaired glucose tolerance (IGT). The sensitivity of a questionnaire score greater than 8 was 78.0%, with specificity of 69.5%. The best predictors of diabetes and IGT were BMI and risk score.

A study on prevention of diabetes in South Asians has reported on the development of tools for risk assessment (95). These involve measuring **dietary intake and physical activity** using outputs from a series of focus groups involving **Hindus, Muslims, and Sikhs**. Tools asked about portion sizes, consumption of fat and fibre, and exchanging foods for healthier alternatives. Intervention was then targeted at the main cook in the family and a standard approach was adopted using Counterweight leaflets translated into Urdu and Punjabi. Leaflets were used by dieticians as discussion points. Important facilitators were appropriate venue, cultural awareness, and practical information in own language, including visual demonstrations (e.g. portion size). It was reported that diabetes risk can act as a motivator to change or a reason to be complacent (i.e. diabetes 'runs in the family'); the latter often thwarted lifestyle change efforts. A lot of informal work such as visiting people in their homes was required prior to the more structured trial.

Finally, a number of studies describing work on adapting UK health promotion messages to South Asian communities are described. These often used principles described by Netto in order to identify what was acceptable and effective for South Asians in terms of participation and compliance with lifestyle modifications (20). One adaptation study for Indian and Pakistani populations involved changing an intervention for prevention of diabetes from an individual-focused to a family-focused approach (2). The complex intervention aimed to promote exercise and improve diet. It included dieticians visiting participants in their homes and providing tailored advice, including to the person responsible for meal preparation, and pedometers to record daily exercise. Study questionnaires and resources were translated. No lifestyle modification outcomes were reported. Instead, translation difficulties and the relative advantages of recruitment through the NHS or community groups were the main outcomes described.

5.2.2 COMMON THREADS EXTRACTED FROM GREY LITERATURE (II)

The grey literature contains little consistent evidence about the comparable effectiveness of different intervention projects or their cost-effectiveness. In fact, projects demonstrate a similar pattern to that we have reported in other reviews over the last decade. These include duplication of effort and 'reinvention of the wheel'; retrospective, poor or incomplete evaluation; and limited transfer of findings into the peer-reviewed literature (59). Also, none of the projects in this area appear to report on cost-effectiveness. . In summary, studies generally: (i) do not define identified measures of success in advance and measure these prospectively; (ii) do not calculate the cost of providing the intervention; and (iii) do not estimate its likely cost-effectiveness.

Lifestyle modification intervention projects to prevent or delay diabetes onset in South Asians reported in the grey literature have mainly been carried out by the NHS (e.g. Primary Care Trusts). They often target mixed populations living in deprived areas rather than a single ethnic minority group. Most pre-diabetes intervention projects are focused on weight management, either directly by aiming to help people lose weight or indirectly by including weight loss as one of the intervention targets. Projects often include a health screening stage prior to behaviour change. Screening has proved to be a good way of capturing people's

interest and motivating them to consider making lifestyle changes. Finally, many projects focus more generally on lifestyle change to improve cardiovascular health, rather than specifically on diabetes prevention, but will benefit both.

The physical activity interventions that appear to be most acceptable for South Asians are family and community walks; with evidence that single sex gyms are also acceptable to Asian women. For dietary interventions, worries about causing offence by failing to offer traditional food can best be addressed if the whole community is involved in education about diet. Attempts to modify a family's diet by working with the main family cook may be more effective if a South Asian dietician is used and if discussions on changes to the family diet incorporate the mother-in-law, since she can be the authority figure on what food is acceptable. Also, in some communities, older men may need to be involved in any planned dietary changes because the father-in-law may be responsible for food shopping rather than the main cook. Finally, recipes or dietary advice needs to be tailored to the food preferences and culture of the particular South Asian group (including gender); for example, some groups eat meat, and others are vegetarian, different groups have different traditional cuisine and different religious food observances.

A wide range of projects report similar factors contributing to the 'success' of the intervention and common facilitators and barriers to progress. Many of the conclusions drawn about successful interventions simply repeat those reported in previous published studies. These include: tailoring the intervention appropriately; keeping key messages simple and consistent; using visual and demonstration methods ("Show not tell") rather than just speaking to people (e.g. demonstrating how to adapt recipes to make them more healthy); setting goals and targets; encouraging people to make small changes to their everyday lifestyle (more sustainable in the longer term); ensuring a non judgemental approach from staff; recruiting staff from the local community; and using appropriate resources (DVDs, leaflets etc).

Two common barriers regularly identified are language and cost (e.g. purchase of more healthy food, travel costs to venue for exercise classes). Religious and cultural practices may also mean that certain times of the year, days of the week, settings, or timings are not suitable for community events or interventions.

5.3 Semi-Grey Literature Identified

Twenty one papers were identified using the two South Asian search engines Indian Pub Med (IndMED) and the Pakistani equivalent (Pakmedinet) (see **Annex 4**). Of these, six were identified as intervention studies and copies ordered (103-107). The British Library was unable to supply copies of two of these papers(103, 108) (see **Annex 4** for reason), and one is still awaited (105).

Of the three remaining papers, one was a study investigating the effectiveness of posters as a tool for imparting information related to high blood pressure (104). Impact was assessed after 30 days. 1,017 people attending the facilities were interviewed. 80% had noticed the posters, 64% of these understood the overall message of the poster correctly and 501 got their blood pressure checked. The

authors suggest that a larger prospective study is needed to assess the poster as a tool for prompting people to get their blood pressure checked.

A second study was undertaken to determine the frequencies of diabetes, hypertension and established lifestyle risk factors and to assess the level of awareness about diabetes and hypertension in people attending a one-day health mela[1] in Karachi (107). A structured questionnaire was administered to 264 participants. The mela identified high frequencies of diabetes (14%), impaired glucose tolerance (8%) and hypertension (24%). A majority of the study population were overweight/obese (54% M & 67% F) and reported a lack of exercise (59%). Half the men and just over one third of the women were able to correctly define diabetes and hypertension.

The third study analysed the response of the public in Madras to health information disseminated by various media (106). Stratified sampling was used and the results clearly show that an audio-visual approach is the best format. Popular films have a definite impact on the majority of the South Indian public, particularly those in the lower and middle socio-economic strata. However, knowledge about diabetes was reported to come from family members (40%) followed by health care personnel (26%), with print media only being cited by 4%. Health dissemination strategies that involve audio-visual techniques and prominent film personalities are recommended.

5.4 Overview of Research in Progress

5.4.1 SYSTEMATIC REVIEWS & GUIDANCE

Two systematic reviews of relevance currently in progress were identified; both have been commissioned by the NIHR HTA Programme (see **Annex 6**).

The first review is examining the evidence on '**Non-pharmacological interventions to reduce the risk of diabetes in people with impaired glucose regulation (IGT and IFG)**' (109). This review, plus economic evaluation, is being undertaken by the University of Aberdeen and is due to report in October 2011. Although this review is not focused exclusively on South Asians or BME populations, it will explicitly consider evidence of ethnic differences in any trial findings. Interventions being considered include those aimed at: (i) weight loss by calorie restriction, alone or combined with exercise; (ii) exercise therapies alone, without weight loss; (iii) qualitative changes in diet, without calorie restriction and weight loss; and (iv) improving adherence to diet and exercise.

A second review, not focused exclusively on diabetes risk, is examining the evidence on '**Modification of health promotion interventions to meet the needs of ethnic minority groups**' (110). This review will report a little later (mid-2012) and is being undertaken by the University of Edinburgh. The review is gathering evidence on effective cultural adaptation of health promotion interventions for use in South Asian, Black and Chinese ethnic minority populations. Three forms of

[1] Religious, cultural or similar gathering/ fair.

health promotion are being considered; smoking cessation, physical activity and dietary. The final review will include findings from interviews with research teams working in relevant areas and with ethnic minority groups.

As of 1st April 2011, a number of guidance documents are also being developed by NICE. The following guidance has recently been referred to NICE by Ministers:

- Walking and cycling: local measures to promote walking and cycling as a form of travel or recreation.

The further following pieces of guidance are on hold whilst they are reviewed by Ministers:

- Preventing obesity using a 'whole-systems' approach at local and community level.
- Increasing fruit and vegetable provision for disadvantaged communities
- Identification and management of overweight and obese children in primary care
- Using the media to promote healthy eating: guidance for policy makers, food retailers and the media
- Identification and weight management for overweight and obese children: community based interventions

5.4.2 TRIALS AND COHORT STUDIES

A large number of UK trials and cohort studies are currently underway on diabetes prevention. These are due to report from 2013 onwards (see **Annex 6**).

Two UK trials are specifically focused on the South Asian population:

PODOSA (Prevention of Diabetes and Obesity in South Asians) is an MRC-funded RCT underway in Edinburgh and Glasgow which will report early in 2013 (111). This is evaluating a family-based lifestyle intervention in the community setting. The intervention is targeted at people of **Indian and Pakistani origin** aged ≥35 years with impaired fasting glycaemia or impaired fasting glucose with large waists (≥ 80cm for women and 90cm for men). The intervention involves 15 dietician contacts over a 3 year period and the main outcome will be weight change at 3 years.

BANGLADIP (Diabetes prevention in **people from Bangladesh**) is a pilot RCT currently underway in East London aimed at testing the feasibility of a combined lifestyle and drug intervention (112). Trial recruitment closed at the end of 2010 and the follow up stage is now being completed. Individuals entered into the study are those identified as at risk of developing diabetes (e.g. patients with metabolic syndrome, impaired glucose tolerance or impaired fasting glucose). The intervention consists of: (i) behavioural lifestyle advice on healthy eating and exercise given over a 12 month period, plus (ii) at 6 months (until trial end at 1 year) the offer of pharmacotherapy (metformin) to all participants. A control group receives routine GP care for 1 year consisting of standard healthy lifestyle advice from the practice nurse. An extended arm of the BANGLADIP study (**BANGLADIP Qualitative Study**) is also now underway (113). This involves all patients who

took part in the BANGLADIP pilot trial; other than the fact that this is a qualitative study, no further details are provided by NIHR.

A number of other trials are being undertaken in multi-ethnic populations, although not specifically focused on South Asians.

An NIHR-funded Programme in Leicester includes a pilot study (**PREVENT**) to test a community based primary prevention programme for type 2 diabetes (114). Leicester has a **large South Asian population**. The intervention consists of integrated identification, lifestyle intervention and community services. Recruitment and follow-up are now complete for this pilot. The **Let's Prevent** study (part of the same NIHR Programme) is an RCT designed to establish whether a structured educational lifestyle programme of diet and exercise (based on the DESMOND curriculum) can prevent individuals with pre-diabetes going on to develop diabetes (115). The educational sessions are held in small groups and, if necessary, an interpreter and translated information are made available (**South Asian languages only**). This trial is still in the recruitment stage. Both research projects are linked to the **DESMOND Ongoing** study (116). This cluster RCT is evaluating the effect on long-term blood glucose (HbA1c) levels of ongoing delivery of the structured DESMOND education programme for people with established type 2 diabetes. This trial started recruiting in July 2010; a completion date is not available.

Another trial commissioned by the HTA Programme is a **cluster RCT of an obesity prevention intervention in primary school age children** aged 6-7 years in the West Midlands (117). This study will report in 2017. Schools are stratified according to urban vs. rural location, proportion of pupils from **ethnic minority groups** and proportion of children entitled to free school meals (as a proxy for deprivation). The effectiveness and cost-effectiveness of a community-level, multi-component intervention programme will be assessed compared to usual practice. Follow up will be over 2 years and the main outcome will be children's weight, with blood pressure, 24 hour dietary intake, physical activity, health-related quality of life and body image as secondary outcomes.

Another RCT commissioned by the HTA Programme is assessing the **cost-effectiveness of "booster" interventions to sustain increases in physical activity in middle-aged adults** (118). This study will report in 2013. The research is being carried out by the University of Sheffield in 20 neighbourhoods with a large, **ethnically diverse population**, high levels of economic deprivation and low levels of physical activity. Trial participants receive either a standardised "brief intervention" which includes provision of an interactive DVD (control) or the brief intervention followed by a "mini booster" (consisting of two telephone calls one month apart) or a "full booster" (consisting of face-to-face meetings with a facilitator at the same intervals). The primary outcome will be 7-day accelerometry measured at 3 months.

Two UK trials are linked to the 5-year follow-up currently underway in the Anglo-Danish-Dutch study of intensive treatment of people with newly diagnosed diabetes in Primary Care (**ADDITION**) funded by NIHR, MRC and the Danish Council for Strategic Research Funds (119). These trials aim to assess the value of a combination of interventions. First, studies are assessing a screening strategy

to **identify people with undetected diabetes** in primary care based on a diabetes risk score and various biochemical tests, including measuring the effects of screening on health outcomes at the population level. To be eligible participants have to be in the top 25% for risk of having undiagnosed diabetes. A second treatment phase of the studies assesses the costs and benefits of **early multifactorial therapy** in individuals with screen-detected diabetes in terms of cardiovascular events at 2 and 5 years. The aim of this research programme is to provide the NHS National Screening Committee with timely evidence to inform their decision on whether screening for type 2 diabetes should become part of health policy in the United Kingdom; also, whether intensive multifactorial therapy should be added to routine care in individuals with screen-detected type 2 diabetes. There is no specific mention of South Asian patients although **ethnic group is recorded** in all studies. However, the **ADDITION-Cambridge** trial is being conducted in the East Anglia region (120). Only the **ADDITION-Leicester** trial is being undertaken in a **multi-ethnic population** with type 2 diabetes (121).

Although unpublished, the 5 year results from ADDITION were reported at the European Association for the Study of Diabetes (EASD) meeting in September 2010 (122-125). Presenters reported that intensive multifactorial treatment by GPs did not significantly improve outcomes (in terms of cardiovascular events over five years) compared to routine-care. Instead, screen detection appeared to be the main factor influencing outcomes. However, participants were predominantly white (around 90%), with the exception of the Leicester centre where 30% of patients were of **South Asian origin**.

A sub-study of ADDITION-Cambridge (**ADDITION-10% study)** is evaluating the benefits and costs (psychological and economic) of screening for type 2 diabetes at the population level (126). Recruitment is now closed and follow-up complete. This sub-study supplements the **Psychological Impact of Screening Study** which was also embedded in the ADDITION-Cambridge trial (127). The latter study assessed changes in anxiety, depression and related measures over 12 months among those invited to participate in diabetes screening compared with participants in no-screening (control) practices.

Another UK multi-centre trial currently underway is evaluating **Vitamin D Supplementation in People at Risk of Type 2 Diabetes** (128). As well as contributing to bone health, vitamin D is also involved in the way the body handles sugar. Vitamin D deficiency is increasingly recognised as being common among South Asian adults (58). Participants will be drawn equally from Cambridge and East London so an **ethnic minority population will be included**. The trial aims to see whether giving vitamin D to people identified as being at risk of developing diabetes can prevent or delay onset of the disease. The study will also check the acceptability of supplementation. People at risk of developing type 2 diabetes will be defined based on the Cambridge Risk Score, which includes a differential cut-off for South Asians. The closure date for recruitment to this trial is January 2013. The **DALI Group Interviews Study** (a single centre study in Cambridge) is exploring determining factors which influence the motivation and attitudes of obese women to Vitamin D supplementation during pregnancy and attitudes to lifestyle and dietary interventions (129). The aim is to provide a foundation for the development and delivery of effective Vitamin D and lifestyle interventions for the

prevention of gestational diabetes mellitus (GDM). The study closed recruitment at the end of March 2011.

There are two relevant cohort studies in the UK. The **Born in Bradford NHS Research Programme** is an observational cohort study currently underway of mothers booked in to have their baby at Bradford Royal Infirmary (130). The study will include 10,000 babies (~ 5,000 of **South Asian origin**) and report in 2013. The aim is to examine the patterns and aetiology of childhood obesity in a multi-ethnic population and to use this evidence to develop a tailored prevention intervention. In particular, the study will review the evidence of effectiveness of obesity prevention interventions in **pregnant women and/or children up to the age of 5 years** of South Asian origin, identify modifiable risk factors for childhood obesity, and test the feasibility of implementation and evaluation of an intervention to prevent obesity. The ultimate aim of the programme is to design an innovative community/family-based intervention to improve modifiable behaviours in both parent and child. The **Child Heart and Health Study in England (CHASE)** is a similarly large cohort study which is undertaking a detailed investigation of patterns of risk factors for type 2 diabetes and CVD in children of South Asian, black African-Caribbean and white European origin. The study completed fieldwork in mid-2008, and an extensive list of publications is available with further publications due in 2011 (131). CHASE was based in 200 Primary Schools in London, Birmingham and Leicester; 5,000 participants were recruited to provide balanced numbers of **South Asians** (including similar numbers of **Indian, Pakistani** and **Bangladeshi** origin), black African-Caribbeans and white Europeans.

Outside the UK, an MRC-funded doctoral project is examining **health promotion, prevention, and the treatment of diabetes and CVD in the state of Kerala** (132). The research includes participant observation in clinical settings and semi-structured interviews with poor/middle class Indian households regarding diet, lifestyle, and treatment behaviours. The thesis will be submitted in September 2011. Kerala has the highest prevalence in India for type 2 diabetes (16.3 per cent) and CVD (20 per cent).

Some other trials on diabetes prevention are underway, where inclusion of ethnic minority populations is not specified.

The **ProActive: Follow-up Study** is a long-term follow-up of a physical activity RCT cohort in Cambridge (133). The trial completed initial 12 month follow-up at the end of 2004, and longer term follow-up closed in December 2010. The intervention programme to promote physical activity is being evaluated in a high-risk group of people who have a parent with type 2 diabetes and a self-reported sedentary lifestyle. The aim is to identify whether teaching skills of behaviour change can help increase physical activity and reduce risk of type 2 diabetes. Participants at baseline reported a moderately strong intention to increase activity, but little concern about diabetes, and a perception of the risks of developing the disorder only slightly greater than others of their age. **No details about ethnicity** of the trial population are provided.

Research is also underway in a community setting in Norfolk as part of a *Diabetes Prevention Programme*, although there is **no specific mention of ethnic minority**

population. The first project (**Screening Cohort**) is a feasibility study to screen people at risk of diabetes (134). Recruitment to this two year feasibility study is now closed and follow-up completed. The second project (**UEA-IFG Study**) is developing a structured diet and lifestyle programme and a second stage will investigate whether this programme can reduce the risk of type 2 diabetes (135). This project closed recruitment in mid-January 2010 and follow-up is currently underway. A further study (**Norfolk DPS Screening Cohort)** is at the set-up stage (136). This will be an observational cohort study with a planned recruitment closure date of the end of February 2016. The project will recruit Norfolk residents aged 40+ years with at least one of the following: BMI>30kg/m^2; parent, sibling or child with type 2 diabetes; personal history of CHD or gestational diabetes; or someone identifying themselves as having known IFG or IGT. No further details are available at this stage. The Diabetes Research Network (DRN) Eastern LRN lists a number of other diabetes studies underway in a recent Eastern DRN Newsletter (137). **No details about ethnicity** are provided for these.

The Peninsula Medical School, Exeter is undertaking a study of Diabetes in Pregnancy - **DIPMAB** (138). This single hospital study (in Plymouth) of GDM is funded by Novo Nordisk Pharmaceuticals Limited. The researchers will recruit three groups of women (100 women with previous GDM and their offspring, 100 women with normal glucose tolerance in pregnancy and their offspring, 100 women with previous type 1 diabetes and their offspring). The closure date is October 2011. **No details about ethnicity** of the population recruited or about the study protocol are provided.

A further three trials are currently **underway in the USA** focused on pre-diabetes and diabetes prevention in ethnic minority populations. Interventions in these trials centre on programmes to achieve diabetes prevention through weight loss. Populations with a high diabetes prevalence in the US include South Asians (18.3%), African Americans (13.3%), American Indians (12.8%), and Mexican Americans (9.5%) compared with 8.7% of European Americans diagnosed with diabetes. Worldwide the highest rates of type 2 diabetes are found among Native Americans, particularly the Pima Indians, in the USA (139).

In New York, **HEED (Help Educate to Eliminate Diabetes)** is a trial to evaluate a community-based, peer-led weight loss programme for overweight adults with pre-diabetes in an **ethnically diverse population** in East Harlem (140). An RCT will assess the effectiveness of this culturally tailored intervention in 400 overweight (BMI > 25) adults with pre-diabetes. The primary outcome will be weight loss at 6, 12, and 24 months post-enrolment into trial. The trial is currently still recruiting.

A second trial in California, which has the largest South Asian population in the USA, the **E-LITE Study** is evaluating lifestyle interventions to treat elevated cardiometabolic risk in primary care (141). This trial is being undertaken by the Palo Alto Medical Foundation, and is comparing a behavioural Self-Management programme (SM) and a behavioural Care Management programme (CM). The primary hypothesis is that the CM intervention will reduce BMI more than the SM intervention, which in turn will reduce BMI more than usual care, over 15 months. Although **all ethnic groups are included**, one of the trial exclusion criteria is an

inability to speak, read or understand English. This trial is also currently still recruiting.

A third study **Integrating Lifestyle Therapy for Diabetes Prevention into Primary Care** is being undertaken in an **ethnically diverse population** in Chicago(142). An educational intervention aimed at both primary care providers and their patients with metabolic syndrome/ pre-diabetes is being evaluated. The primary objective is to test the feasibility of integrating less intensive lifestyle intervention input into patient visits with their primary care provider to improve weight loss and decrease risk factors. Primary outcomes at 1.5 years will be weight loss (patients) and improved ability to diagnose and treat metabolic syndrome/ pre-diabetes (providers). The study is active but not yet recruiting.

6 CONCLUSIONS

How best to address pre-diabetes in the South Asian population remains a problem. Even though a large number of grey literature reports and descriptions of intervention projects were identified, there is a shortage of high quality evidence. Also, where evidence is available, it often does not specify the outcomes for specific South Asian population groups so that care is needed in generalising any findings to these populations. As a result, the value of the descriptions of service-led lifestyle interventions targeted at the South Asian population (or at specific BME groups with increased risk of diabetes) is promising, but not conclusive.

Effective preventive interventions such as those designed to tackle obesity, and therefore improve diabetes or CVD outcomes, require intervention across the entire life course. The results suggest that targeted interventions will be more effective if they build on existing community links and involve engagement with extended family members and community leaders. For children, lifestyle modifications can be achieved by motivating and empowering parents in the context of the community in which they live.

A number of trials and systematic reviews are in progress. Hopefully, these will add to the evidence base, although only two appear to be considering cost-effectiveness. The ‘semi-grey’ literature from India and Pakistan may also provide useful insights, although it can be difficult to access.

With an ageing South Asian population in the UK, and an increasing number of people developing diabetes and CVD, how best to ensure that health promotion interventions to reduce diabetes risk in South Asians are implemented cost-effectively remains an important issue to address.

ANNEX 1

Results of Searches of Index to Theses

A comprehensive listing of theses with abstracts accepted for higher degrees by universities in the United Kingdom and Ireland since 1716; last updated 14 January 2011 (Volume 59. 7th update of 8). Of the 556,755 theses in the collection, 324,161 have abstracts.

Links to theses freely available for download from EThOS, together with links to items within 40 UK/Irish university repositories, provided some 50,000 theses which were downloadable at January 2011.

PhD/ MD Theses of Potential Interest

Author Title

1: Samanta, A. A study of diabetes in Asians.
2: Katulanda, P. Aetiology and epidemiology of adult-onset diabetes in an endogenous South Asian population in Sri Lanka.
3: Dornhorst, A. Gestational diabetes: a model of non-insulin dependent diabetes.
4: Dhawan, J. Observations on coronary artery disease in Asians.
5: Meetoo, D. Non-compliance and diabetes self-care activities: a case study of Asians and Caucasians. (BL: DXN053830)
6: Porter, J. An investigation of novel diabetes genes in childhood-onset autosomal dominant non-type 1 diabetes families.
7: Martin, P.G. Patterns of proteinuria in patients with diabetes mellitus
8: Singh, H. Psychological aspects of diabetes management in South Asian and white men and women with diabetes.
9: Dixon, A. N. Type 2 diabetes mellitus in individuals of South Asian ethnic origin
10: Chakraborty, K. Understanding diabetes treatment behaviours: Health risk decisions of Asian sub-groups and White people.
11: Hughes, L.O. First myocardial infarction and cardiovascular risk factors in Asians and Whites living in North West London.
12: **Tringham, J.R****. Strategies for the early detection of type 2 diabetes in an at risk population.
13: Pisitchayakhon-Garnett, K.K. British Indo-Asians with diabetes mellitus: their adherence and use of medicinal plants.
14: Hawthorne, K. Overcoming cross-cultural difficulties in diabetes management - making diabetes health education relevant to a British South Asian community.
15: Ehtisham, S. A study of the clinical characteristics of childhood type 2 diabetes with particular reference to ethnic differences in body composition and insulin sensitivity.
16: Bellary, S. Enhanced care to people of South Asian Ethnicity-the United Kingdom Asian Diabetes Study (UKADS)
17: Newton, J.D. Studies of the epidemiology and prognosis of patients with heart failure in Leicestershire.
18: **Wasim, H****. M. Risk factor for diabetes and cardiovascular disease and its management in South Asians.
19: **Keval, H.C**** Cultural negotiations in health and illness: the experience of adult onset diabetes among Gujarati South Asians in England
20: McKeigue, P.M. Coronary heart disease in South Asians overseas.
21: Maghrabi, I.A. Community pharmacy-based provision of pharmaceutical care in type 2 diabetes mellitus and hypertension.
22: Chauhan, U. Improving access to health care for minority ethnic populations with diabetes and heart disease.
23: Zindrou, D. Risk factors in relation to outcome from coronary artery bypass grafting in European Whites and Indian subcontinent Asians in the UK.
24: Forouhi, N.G. The relationship between body fat distribution, insulin sensitivity, and postprandial

lipids in Europeans and South Asians: a cross-sectional study. (BL: DXN053071)

25: Bhabuta, A. Asians and food-dietary patterns, beliefs and knowledge

26: Britten, A. C. Genetic aspects of autoimmune diabetes with particular reference to the role of HLA

27: McDonnell, B. The effect of ethnicity, diabetes and exercise on arterial stiffness.

28: Chatterjee, S. Outcomes and phenotype of subjects with screen-detected diabetes and new and emerging therapies for Type 1 and Type 2 diabetes mellitus

29: Scott, S.R. The management of type 2 diabetes.

30: Sayer, J.W. Sympathetic activation and the pathogenesis of acute myocardial infarction

31: Bose, K.S. Obesity, body fat distribution and other risk factors of non-insulin-dependent diabetes mellitus in different ethnic groups living in East Anglia.

32: Al-Daghri, N. M. Metabolic basis of coronary artery disease.

33: Mackie, A.D.R. The progression of nephropathy in non-insulin-dependent diabetes mellitus.

34: Nagi, D.K. Cardiovascular risk factor in Asian and Caucasian subjects with and without Type 2 diabetes studies using highly specific assays for insulin, intact proinsulin and des 31,32 split proinsulin.

35: Blackledge, Hanna Maria Outcomes in Heart Failure: Study of Contemporary Trends in a Multi-Ethnic Population

36: Odoki, K. H. Adiposity in British secondary school children: A population based study.

37: Banerjee, M. Vascular function and IGF system in postpartum women in relation to glycaemic and blood pressure status in pregnancy.

38: Galasko, G.I.W. Left ventricular dysfunction: its community prevalence, aetiology and screening.

39: Khattar, R.S. Prognostic value of direct continuous ambulatory blood pressure monitoring in essential hypertension

40: Alissa, E.M. Micronutrient status and atherosclerosis.

41: Neasham, D.E. The geographical epidemiology of neural tube defects and Down syndrome in England and Wales.

42: Beales, P.L. A clinical and genetic study of the Bardet-Biedl syndrome

**** PhD/ MD Theses Selected**

ANNEX 2

Medline Search Strategy to Identify Published Reviews

Search carried out 230211- Strategy saved as SAGRED 230211.
Database: Ovid MEDLINE(R) <1948 to February week 2 2011>
Search Strategy:
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1 diabet*.ab,ti. (304254)
2 Diabetes Mellitus/di, dh, ec, ed, pc [Diagnosis, Diet Therapy, Economics, Education, Prevention & Control] (11550)
3 exp Insulin Resistance/ (37776)
4 Impaired fasting glucose.ab,ti. (1496)
5 impaired glucose tolerance.ab,ti. (6437)
6 exp Hemoglobin A, Glycosylated/ (16774)
7 HbA1c.ab,ti. (8637)
8 insulin resistance.ab,ti. (33897)
9 undiagnosed diabet*.ab,ti. (508)
10 exp Prediabetic State/ (2733)
11 prediabe*.ab,ti. (2178)
12 or/1-11 (337892)
13 (ethnic or minorit*).ab,ti. (64306)
14 (BME or black ethnic minorit* or black minorit* ethnic*).mp. (489)
15 (migrant* or immigrant*).ab,ti. (18559)
16 race*.mp. or racial.ab,ti. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier] (76248)
17 cultur*.ab,ti. (685089)
18 (multicultural or multi-cultural).ab,ti. (1538)
19 (cross-cultural or crosscultural).ab,ti. (5124)
20 (trans-cultural or transcultural).ab,ti. (1319)
21 (multi-rac* or multirac*).ab,ti. (485)
22 (multiethnic or multi-ethnic).ab,ti. (2758)
23 (multi-lingu* or multilingu*).ab,ti. (475)
24 (ethno-cultur* or ethnocultur*).ab,ti. (290)
25 (socio-cultural or sociocultural).ab,ti. (5779)
26 (divers* or diverse population* or cultural diversity).ab,ti. (186493)
27 (south asian* or bangladeshi* or pakistani* or indian* or sri lankan*).mp. (56679)
28 (asian* or east asian* or chinese or taiwanese or vietnamese or korean* or japanese).mp. (206941)
29 (afro-caribbean* or african-caribbean* or caribbean or african* or black* or afro*).mp. (165711)
30 (islam* or hindu* or Sikh* or buddhis* or muslim* or moslem* or christian* or catholic* or jew*).ab,ti. (21358)
31 ethnic group*.mp. (48441)
32 ((ethnic or linguistic) adj diversity).ab,ti. (475)
33 acculturation.ab,ti. (2165)
34 (faith* or belief* or religion*).ab,ti. (48423)
35 or/13-34 (1385195)
36 intervention*.ab,ti. (368126)
37 (health promotion or promot* health).ab,ti. (15354)
38 Health education.mp. or exp Health Education/ (126027)
39 prevent*.ab,ti. (714567)
40 (health* adj (behaviour or behavior)).ab,ti. (4363)
41 screen*.ab,ti. (332973)
42 or/36-41 (1418670)
43 ((physical adj5 activit*) or exercise*).ab,ti. (182922)
44 yoga.ab,ti. (968)
45 ((weight adj5 (management or control)) or weight).ab,ti. (455246)

46 (diet* or diet* modification or diet* change* or nutrition* or food*).ab,ti. (548078)
47 (smoking or smoking cessation or stop smoking or smoking reduction).ab,ti. (111632)
48 exp Life Style/ (51004)
49 lifestyle*.ab,ti. (32943)
50 (fruit* or vegetable*).ab,ti. (49785)
51 (activit* or inactivit*).ab,ti. (1773169)
52 (food habit* or healthy eat*).ab,ti. (2633)
53 exp Obesity/ (105087)
54 (obes* or overweight).ab,ti. (123471)
55 or/43-54 (2864116)
56 12 and 35 and 42 and 55 (4367)
57 limit 56 to (abstracts and english language and "review articles" and humans and yr="2000 - Current") (592)
58 asian*.ab,ti. (29645)
59 57 and 58 (66)

ANNEX 3

Reviews Identified for Bibliography Search

Published review bibliographies checked for grey literature references:

1. Khunti K, Camosso-Stefinovic J, Carey M, Davies MJ, Stone MA. 2008 Educational interventions for migrant South Asians with Type 2 diabetes: a systematic review. *Diabet Med*. 25(8):985-92.

2. Ramachandran A. Snehalatha C. Current scenario of diabetes in India. [Review] *Journal of Diabetes*. 1(1):18-28, 2009 Mar.

3. Misra A. Khurana L. The metabolic syndrome in South Asians: epidemiology, determinants, and prevention. [Review] [192 refs] *Metabolic Syndrome & Related Disorders*. 7(6):497-514, 2009 Dec.

4. Misra A. Khurana L. Isharwal S. Bhardwaj S. South Asian diets and insulin resistance. [Review] [89 refs] *British Journal of Nutrition*. 101(4):465-73, 2009 Feb.

5. Basit A. Shera AS. Prevalence of metabolic syndrome in Pakistan. [Review] [34 refs] *Metabolic Syndrome & Related Disorders*. 6(3):171-5, 2008 Sep.

6. Mathews R. Zachariah R. Coronary heart disease in South Asian immigrants: synthesis of research and implications for health promotion and prevention in nursing practice. [Review] [31 refs] *Journal of Transcultural Nursing*. 19(3):292-9, 2008 Jul.

7. Bhardwaj S. Misra A. Khurana L. Gulati S. Shah P. Vikram NK. Childhood obesity in Asian Indians: a burgeoning cause of insulin resistance, diabetes and sub-clinical inflammation. [Review] [15 refs] *Asia Pacific Journal of Clinical Nutrition*. 17 Suppl 1:172-5, 2008.

8. Misra A. Khurana L. Vikram NK. Goel A. Wasir JS. Metabolic syndrome in children: current issues and South Asian perspective. [Review] [163 refs] *Nutrition*. 23(11-12):895-910, 2007 Nov-Dec.

9. Joshy G. Simmons D. Epidemiology of diabetes in New Zealand: revisit to a changing landscape. [Review] [68 refs] *New Zealand Medical Journal*. 119(1235):U1999, 2006.

10. Hill J. Management of diabetes in South Asian communities in the UK. [Review] [57 refs] *Nursing Standard*. 20(25):57-64; quiz 66, 2006 Mar 1-7.

11. Fischbacher CM. Hunt S. Alexander L. How physically active are South Asians in the United Kingdom? A literature review. [Review] [41 refs] *Journal of Public Health*. 26(3):250-8, 2004 Sep.

12. Williamson DF. Vinicor F. Bowman BA. Centers For Disease Control And Prevention Primary Prevention Working Group. Primary prevention of type 2 diabetes mellitus by lifestyle intervention: implications for health policy. [Review] [56 refs] *Annals of Internal Medicine*. 140(11):951-7, 2004 Jun 1.

ANNEX 4

'Semi-Grey' Literature Sources & Items Identified

Indian and Pakistani Source Journals Identified

1. Indian Journal of Clinical Biochemistry
2. Indian Journal of Clinical Practice
3. Indian Journal of Community Medicine
4. Indian Journal of Occupational and Environmental Medicine
5. Indian Journal of Medical Research
6. Indian Pediatrics
7. Indian Practitioner
8. Journal of Ayub Medical College
9. Journal of College of Physicians and Surgeons Pakistan
10. Journal of the Pakistan Medical Association
11. The Professional Medical Journal

Items identified

1. Augustine LF; Poojara RH. Prevalence of obesity, weight perceptions and weight control practices among urban college going girls. *Indian Journal of Community Medicine*. 2003 Oct-Dec; 28(4): 187-90.

2. Bhatia V. IAP national task force for childhood prevention of adult diseases: insulin resistance and type 2 diabetes mellitus in childhood. *Indian Pediatrics*. 2004 May; 41(5): 443-457.

3. Bhave S; Bavdekar A; Otiv M. IAP national task force for childhood prevention of adult diseases: childhood obesity. *Indian Pediatrics.* 2004 Jun; 41(6): 559-575.

4. Dutt D; Ray G; Chatterjee P. Risk factor assessment for type II diabetes mellitus in a tertiary Hospital in Kolkata. *Indian Journal of Community Medicine*. 2004 Oct-Dec; 29(4): 169-170.

5. Hashmi NR, Daud S, Manzoor I. Diabetes Mellitus; awareness among individuals attending outpatient department of Ghurki Trust Teaching Hospital. *Professional Med* J. Jan - Mar 2008;15(1):96-100.

6. Hassan A. Screening of pregnant women for gestational diabetes mellitus. *J Ayub Med Coll*. Apr - Jun 2005;17(2):54-8.

7. ** ## Krishnan N; Varman M; Roberts M. Diabetes control: role of health education and other factors: a study in a newspaper industry. *Indian Journal of Occupational and Environmental Medicine*. 2004 May-Aug; 8(2): 29-33.

8. Kumar D; Mittal PC; Singh S. Socio-cultural and nutritional aspects of fast-food consumption among teenagers and youth. *Indian Journal of Community Medicine*. 2006 Jul-Sep; 31(3): 178-80.

9. Misra A; Wasir JS; Vikram NK. Carbohydrate diets, postprandial hyperlipidaemia, abdominal obesity and Asian Indians: a recipe for atherogenic disaster. *Indian Journal of Medical Research.* 2005 Jan; 121(1): 5-8.

10. Mumtaz S, Ashfaq T, Siddiqui H. Knowledge of medical students regarding Diabetes mellitus at Ziauddin University, Karachi. *J Pak Med Assoc*. Mar 2009;59(3):163-6.

11. Nishtar, S., S. Shera, et al. (2004). "Diabetes prevention and control: National Action Plan for NCD Prevention, Control and Health Promotion in Pakistan." *J Pak Med Assoc* 54(12 Suppl 3): S26-30.

12. ** Nishtar, S., N. Zoka, et al. (2004). "Posters as a tool for disseminating health related information in a developing country: a pilot experience." *J Pak Med Assoc* 54(9): 456-460.

13. Nishtar, S. (2004). "The National Action Plan for the Prevention and Control of Non-communicable Diseases and Health Promotion in Pakistan--Prelude and finale." *J Pak Med Assoc* 54(12 Suppl 3): S1-8.

14. Nishtar, S., A. M. Faruqui, et al. (2004). "The National Action Plan for the Prevention and Control of Non-communicable Diseases and Health Promotion in Pakistan--Cardiovascular diseases." *J Pak Med Assoc* 54(12 Suppl 3): S14-25.

15. ** Olendzki B; Speed C; Domino FJ. Nutritional assessment and counseling for prevention and treatment of cardiovascular disease. IJCP. 2006 May; 16(12): 60-7.

16. ** ## Pingle SR; Deshpande AK; Malik JS. Impact of intervention strategies for risk factor modification. *Indian Journal of Occupational and Environmental Medicine*. 2001 Apr-Jun; 5(2): 91-5.

17. Qidwai W, Azam SI. Knowledge, attitude and practice regarding Obesity among patients, at Aga Khan University Hospital, Karachi. *J Ayub Med Coll* Jul - Sep 2004;16(3):32-4.

18. ** Rafique G, Khuwaja AK. Diabetes and Hypertension: Public awareness and lifestyle - findings of a health mela. *J Coll Physicians Surg Pak.* Dec 2003;13(12):679-83.

19. Ramachandran A. Diabetes and Obesity: the Indian angle [editorial]. *Indian Journal of Medical Research.* 2004 Nov; 120(5): 437-439.

20. ** Reddy BBO; Jayalakshmi R; Chettri M; Krishnaswami CV; Vijayakumar G; Chellamariappan M; Ganesan A; Srivatsa A; Venkataraman SV; Shekher S; Pannerselvan A. "Mass media communication" as a tool for effective diabetes awareness and its prevention at Chennai. *Indian Practitioner*. 1998 Jan; 51(1): 11-18.

21. Sharma P; Mishra S. Metabolic Syndrome: Identification Prevents type II Diabetes and Cardiovascular Disease. *Indian Journal of Clinical Biochemistry*. 2007 Jan; 22(1): 1-3.

** Intervention study

British Library unable to supply. [Holding libraries in UK hold item as e-resource which cannot be copied according to licence agreements. Searches abroad could not identify any institutions which will send copies in response to international requests.]

ANNEX 5

Details of Website Sources & Items Identified

(i) Websites Explored

A wide array of health, health policy, evidence-based medicine, health services research and other web sites were explored. These included the following:

Diabetes/ Health Lifestyle websites. For example:

- DESMOND
- Prevention of Diabetes & Obesity in South Asians (PODOSA)
- Diabetes UK
- Silver Star
- Sikh Diabetes Awareness Charity
- Apnee Sehat

South Asian/ BME-relevant websites. For example:

- South Asian Health Foundation (SAHF)
- Race Equality Foundation
- Health Development Authority (HDA), previously HEA
- MultiKulti
- British Asian Professionals

Other agency websites. For example:

- NICE
- NIHR (incl. Diabetes Research Network)
- HTA
- MRC
- CLAHRC
- Cochrane
- London Public Health Observatory (LHO)
- Race for Health
- WISDEM

(ii) Items identified

REVIEWS/ GUIDANCE/ REPORTS

Source	Title	Publication Type	Publication Date	URL
All Party Parliamentary Group for Diabetes & Diabetes UK (143)	Diabetes and the disadvantaged: reducing health inequalities in the UK. A report for World Diabetes Day	Report	2006	http://www.diabetes.org.uk/Documents/Reports/Diabetes_disadvantaged_Nov2006.pdf
CEEHD (10)	Type 2 diabetes and obesity in the south Asian population (Wasim Hanif).	Evidence Update	2008	http://www.library.nhs.uk/ETHNICITY/ViewResource.aspx?resID=296344&tabID=290
CEEHD (27)	Obesity and south Asian children (Lakhanpaul M & Bird D).	Evidence Update	2009	http://www.library.nhs.uk/ETHNICITY/ViewResource.aspx?resID=327155&tabID=289
DH & British Heart Foundation (80)	Heart disease and South Asians : delivering the National Service Framework for coronary heart disease	Report	2004	http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4098586
HDA (45)	Opportunities for and barriers to good nutritional health in minority ethnic groups	Review	1997	http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=375
HDA (144)	Coronary heart disease: Contrasting the health beliefs and behaviours of South Asian communities	Research study	1997	http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=182
HDA(145)	Effectiveness of interventions to promote healthy eating in people from minority ethnic groups: A review	Review of interventions	1998	http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=310

REVIEWS/ GUIDANCE/ REPORTS (contd)

Source	Title	Publication Type	Publication Date	URL
HDA(146)	Active for life: Promoting physical activity with black and minority ethnic groups	Guidance	1999	http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=158
HTA(81)	Promoting physical activity in South Asian Muslim women through 'exercise on prescription'	HTA Report	2002	http://www.hta.ac.uk/project/1058.asp
LHO(147)	Causes of childhood obesity in London: diversity or poverty? The effect of deprivation on childhood obesity levels among ethnic groups in London	Report	2010	http://www.lho.org.uk/viewResource.aspx?id=16724
LHO(148)	Choosing health. A briefing on nutrition, physical activity and obesity in London	Briefing	2005	http://www.lho.org.uk/viewResource.aspx?id=9044
NICE (7)	Public Health Guidance 6 Behaviour change at population, community and individual levels	Guidance	2007	http://www.nice.org.uk/nicemedia/live/11868/37924/37924.doc
NICE (2)	Public Health Draft Guidance - Type 2 Diabetes: Preventing Pre-Diabetes among Adults in High-Risk Groups	Guidance	2010	http://www.nice.org.uk/nicemedia/live/12067/51582/51582.pdf
NICE (149)	Public Health Guidance 25 Prevention of cardiovascular disease at population level	Guidance	2010	http://www.nice.org.uk/nicemedia/live/13024/49275/49275.doc
NICE (150)	Cardiovascular disease prevention in populations and effects on health inequalities (Expert paper for NICE Public Health Guidance 25)	Expert Paper	2010	http://www.nice.org.uk/nicemedia/live/13024/49358/49358.pdf

TOOLKITS/ CDs/ DVDs

Apnee Sehat	Healthy Lifestyle DVD and Apnee Health Booklet	Toolkit, DVD	N/A	http://www.apneesehat.net/resources/index.html
Diabetes UK	Toolkit to Support the Running of Diabetes Awareness Events for the South Asian Communities	Toolkit	2006	http://www.diabetes.org.uk/Professionals/Shared_Practice/Care_Topics/Black_and_Minority_Ethnic_Communities/Toolkit_to_Support_the_Running_of_Diabetes_Awareness_Events_for_the_South_Asian_Communities/
Diabetes UK	Diabetes UK releases interactive CD for the South Asian community	CD Rom	2011	http://www.diabetes.org.uk/About_us/News_Landing_Page/Diabetes-UK-releases-interactive-CD-for-the-South-Asian-community/
Diabetes UK	Diabetes Risk Score	Toolkit	2011	http://www.diabetes.org.uk/About_us/News_Landing_Page/Over-70000-people-have-taken-our-Diabetes-Risk-Score/

ANNEX 6

Details of Research in Progress Identified

Source	Title	Status	Publication Date	URL
Systematic Reviews				
HTA	Non-pharmacological interventions to reduce the risk of diabetes in people with impaired glucose regulation: systematic review and economic evaluation	Current Review	Oct 2011	http://www.hta.ac.uk/project/1541.asp
HTA	Modifying health promotion interventions to meet the needs of ethnic minority groups	Current Review	2012	http://www.hta.ac.uk/project/1745.asp
UK Trials, Cohort Studies etc				
DESMOND (NIHR Programme Grant)	**PREVENT -** A pilot study to test a community based primary prevention programme for Type 2 Diabetes integrating identification, lifestyle intervention and community services for prevention.	Current research	Closed - follow-up complete	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4375
DESMOND (NIHR trial)	**Let's Prevent:** A randomised controlled trial of the prevention of diabetes using an educational intervention and continuous support programme in those with pre-diabetes in a multi ethnic population. *N.B-This is part of the PREVENT programme grant award (above)*	Current research	N/A	http://www.desmond-project.org.uk/279.html
DESMOND	**Desmond Ongoing**: A Cluster Randomised Controlled Trial to measure effect of the ongoing delivery of structured education programme for people with established type 2 diabetes on long term HbA1c	Current research	N/A	http://www.desmond-project.org.uk/280.html
HTA	A randomised controlled trial and cost-effectiveness evaluation of "booster" interventions to sustain increases in physical activity in middle-aged adults in deprived urban neighbourhoods	Current Research	2013	http://www.hta.ac.uk/project/1758.asp

Source	Title	Status	Publication Date	URL
HTA	A cluster randomised controlled trial of the effectiveness and cost-effectiveness of an obesity prevention intervention in primary school age children	Current Research	2017	http://www.hta.ac.uk/project/1725.asp
MRC	Understanding Health Promotion, Prevention, and the Treatment of Diabetes and Cardiovascular Disease in Kerala, India	Current PhD Research	Sept 2011	http://www.mrc.ac.uk/ResearchPortfolio/Grant/Record.htm?GrantRef=G0802703&CaseId=14352
MRC	**PODOSA**: Prevention of Diabetes and Obesity in South Asians	Current research	2013	http://www.podosa.org/faq.html#third
NIHR	**Born in Bradford NHS Research Programme**: Development and evaluation of interventions for the prevention of childhood obesity in a multi-ethnic population	Current research	2013	http://www.leeds.ac.uk/hsphr/psychiatry/research/childobesity.html
NIHR	Diabetes prevention in people from Bangladesh; a pilot study in East London **(BANGLADIP)- An extended arm of the study**	Current research	Dec 2010 (closure date)	http://public.ukcrn.org.uk/Search/StudyDetail.aspx?StudyID=8362
UKCRN	**BANGLADIP**- Diabetes prevention in people from Bangladesh: A pilot trial in East London	Current research	Closed - in follow-up	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4456
UKCRN	Anglo-Danish-Dutch study of Intensive Treatment of people with newly diagnosed diabetes in Primary Care (**ADDITION - 5 year follow up**).	Current research	Closed 28/01/10 (follow up complete)	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=5104
UKCRN	**ADDITION-10% study.** Evaluation of the benefits and costs (psychological and economic) of screening for type 2 diabetes at the population level. **A sub-study of ADDITION.**	Current research	N/A (follow up complete)	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=5162
UKCRN	Vitamin D Supplementation in People at Risk of Type 2 Diabetes.	Current research	2013 (closure date)	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=7732

Source	Title	Status	Publication Date	URL
UKCRN	**DALI Group Interview Study:** Developing a programme for optimal adherence to lifestyle and dietary interventions for the prevention of gestational diabetes mellitus: a group interview study.	Current research	31/03/2011 (closure date)	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=8959
UKCRN	**Diabetes Prevention Programme: Screening Cohort** - Screening for the Diabetes Prevention Programme in a UK community setting	Current research	Closed - follow-up complete	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=9059
UKCRN	**Diabetes Prevention Programme: UEA-IFG Study** - Delivering the Diabetes Prevention Programme in a UK community setting	Current research	Closed - in follow-up	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4832
UKCRN	**Norfolk DPS Screening Cohort** - Delivering a Realistic Diabetes Prevention Programme in a UK Community Norfolk DPS Screening Cohort.	In set up	Closure date 28/02/2016	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=10198
UKCRN	**DIPMAB** - Diabetes in Pregnancy - a Study of Mothers and Babies	Current research	Closure date 01/10/2011	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4444
UKCRN	**Proactive**: Follow-up study	Current research	Closed (03/12/2010) follow-up complete	http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4869
USA Trials				
*meta*Register of Controlled Trials (*m*RCT)	Project HEED (Help Educate to Eliminate Diabetes), a community-based, peer-led weight loss program for overweight adults with pre-diabetes	Recruiting	N/A	http://www.controlled-trials.com/mrct/trial/703659/pre-diabetes+AND+ethnic
*m*RCT	Integrating Lifestyle Therapy for Diabetes Prevention Into Primary Care	Active, not recruiting	N/A	http://www.controlled-trials.com/mrct/trial/493065/pre-diabetes+AND+ethnic
*m*RCT	Evaluation of Lifestyle Interventions to Treat Elevated Cardiometabolic Risk in Primary Care	Recruiting	N/A	http://www.controlled-trials.com/mrct/trial/490235/pre-diabetes+AND+ethnic

ANNEX 7

Questionnaire for Experts

Health promotion interventions to reduce risk of diabetes in South Asians

Experts Questionnaire

We are inviting a number of experts to provide information for a review we are undertaking.

This is a **grey literature review** (i.e. unpublished materials or non-peer reviewed papers). The main aim is to collect evidence on:

- health promotion interventions / initiatives aimed at **reducing diabetes risk in the South Asian population**.

Interventions may be targeted at **adults**, **children**, **families**, **pregnant women** or **communities**. We are particularly interested in the description of interventions and/or measures of their effectiveness.

If you know of any studies / initiatives (either planned, ongoing or completed), please can you let us know - especially if there are any reports or other materials (e.g. tools) available. Please provide as many details as you can – so we can track them down.

Finally, if you know of **anyone else** who may be able to help, **please forward this questionnaire** to them (snowball exercise).

Ala Szczepura
Professor of Health Services Research
Warwick Medical School

Mark Johnson
Professor Diversity in Health & Social Care
Mary Seacole Research Centre, De Montfort University

TYPE OF INTERVENTION / TITLE OF STUDY *(TARGET POPULATION & SETTING)*	**NAME OF RESEARCHER / LOCATION** *(CONTACT DETAILS IF POSSIBLE)*	**STUDY OUTPUTS** *(ATTACH REPORT / WEBSITE IF POSSIBLE)*

Please return to ala.szczepura@warwick.ac.uk

Many thanks for your help.

ANNEX 8

Data Extraction Sheets: Intervention Projects

Short title (ref)	Target group (location)	Intervention description	Outcome(s) recorded	Findings reported	Quality[1]
Focus on Asians with Diabetes (FAD) (83)	a) South Asians with diabetes and their families b) Healthcare professionals (West Midlands)	Educational material, including a video available in five Asian languages and English	Acceptability	Reported to be "acceptable to patients carers and professionals"	Weak (-) / Excluded
National Evaluation Local Exercise Action Pilots (LEAP). (87)	Young women - South Asian & others. (North Kirklees, Yorkshire)	Activity classes; provision of choices (one of ten pilots to promote physical activity)	Feedback after activities. Active Lifestyle Evaluations (Motivational Interviews) Attendance registers; Comments books, questionnaires etc	South Asian women: participated but adherence poor. Most successful activity walking in small groups with families. South Asian girls: parental support essential for initial participation & adherence. Teenage girls: school setting most effective for engaging girls (staff support need to ensure success). In-depth consultation prior to activity programme essential for selection of activities, venues and cultural sensitivities.	Fit for Purpose/Weak (+/-)
Health Development Service (HDS) (89)	People attending Sikh Gurdwara & Hindu Temple. (Newcastle)	Information service in client's first language. Aims to proactively raise awareness of health issues. Partnership with GP practices/ local people to develop exercise sessions (HealthWORKS and New Deal for Communities).	Not reported	Descriptive only. No outcomes reported	Weak (-) / Excluded

[1] See Annex 9 for details.

Data Extraction Sheets: Intervention Projects (contd)

Short title (ref)	Target group (location)	Intervention description	Outcome(s) recorded	Findings reported	Quality[1]
Exercise on Prescription Schemes for South Asian Muslim women (81))	National survey of Health Authority districts in the UK with South Asian populations South Asian populations of at least 0.5% (national)	[Survey to identify Exercise on Prescription Schemes in 66 Health Authorities, 133 GPs and 58 leisure centres]	Number and description of Exercise on Prescription schemes.	Five schemes identified in which provision was made for South Asian Muslim women.	Fit for Purpose/Weak (+/-)
Prescription for Exercise (81)	Mixed South Asian population (West Pennine HA; initially in Oldham)	GP referral following practice nurse assessment. Open to 18+ years/ any condition; take up mostly people 50+ years, most > 65.	Impact of intervention & barriers to exercise (interviews women & coordinator)	Qualitative findings synthesised for 5 interventions Women mentioned increased energy levels & more motivation in all aspects of their life. Barriers to exercise were: no culture of exercise language religion (separation of sexes and maintaining dress code) age (older migrant cohort greater cultural differences) socio-economic status (cost including transport).	Weak (-) / Excluded
Bradford : Encouraging Exercising People (BEEP) (81)	Mixed South Asian population (initially Shipley area of Bradford)	Referrals made by dieticians, physiotherapists & diabetic clinics. Scheme aimed at disadvantaged groups, including ethnic minority groups	Impact of intervention & barriers to exercise (interviews women & coordinator)		Weak (-) / Excluded
Active for Life (81)	Ethnic minority groups 28% of city population. (Leicester City, Leicester HA)	GP, practice nurses, or self-referral via coordinator. Large South Asian population.	Impact of intervention & barriers to exercise (interviews women & coordinator)		Weak (-) / Excluded
Fitness for Life (81)	Multi-ethnic population (Blackburn, East Lancashire HA)	GP or practice nurse referral. 11% referrals are from ethnic minority groups	Impact of intervention & barriers to exercise (interviews women & coordinator)		Weak (-) / Excluded
Exercise on Prescription (81)	Multi-ethnic population 21% in city are non-white (Birmingham, Birmingham HA)	GP or practice nurse referral. Each leisure each centre has fitness officer dedicated specifically to these patients	Impact of intervention & barriers to exercise (interviews women & coordinator)		Weak (-) / Excluded

[1] See Annex 9 for details of quality grading.

Data Extraction Sheets: Intervention Projects (contd)

Short title (ref)	Target group (location)	Intervention description	Outcome(s) recorded	Findings reported	Quality[1]
West Midlands Food and Health Audit (82)	All PCTs (West Midlands)	Regional audit of projects commissioned or delivered by PCTs	Number food and health projects (also projects including physical activity) Response rate	17 PCTs responses (100%) 152 projects identified 1 focused on South Asian women 1 mentions S Asian population 1 mentions BME population Most PCTs focusing on obesity Children key target group Adult projects focus on weight management/ healthy eating education (via cooking & cooking skills)	Fit for Purpose/Weak (+/-) [Audit]
Feeling Good (82)	South Asian women aged 12-65 (Walsall, West Midlands)	Pogramme that includes physical activity and healthy eating sessions Counselling also available if required	Warwick Edinburgh Wellbeing Scale, a five a day questionnaire, body image questionnaire and general activity questionnaire Improve mental & physical wellbeing Recorded at 13-15 weeks depending on cycle of programme	Not reported	**N/A**
Specialist Obesity Service (82)	Adults BMI 40+ (37.5+ if Asian) or BMI 35+ (32.5+ if Asian) with co-morbidities (Heart of Birmingham & South Birmingham)	Weight management service for patients with BMI > 40. Devise a weight management strategy with the patient	Achieving weight loss. Activity reports 6 monthly	Not reported	**N/A**
Cookwell (82)	All residents (including ethnic minorities) (Sandwell PCT, West Midlands)	6 week cooking course aims to increase nutrition knowledge & empower people to make healthier food choices & increase confidence in cooking healthy meals	Increased confidence in cooking & more healthy diet (short questionnaire beginning & end of course). Food Interest Groups asked more detailed qualitative questions to inform future delivery	Not reported	**N/A**

[1] See Annex 9 for details of quality grading.

Data Extraction Sheets: Intervention Projects (contd)

Short title (ref)	Target group (location)	Intervention description	Outcome(s) recorded	Findings reported	Quality[1]
Ryan M. Community projects addressing risk factors for pre-diabetes in BME adults & lower socio-economic groups. (70)	Regional health and public health networks and other organisations	Email survey to identify projects relevant to prevention of risk factors associated with pre-diabetes in adults. Projects identified sent a questionnaire	Questionnaires returned by 32 projects. Fifteen projects were excluded as they did not meet the criteria e.g. not adults. Eight projects selected for more detailed case studies.	32 preventive studies selected. (8 mention South Asians & 1 mentions ethnic,) Most responses for projects targeting specific groups referred to South Asian communities.	Fit for Purpose/Weak (+/-) [Survey]
Apnee Sehat West Midlands (52)	South Asian Communities (Coventry & Leamington Spa)	A social enterprise providing health education sessions and screening in places of worship & community centres. Can provide culturally sensitive sessions for different South Asian Groups.	Qualitative evaluation; case study approach. Focus groups, individual semi-structured interviews and participant observations	Participants noted changes at the individual and household level. Posters delivering simple health messages well received.	Fit for Purpose/Weak (+/-)
Diabetes Community Champions (70)	People from Black, Asian and minority ethnic communities (London; run by Diabetes UK)	Community members trained to provide education sessions about diabetes risk factors/ prevention. Champions deliver sessions where community meets	No evaluation yet (hope to undertake)	Project just started	**N/A**
Early Identification Project (70)	People visiting mosques, community venues, pharmacies & other busy sites such as high streets. (Surrey; ; run by Diabetes UK)	Risk assessment sessions– some particularly targeting Black, Asian and Minority Ethnic groups. All visitors given lifestyle information. Publicity & information also sent to all GPs and pharmacies during same time period.	Project aims to raise awareness of risk factors for/symptoms of type 2 diabetes. Sessions aim to identify 'at risk' individuals & refer	Not complete. A roadshow undertook 244 risk assessments (60% scored moderate or high risk & referred to GP for further tests). Busy venues work better	Weak (-) / Excluded
Measure Up Roadshow (151)	General public (at risk & undiagnosed). Seeks to target harder to reach groups and Black, Asian and minority groups. (UK wide; run by Diabetes UK)	A mobile unit travels to busy venues– markets, high streets, community events and shows etc Risk assessment offered – quick questionnaire. General lifestyle information about preventing type 2 diabetes. Dieticians available to talk about how to reduce risk.	Number people risk assessed. No. Identified at moderate-high risk.	2009: 5,050 people risk assessed; 1,929 at moderate to high risk. 2010: 7,373 people risk assessed; 3,610 at moderate to high risk.	Weak (-) / Excluded

[1] See Annex 9 for details of quality grading.

Data Extraction Sheets: Intervention Projects (contd)

Short title (ref)	Target group (location)	Intervention description	Outcome(s) recorded	Findings reported	Quality[1]
SACHE Campaign – Diabetes (152)	South Asian community aged over 25 years (London)	Education & awareness raising sessions about diabetes, risk factors & prevention. Sessions: • use Bollywood style DVD • delivered in community languages • delivered in places of worship, workplaces & community centres.	Not being evaluated	Qualitative evaluation undertaken of similar project for vascular health. State that this project "was successful"	**N/A**
Saheli Women's Group and Saheli Adventure Group (153)	Asian women and girls (Birmingham)	Women only gym and fitness centre (social enterprise) – 95% of staff are local & have been trained by Saheli. Centre offers wide range of physical activity sessions – including healthy walks. Project for Asian girls to do adventurous activities Encourages women to become fitness instructors	Aims to provide culturally supportive services to promote engagement in physical activity. Birmingham University 2008 undertook a Social Return of Investment Evaluation.	Social Return of Investment Evaluation reported positive findings. (Currently being evaluated by Birmingham University Health Services Management Centre and Acton Shapiro Evaluators.)	Fit for Purpose (+)
Seek Diabetes Awareness Charity (70, 154)	Black and minority ethnic groups especially South Asian groups (East and West Midlands)	Community based charity set up to raise awareness of diabetes among BME community. Provides screening sessions & prevention/ lifestyle information in range of venues – places of worship, workplaces and community centres. Onward referral to GPs if appropriate.	Internal monitoring data of sessions and screening results and referrals	Not reported	**N/A**
Slimmers Kitchen (70, 155)	People living in 40% most deprived areas and with a BMI over 30 or 27.5 for people of Asian origin) (Dudley, West Midlands)	12 week programme of cooking healthy meals and physical activity. Aims to help participants make long term life style changes. Sets a 5% weight loss target. Runs tailored groups for men, women and BME communities.	Before and after weight loss and waist circumference measurements and dietary assessments.	Reports achieves positive results.	**N/A**

[1] See Annex 9 for details of quality grading.

Data Extraction Sheets: Intervention Projects (contd)

Short title (ref)	Target group (location)	Intervention description	Outcome(s) recorded	Findings reported	Quality[1]
Eat Well Project (156)	Residents in 11% most deprived areas of London. Local areas with 1,500 to 2000 residents (London)	Cook & Eat courses aim to enable & motivate community to eat more healthily; showcase community produced food; and celebrate different cultural/ ethnic cooking traditions. Part of Well London Programme	Well London Programme being evaluated overall. Cluster RCT with follow up surveys.	Project underway (ends March 2012)	Strong (++)

[1] See Annex 9 for details of quality grading.

ANNEX 9

Quality Grading: Intervention Studies

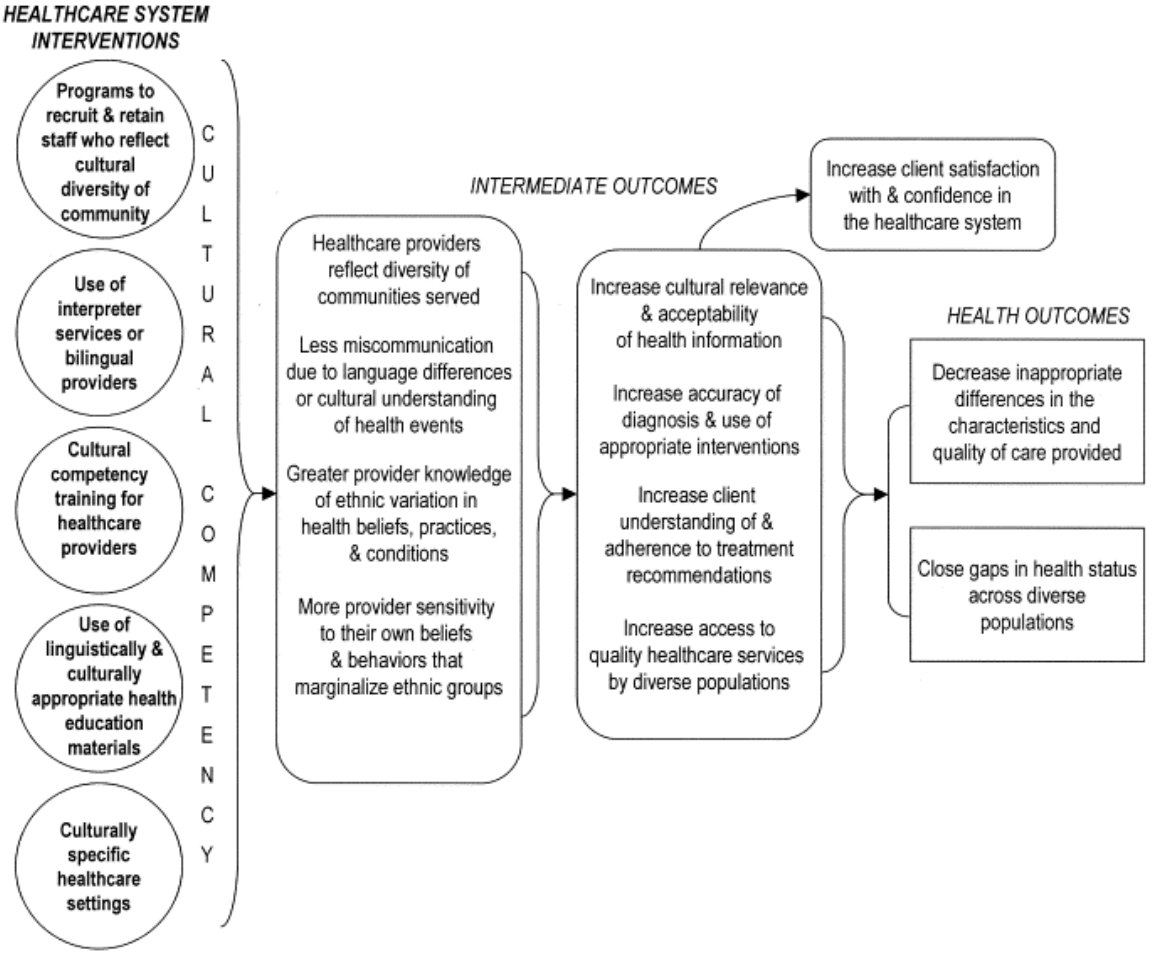
Modified from CRD Grading

CRD	CRD Description (CRD 2009)	Added Description (CEEHD 2010)	Level of Evidence (Quality Grading)
1	Experimental studies e.g. RCT		Strong (++)
2	Quasi-experimental study		Strong (++)
3a	Controlled Design: Cohort Studies		Strong (++)
3b	Controlled Design: Case Control Studies		Fit for Purpose (+)
4	Observational Studies (no controls)	Discussion of issues (review) based on multiple sources	Fit for Purpose/Weak (+/-)
5	Expert Opinion based on research or consensus	Discussion of issues (review) based on Experience	Fit for Purpose/Weak (+/-)
-		Descriptive or Demotic advice or argument	Weak (-) / Excluded
-		Potentially misleading – due to poor categorisation or reliance on stereotype	Excluded but may be noted.

Quality grading

++ = Strong
+ = Fit for Purpose
+/- = Fit for Purpose/ Weak
- = Weak

Figure 1: Analytic framework used to evaluate the effectiveness of healthcare system interventions to increase cultural competence



Source: (157)

REFERENCES

1. Specialist Collection for Ethnicity and Health. What Are Ethnic Groups? : NHS Evidence; 2010 [cited 2010 19 November]; Available from: http://www.library.nhs.uk/ethnicity/page.aspx?pagename=EH.
2. NICE. Public Health Draft Guidance. Type 2 diabetes: preventing pre-diabetes among adults in high risk groups. NICE guidelines; 2010 [cited 2011 9 April]; Available from: http://www.nice.org.uk/nicemedia/live/12067/51582/51582.pdf.
3. Welch V, Tugwell P, Petticrew M, de Montigny J, Ueffing E, Kristjansson B, et al. How effects on health equity are assessed in systematic reviews of interventions. Cochrane Database Syst Rev. 2010(12):MR000028.
4. Tugwell P, Petticrew M, Kristjansson E, Welch V, Ueffing E, Waters E, et al. Assessing equity in systematic reviews: realising the recommendations of the Commission on Social Determinants of Health. BMJ. 2010;341:c4739.
5. Salway S, Barley R, Allmark P, Gerrish K, Higginbottom G, Ellison G. Ethnic diversity and inequality: ethical and scientific rigour in social research. Joseph Rowntree Foundation, York, UK. 2011; Available from: http://www.jrf.org.uk/sites/files/jrf/ethnicity-social-policy-research-full.pdf.
6. Johnson M, Everson-Hock E, Jones R, Buckley Woods H, Baxter S, Goyder E, et al. Prevention of type 2 diabetes - Interventions to reduce risk factors for pre-diabetes among UK adults from black and minority ethnic groups. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51590.
7. NICE. Public Health Guidance 6. Behaviour change at population, community and individual levels. NICE guidelines; 2007 [cited 2011 9 May]; Available from: http://www.nice.org.uk/nicemedia/live/11868/37924/37924.doc
8. ONS. The Office of National Statistics. 2010; Available from: http://www.ons.gov.uk/about.
9. Fischbacher CM, Bhopal R, Steiner M, Morris AD, Chalmers J. Is there equity of service delivery and intermediate outcomes in South Asians with type 2 diabetes? Analysis of DARTS database and summary of UK publications. J Public Health (Oxf). 2009 Jun;31(2):239-49.
10. Hanif W. Type 2 diabetes and obesity in the south Asian population. NHS Evidence; 2008 [cited 2010 19 September]; Available from: http://www.library.nhs.uk/ethnicity/viewResource.aspx?resid=296344&code=a650e11a04575c7b1e6a1bb48671f39d.
11. Landman J, Cruickshank JK. A review of ethnicity, health and nutrition-related diseases in relation to migration in the United Kingdom. Public Health Nutr. 2001 Apr;4(2B):647-57.
12. Ramachandran A, Snehalatha C, Vijay V, Colagiuri S. Detecting undiagnosed diabetes in urban Asian Indians--role of opportunistic screening. J Assoc Physicians India. 2004 Jul;52:545-6.
13. Whincup PH, Nightingale CM, Owen CG, Rudnicka AR, Gibb I, McKay CM, et al. Early emergence of ethnic differences in type 2 diabetes precursors in the UK: the Child Heart and Health Study in England (CHASE Study). PLos Med. 2010;7(4):e1000263.
14. Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001 May 3;344(18):1343-50.

15. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med. 2002 Feb 7;346(6):393-403.
16. Ramachandran A, Snehalatha C, Mary S, Mukesh B, Bhaskar AD, Vijay V. The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). Diabetologia. 2006 Feb;49(2):289-97.
17. International Diabetes Federation B. Diabetes Atlas (2009). 2009 [cited 2010 18 October].
18. Kumar S. Diabetes and Ethnicity. NHS Evidence; 2007 [cited 2010 19 November]; Available from: http://www.library.nhs.uk/ethnicity/viewResource.aspx?resID=269934&code=9affbc666f4c4f792370742ac30e8750.
19. Khunti K, Walker N, Sattar N, Davies M. Unanswered questions over NHS health checks. BMJ 2011;342.
20. Netto G, Bhopal R, Lederle N, Khatoon J, Jackson A. How can health promotion interventions be adapted for minority ethnic communities? Five principles for guiding the development of behavioural interventions. Health Promot Int. 2010 Jun;25(2):248-57.
21. Lee S, Bacha F, Arslanian SA. Waist circumference, blood pressure, and lipid components of the metabolic syndrome. J Pediatr. 2006 Dec;149(6):809-16.
22. WHO. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004 Jan 10;363(9403):157-63.
23. Alberti KG, Zimmet P, Shaw J. Metabolic syndrome--a new world-wide definition. A Consensus Statement from the International Diabetes Federation. Diabet Med. 2006 May;23(5):469-80.
24. South Asian Health Foundation (SAHF). Position Statement on Diagnosis and Treatment of Obesity in British South Asians. 2010 [cited 2010 8 September]; Available from: http://www.sahf.org.uk/news.aspx?id=16
25. Misra A, Chowbey P, Makkar BM, Vikram NK, Wasir JS, Chadha D, et al. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. J Assoc Physicians India. 2009 Feb;57:163-70.
26. Zimmet P, Alberti KG, Kaufman F, Tajima N, Silink M, Arslanian S, et al. The metabolic syndrome in children and adolescents - an IDF consensus report. Pediatr Diabetes. 2007 Oct;8(5):299-306.
27. Lakhanpaul M, Bird D. Obesity and South Asian Children. NHS Evidence; 2009 [cited 2010 19 November]; Available from: http://www.library.nhs.uk/ETHNICITY/ViewResource.aspx?resID=327155&tabID=290.
28. Tedstone A. Expert Paper 4 - expert advice, dietary surveys and nutrition research. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51605.
29. Foster G, Taylor SJ, Eldridge SE, Ramsay J, Griffiths CJ. Self-management education programmes by lay leaders for people with chronic conditions. Cochrane Database Syst Rev. 2007(4):CD005108.
30. Duke SA, Colagiuri S, Colagiuri R. Individual patient education for people with type 2 diabetes mellitus. Cochrane Database Syst Rev. 2009(1):CD005268.
31. Hawthorne K. Effect of culturally appropriate health education on glycaemic control and knowledge of diabetes in British Pakistani women with type 2 diabetes mellitus. Health Educ Res. 2001 Jun;16(3):373-81.

32. Hawthorne K, Robles Y, Cannings-John R, Edwards AG. Culturally appropriate health education for Type 2 diabetes in ethnic minority groups: a systematic and narrative review of randomized controlled trials. Diabet Med. 2010 Jun;27(6):613-23.
33. Simmons D. Diabetes self help facilitated by local diabetes research: the Coventry Asian Diabetes Support Group. Diabet Med. 1992 Nov;9(9):866-9.
34. Hawthorne K, Robles Y, Cannings-John R, Edwards AG. Culturally appropriate health education for type 2 diabetes mellitus in ethnic minority groups. Cochrane Database Syst Rev. 2008(3):CD006424.
35. Vyas A, Haidery AZ, Wiles PG, Gill S, Roberts C, Cruickshank JK. A pilot randomized trial in primary care to investigate and improve knowledge, awareness and self-management among South Asians with diabetes in Manchester. Diabet Med. 2003 Dec;20(12):1022-6.
36. Jack L, Jr., Liburd L, Spencer T, Airhihenbuwa CO. Understanding the environmental issues in diabetes self-management education research: a reexamination of 8 studies in community-based settings. Ann Intern Med. 2004 Jun 1;140(11):964-71.
37. Bravis V, Hui E, Salih S, Mehar S, Hassanein M, Devendra D. Ramadan Education and Awareness in Diabetes (READ) programme for Muslims with Type 2 diabetes who fast during Ramadan. Diabet Med. 2010 Mar;27(3):327-31.
38. Khunti K, Camosso-Stefinovic J, Carey M, Davies MJ, Stone MA. Educational interventions for migrant South Asians with Type 2 diabetes: a systematic review. Diabet Med. 2008 Aug;25(8):985-92.
39. O'Hare JP, Raymond NT, Mughal S, Dodd L, Hanif W, Ahmad Y, et al. Evaluation of delivery of enhanced diabetes care to patients of South Asian ethnicity: the United Kingdom Asian Diabetes Study (UKADS). Diabet Med. 2004 Dec;21(12):1357-65.
40. Bellary S, O'Hare JP, Raymond NT, Gumber A, Mughal S, Szczepura A, et al. Enhanced diabetes care to patients of south Asian ethnic origin (the United Kingdom Asian Diabetes Study): a cluster randomised controlled trial. Lancet. 2008 May 24;371(9626):1769-76.
41. Petrou S. Personal Communication: Ethnic inequalities in health-related quality of life in patients with type 2 diabetes (UKADS). 2011.
42. Mathews G, Alexander J, Rahemtulla T, Bhopal R. Impact of a cardiovascular risk control project for South Asians (Khush Dil) on motivation, behaviour, obesity, blood pressure and lipids. J Public Health (Oxf). 2007 Dec;29(4):388-97.
43. Gillies CL, Abrams KR, Lambert PC, Cooper NJ, Sutton AJ, Hsu RT, et al. Pharmacological and lifestyle interventions to prevent or delay type 2 diabetes in people with impaired glucose tolerance: systematic review and meta-analysis. BMJ. 2007 Feb 10;334(7588):299.
44. Herman WH, Hoerger TJ, Brandle M, Hicks K, Sorensen S, Zhang P, et al. The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. Ann Intern Med. 2005 Mar 1;142(5):323-32.
45. Bush H WR, Sharma S, Cruikshank K, . Opportunities for and barriers to good nutritional health in minority ethnic groups.: HDA; 1997 [cited 2011 9 May]; Available from: http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=375
46. Department of Health. Healthy Weight, Healthy Lives: Consumer Insight Summary. 2008.
47. Aga Khan Health Board. Expert Paper 12 - Ismaili Nutrition Centre. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51597.

48. Choudhury SM, Brophy S, Williams R. Understanding and beliefs of diabetes in the UK Bangladeshi population. Diabet Med. 2009 Jun;26(6):636-40.
49. Netto G, McCloughan L, Bhatnagar A. Effective heart disease prevention: lessons from a qualitative study of user perspectives in Bangladeshi, Indian and Pakistani communities. Public Health. 2007 Mar;121(3):177-86.
50. Donin AS, Nightingale CM, Owen CG, Rudnicka AR, McNamara MC, Prynne CJ, et al. Nutritional composition of the diets of South Asian, black African-Caribbean and white European children in the United Kingdom: the Child Heart and Health Study in England (CHASE). Br J Nutr. 2010 Jul;104(2):276-85.
51. Wojcicki JM, Heyman MB. Let's Move--childhood obesity prevention from pregnancy and infancy onward. N Engl J Med. 2010 Apr 22;362(16):1457-9.
52. Apnee Sehat. Who we are - and why are we different. 2010 [cited 2010 13 November]; Available from: http://www.apneesehat.net/whoweare/index.html.
53. Netto G, Bhopal R, Khatoon J, Lederle N, Jackson A. Health promotion and prevention interventions in Pakistani, Chinese and Indian communities related to CVD and Cancer. A review of the published evidence in the UK, other parts of Europe and the United States. 2008 [cited 2011 20 April]; Available from: http://www.healthscotland.com/uploads/documents/8886-HealthPromotionAndPreventionInterventions20080801.pdf.
54. Fischbacher CM, Hunt S, Alexander L. How physically active are South Asians in the United Kingdom? A literature review. J Public Health (Oxf). 2004 Sep;26(3):250-8.
55. Owen CG, Nightingale CM, Rudnicka AR, Sattar N, Cook DG, Ekelund U, et al. Physical activity, obesity and cardiometabolic risk factors in 9- to 10-year-old UK children of white European, South Asian and black African-Caribbean origin: the Child Heart And health Study in England (CHASE). Diabetologia. 2010 Aug;53(8):1620-30.
56. Oude Luttikhuis H BL, Jansen H, Shrewsbury VA, O'Malley C. Interventions for treating obesity in children. Cochrane Database of Systematic Reviews. 2009;2009(1):CD001872.
57. Szczepura A, Johnson M, Gumber A, Jones K, Clay D, Shaw A. An Overview of the Research Evidence on Ethnicity and Communication in Healthcare.: University of Warwick, Coventry, UK2005.
58. Szczepura A. Nutrition in an ethnically diverse society - What are the key challenges? Proceedings of the Nutrition Society. 2011;70:252-62.
59. Atkinson M, Clark M, Clay D, Johnson M, Szczepura A. Systematic review of ethnicity and health service access for London.2001.
60. Patel A, Patel N, Gera M. Understanding Health Behaviour and Attitudes to Managing Diabetes in South Asian Community. South Asian Health Foundation Conference, 20102010.
61. Keval H. Cultural negotiations in health and illness: the experience of adult onset diabetes among Gujarati South Asians in England: Surrey Ph.D; 2008.
62. Audit Commission. Testing times: A review of diabetes services in England and Wales. 2000 [cited 2011 20 April]; Available from: http://www.audit-commission.gov.uk/nationalstudies/health/other/Pages/testingtimes_copy.aspx.
63. Khunti K, Kumar S, Brodie J, (Eds). Diabetes UK and South Asian Health Foundation recommendations on diabetes research priorities for British South Asians. 2009 [cited 2011 20 April]; Available from: http://www.diabetes.org.uk/Professionals/Publications-reports-and-resources/Reports-statistics-and-case-studies/Reports/Diabetes-UK-and-South-Asian-Health-Foundation-recommendations-on-diabetes-research-priorities-for-British-South-Asians/.

64. Diabetes UK. Toolkit to Support the Running of Diabetes Awareness Events for the South Asian Communities. 2006 [cited 2011 20 April]; Available from: http://www.diabetes.org.uk/Professionals/Shared_Practice/Care_Topics/Black_and_Minority_Ethnic_Communities/Toolkit_to_Support_the_Running_of_Diabetes_Awareness_Events_for_the_South_Asian_Communities/.
65. Diabetes UK. Diabetes Lifestyle. 2011 [cited 2011 20 April]; Available from: http://www.diabetes.org.uk/How_we_help/Magazines/Diabetes_lifestyle/.
66. Tozer R, Aubery L, Gill P, Jones C, Patel M, Zaid Q, et al. Developing cultural competence across communities: a coronary heart disease training programme for health advocates and trainers. Diversity in Health and Care 2010;7.
67. British Heart Foundation. South Asians and heart disease. 2011 [cited 2011 20 April]; Available from: http://www.bhf.org.uk/publications/south-asian-publications.aspx.
68. Johnson M, Everson-Hock E, Jones R, Buckley Woods H, Paisley S, Goyder E, et al. Prevention of type 2 diabetes - Interventions to raise awareness in health professionals and assist identification of high-risk groups. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51589.
69. Gillett M, Brennan A, Blake L, Goyder L, Buckley Woods H, Everson-Hock E, et al. Prevention of type 2 diabetes: preventing pre-diabetes among adults in high-risk groups. Report on Use of Evidence from Effectiveness Reviews and Cost-effectiveness Modelling: NICE Public Health Collaborating Centre, ScHARR, University of Sheffield2010.
70. Ryan M, David Leah Associates Ltd. Final report on community projects addressing risk factors for the development of pre-diabetes in adults from high risk groups. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51586.
71. Michie S. Expert Paper 9 - low income groups and behaviour change interventions. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51600.
72. Liu JJ, Davidson E, Bhopal R, Netto G, Johnson M, White M, et al. Modifying smoking cessation, physical activity and dietary interventions for south Asian, African-Caribbean and Chinese-origin populations: preliminary findings. Centre for Population Health Sciences Research Day, 2nd April 2010; University of Edinburgh2010.
73. Netto G. Expert Paper 10 - adapting health promotion interventions for BME communities. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51599.
74. Syed S. Expert Paper 5 - CPD and training, enabling professionals to practice effectively and confidently NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51604.
75. Jones R JM, Everson-Hock E, Buckley Woods H, Goyder E, Chilcott J, Payne N,. Interventions for the prevention of pre-diabetes in high-risk groups: examples of current practice in relation to the UK evidence base. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51588.
76. Modood T, Berthoud R, Lakey J, Nazroo J, Smith P, Virdee S, et al. Ethnic Minorities in Britain: Diversity and Disadvantage Policy Studies Institute, London1997.
77. Johnson M, Owen D, Blackburn C, Rehman H, Nazroo J. Black and Minority Ethnic Groups in England: The second health & lifestyles survey. : Health Education Authority, London. 2000.
78. Johnson M, Everson-Hock E, Jones R, Buckley Woods H, Baxter S, Goyder E, et al. Prevention of type 2 diabetes: Interventions to reduce risk factors for pre-diabetes among UK adults from a lower socioeconomic group. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51584.

79. O'Mara A M-GI, Parry W, Cooper C, Lorenc T,. Review of review-level evidence to inform the development of NICE public health guidance for the prevention of pre-diabetes among adults in high-risk groups. NICE, London.; 2010 [cited 2011 23 April]; Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=51587.
80. Fox C. Heart disease and South Asians : delivering the National Service Framework for coronary heart disease. Department of Health and British Heart Foundation,; 2004 [cited 2010 20 April]; Available from: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4098586.
81. Carroll R, Ali N, Azam N. Promoting physical activity in South Asian Muslim women through "exercise on prescription". Health Technol Assess. 2002;6(8):1-101.
82. Department of Health West Midlands. West Midlands Primary Care Trust Food and Health Audit April 2009 – March 2010 Department of Health West Midlands; 2010 [cited 2011 20 April]; Available from: http://www.obesitywm.org.uk/resources/Food_and_Health_Audit_2009_2010.pdf.
83. Marwa K. Example of good practice - Focus on Asians with Diabetes (FADS). 2004 [cited 2010 13 November]; Available from: http://virco-hosting.com/diabetes/site/goodpractice/ethnic/gp3.php.
84. Marwa K, Mughal S, Sunsoa H, R. B. Challenges of managing diabetes in Asians.(Practice) Journal of Diabetes Nursing 2004 February 1, 2004
85. Coe C, Reynold D. Evaluation of the Apnee Sehat 'Our Health' Project. Institute of Health, University of Warwick.2006.
86. Coe C, Boardman S. From temple to table: an innovative community health and lifestyle intervention aimed at a South Asian community. Ethnicity and Inequalities in Health and Social Care. 2008;1(2):44 - 51.
87. Department of Health. North Kirklees Primary Care Trust LEAP Project: Intervention 3 - To increase levels of physical activity with girls of South Asian origin. 2007; Available from: http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publichealth/Healthimprovement/Healthyliving/LocalExerciseActionPilotsLEAP/DH_4075454.
88. Carnegie Research Institute Leeds Met University. The national evaluation of LEAP: Final report on the national evaluation of the Local Exercise Action Pilots. 2007 [cited 2011 23 April]; Available from: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_073599.pdf.
89. Newcastle Primary Care Trust. Health improvement service for ethnic minorities (HISEM). 2011 [cited 2011 20 April]; Available from: http://www.newcastlepct.nhs.uk/services/community-health-services/health-development-and-improvement/health-development-service/health-development-service.
90. Lewthwaite J, Pilkington J. A prescription for exercise. A report of a pilot study to prescribe exercise as part of a district coronary heart disease prevention strategy. [unpublished report]. Oldham: West Pennine Health Authority.1995.
91. Bradford Health Authority. BEEP evaluation report 1997–1998. Bradford: Bradford Health Authority.1998.
92. Sahrif S. Active for life. Guidelines promoting physical activity with black and minority ethnic groups. London: Health Education Authority.1997.
93. Blackburn Council. Fitness for life: annual report, 1998/99. Blackburn: Blackburn with Darwen Borough Council.1999.
94. Birmingham Health Authority. Birmingham's health improvement programme – source document. Birmingham.1999.

95. Johnson M (Personal Communication). Document 5: Investigators' Group Meeting 26 January 2011 [Modifying health promotion interventions to meet the needs of ethnic minority groups (MRC 07/63/03)]. 2011.
96. Rosengard A, Laing I, Ridley J, S. H. A Literature Review on Multiple and Complex Needs. 2007 [cited 2011 23 April]; Available from: http://www.scotland.gov.uk/Resource/Doc/163153/0044343.pdf.
97. Department of Health. CASE STUDY. Mapping pinpoints diabetes in Slough. 2010 [cited 2011 23 April]; Available from: http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/Browsable/DH_5685544.
98. Gray LJ, Tringham JR, Davies MJ, Webb DR, Jarvis J, Skinner TC, et al. Screening for type 2 diabetes in a multiethnic setting using known risk factors to identify those at high risk: a cross-sectional study. Vasc Health Risk Manag. 2010;6:837-42.
99. Thomas S. Working with South Asian Taxi Drivers to prevent CHD Champions for Achieving Better Health in Sheffield (CABS). CIDT, University of Wolverhampton,; 2009 [cited 2010 20 April]; Available from: http://www.sheffield.nhs.uk/equality/resources/pacesetter_cabsproject1009.pdf.
100. Marmot M. Fair Society, Healthy Lives: A Strategic Review of Health Inequalities in England Post-2010 2010; Available from: http://www.marmotreview.org/.
101. Tringham JR. Strategies for the early detection of type 2 diabetes in an at risk population: Leicester M.D; 2006.
102. Hanif W. Risk factors for diabetes and cardiovascular disease and its management in South Asians.: Birmingham M.D 2007.
103. Krishnan N, Varman M, Roberts M. Diabetes control: role of health education and other factors: a study in a newspaper industry. Indian Journal of Occupational and Environmental Medicine. 2004;8(2):29-33.
104. Nishtar S, Zoka N, Nishtar SS, Khan SY, Jehan S, Mirza YA. Posters as a tool for disseminating health related information in a developing country: a pilot experience. J Pak Med Assoc. 2004 Sep;54(9):456-60.
105. Olendzki B, Speed C, Domino FJ. Nutritional assessment and counseling for prevention and treatment of cardiovascular disease. IJCP. 2006;16(12):60-7.
106. Reddy BBO, Jayalakshmi R, Chettri M, Krishnaswami CV, Vijayakumar G, Chellamariappan M, et al. "Mass media communication" as a tool for effective diabetes awareness and its prevention at Chennai. Indian Practitioner. 1998;51(1):11-8.
107. Rafique G, Khuwaja AK. Diabetes and hypertension: public awareness and lifestyle - findings of a health mela. J Coll Physicians Surg Pak. 2003 Dec;13(12):679-83.
108. Pingle SR, Deshpande AK, Malik JS. Impact of intervention strategies for risk factor modification. Indian Journal of Occupational and Environmental Medicine. 2001;5(2):91-5.
109. NIHR Health Technology Assessment Programme. Non-pharmacological interventions to reduce the risk of diabetes in people with impaired glucose regulation: systematic review and economic evaluation 2011 [cited 2011 20 April]; Available from: http://www.hta.ac.uk/project/1541.asp
110. NIHR Health Technology Assessment Programme. Modifying health promotion interventions to meet the needs of ethnic minority groups. 2011 [cited 2011 20 April]; Available from: http://www.hta.ac.uk/project/1745.asp.
111. PODOSA. PODOSA: Prevention of Diabetes and Obesity in South Asians. 2011 [cited 2011 20 April]; Available from: http://www.podosa.org/faq.html#third.
112. UK Clinical Research Network Study Portfolio. BANGLADIP - Diabetes prevention in people from Bangladesh: A pilot trial in East London 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4456.

113. UK Clinical Research Network Study Portfolio. BANGLADIP Qualitative Study - Diabetes prevention in people from Bangladesh; a pilot study in East London (BANGLADIP)- An extended arm of the study. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=8362.
114. DESMOND. PREVENT - A pilot study to test a community based primary prevention programme for Type 2 Diabetes integrating identification, lifestyle intervention and community services for prevention. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4375.
115. DESMOND. Let's Prevent - A major new study looking at the prevention of Type 2 diabetes 2011 [cited 2011 20 April]; Available from: http://www.desmond-project.org.uk/279.html.
116. DESMOND. DESMOND Ongoing – A cluster randomised control trial. 2011 [cited 2011 20 April]; Available from: http://www.desmond-project.org.uk/280.html.
117. NIHR Health Technology Assessment Programme. A cluster randomised controlled trial of the effectiveness and cost-effectiveness of an obesity prevention intervention in primary school age children 2011 [cited 2011 20 April]; Available from: http://www.hta.ac.uk/project/1725.asp
118. NIHR Health Technology Assessment Programme. A randomised controlled trial and cost-effectiveness evaluation of "booster" interventions to sustain increases in physical activity in middle-aged adults in deprived urban neighbourhoods. 2011 [cited 2011 20 April]; Available from: http://www.hta.ac.uk/project/1758.asp
119. UK Clinical Research Network Study Portfolio. Anglo-Danish-Dutch study of Intensive Treatment of people with newly diagnosed diabetes in Primary Care (ADDITION) - 5 year follow up. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=5104.
120. Echouffo-Tcheugui JB, Simmons RK, Williams KM, Barling RS, Prevost AT, Kinmonth AL, et al. The ADDITION-Cambridge trial protocol: a cluster -- randomised controlled trial of screening for type 2 diabetes and intensive treatment for screen-detected patients. BMC Public Health. 2009;9:136.
121. Webb DR, Khunti K, Srinivasan B, Gray LJ, Taub N, Campbell S, et al. Rationale and design of the ADDITION-Leicester study, a systematic screening programme and randomised controlled trial of multi-factorial cardiovascular risk intervention in people with type 2 diabetes mellitus detected by screening. Trials. 2010;11:16.
122. Gaede P. "EDEG-PCRD Symposium: The effectiveness of early intensive multifactorial therapy in type 2 diabetes" EASD meeting September 2010. 2010 [cited 2011 20 April]; Available from: http://www.abstractsonline.com/Plan/ViewSession.aspx?sKey=80ec9c86-cf28-4239-99bd-7b13ad551802&mKey=%7b10A86782-07E4-4A2D-9100-F660E5D752A9%7d.
123. Lauritzen T. "EDEG-PCRD Symposium: The origins and design of the ADDITION study" EASD meeting September 2010. 2010 [cited 2011 20 April]; Available from: http://www.abstractsonline.com/Plan/ViewSession.aspx?sKey=80ec9c86-cf28-4239-99bd-7b13ad551802&mKey=%7b10A86782-07E4-4A2D-9100-F660E5D752A9%7d.
124. Griffin SJ. "EDEG-PCRD Symposium: The results of the ADDITION study" EASD meeting September 2010. 2010 [cited 2011 20 April]; Available from: http://www.abstractsonline.com/Plan/ViewSession.aspx?sKey=80ec9c86-cf28-4239-99bd-7b13ad551802&mKey=%7b10A86782-07E4-4A2D-9100-F660E5D752A9%7d.
125. Herman WH. "EDEG-PCRD Symposium: Implications of the ADDITION study for the early treatment of diabetes and screening" EASD meeting September 2010. 2010 [cited 2011 20 April]; Available from:

http://www.abstractsonline.com/Plan/ViewSession.aspx?sKey=80ec9c86-cf28-4239-99bd-7b13ad551802&mKey=%7b10A86782-07E4-4A2D-9100-F660E5D752A9%7d.
126. UK Clinical Research Network Study Portfolio. Evaluation of the benefits and costs (psychological and economic) of screening for type 2 diabetes at the population level. A sub-study of ADDITION. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=5162.
127. Eborall HC, Griffin SJ, Prevost AT, Kinmonth AL, French DP, Sutton S. Psychological impact of screening for type 2 diabetes: controlled trial and comparative study embedded in the ADDITION (Cambridge) randomised controlled trial. BMJ. 2007 Sep 8;335(7618):486.
128. UK Clinical Research Network Study Portfolio. Vitamin D Supplementation in People at Risk of Type 2 Diabetes. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=7732.
129. UK Clinical Research Network Study Portfolio. DALI Group Interviews Study: Developing a programme for optimal adherence to lifestyle and dietary interventions for the prevention of gestational diabetes mellitus: a group interview study. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=8959.
130. Leeds Institute of Health Sciences. Born in Bradford NHS Research Programme: Development and evaluation of interventions for the prevention of childhood obesity in a multi-ethnic population. 2011 [cited 2011 20 April]; Available from: http://www.leeds.ac.uk/hsphr/psychiatry/research/childobesity.html.
131. CHASE. CHASE (Child Heart and Health Study in England). Publications. 2011 [cited 2011 20 April]; Available from: http://www.chasestudy.ac.uk/publications.
132. MRC. Understanding Health Promotion, Prevention, and the Treatment of Diabetes and Cardiovascular Disease in Kerala, India. 2011 [cited 2011 20 April]; Available from: http://www.mrc.ac.uk/ResearchPortfolio/Grant/Record.htm?GrantRef=G0802703&CaseId=14352
133. UK Clinical Research Network Study Portfolio. ProActive: Follow-up study. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4869.
134. UK Clinical Research Network Study Portfolio. Diabetes Prevention Programme: Screening Cohort - Screening for the Diabetes Prevention Programme in a UK community setting. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=9059.
135. UK Clinical Research Network Study Portfolio. Diabetes Prevention Programme: UEA-IFG Study - Delivering the Diabetes Prevention Programme in a UK community setting. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4832.
136. UK Clinical Research Network Study Portfolio. Norfolk DPS Screening Cohort - Delivering a Realistic Diabetes Prevention Programme in a UK Community Norfolk DPS Screening Cohort. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=10198.
137. Eastern Diabetes Research Network. Eastern DRN Newsletter. 2011 [cited 2011 20 April]; Available from: http://www.ukdrn.org/eastern/newsletters/EDLRN_NL_Issue%201_Jan09.pdf.
138. UK Clinical Research Network Study Portfolio. DIPMAB - Diabetes in Pregnancy - a Study of Mothers and Babies. 2011 [cited 2011 20 April]; Available from: http://public.ukcrn.org.uk/search/StudyDetail.aspx?StudyID=4444.

139. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care. 2004 May;27(5):1047-53.
140. metaRegister of Controlled Trials (mRCT). Effectiveness Study of Community-Based, Peer-Led Education on Weight Loss and Diabetes. 2011 [cited 2011 20 April]; Available from: http://www.controlled-trials.com/mrct/trial/703659/pre-diabetes+AND+ethnic.
141. metaRegister of Controlled Trials (mRCT). Evaluation of Lifestyle Interventions to Treat Elevated Cardiometabolic Risk in Primary Care. 2011 [cited 2011 20 April]; Available from: http://www.controlled-trials.com/mrct/trial/490235/pre-diabetes+AND+ethnic.
142. metaRegister of Controlled Trials (mRCT). Integrating Lifestyle Therapy for Diabetes Prevention Into Primary Care. 2011 [cited 2011 20 April]; Available from: http://www.controlled-trials.com/mrct/trial/493065/pre-diabetes+AND+ethnic.
143. All Parliamentary Group for Diabetes and Diabetes UK. Diabetes and the disadvantaged: reducing health inequalities in the UK. World Diabetes Day 14 November 2006. 2006 [cited 2011 20 April]; Available from: http://www.diabetes.org.uk/Professionals/Publications-reports-and-resources/Reports-statistics-and-case-studies/Reports/Diabetes_and_the_disadvantaged/.
144. Beishon S NJ. Coronary heart disease: Contrasting the health beliefs and behaviours of South Asian communities. Diabetes UK; 1997 [cited 2011 9 May]; Available from: http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=182
145. White M, Carlin L, Rankin J, Adamson A. Effectiveness of interventions to promote healthy eating in people from minority ethnic groups: A review. HDA; 1998 [cited 2011 9 May]; Available from: http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=310
146. Sahrif S. Active for life: Promoting physical activity with black and minority ethnic groups (guidelines). HDA; 1999 [cited 2011 9 May]; Available from: http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp?o=375
147. Cronberg A, Munro Wild H, Fitzpatrick J, Jacobson B. Causes of childhood obesity in London: diversity or poverty? The effect of deprivation on childhood obesity levels among ethnic groups in London London Health Observatory; 2010 [cited 2011 9 May]; Available from: http://www.lho.org.uk/viewResource.aspx?id=16724.
148. London Health Observatory. Choosing health. A briefing on nutrition, physical activity and obesity in London.: London Health Observatory; 2005 [cited 2011 9 May]; Available from: http://www.lho.org.uk/viewResource.aspx?id=9044
149. NICE. Public Health Guidance 25. Prevention of cardiovascular disease at population level. NICE guidelines; 2010 [cited 2011 9 May]; Available from: http://www.nice.org.uk/nicemedia/live/13024/49275/49275.doc
150. Capewell S. Cardiovascular disease prevention in populations and effects on health inequalities. (Expert paper for NICE Public Health Guidance 25). NICE PDG; 2010 [cited 2011 9 May]; Available from: http://www.nice.org.uk/nicemedia/live/13024/49275/49275.doc
151. Diabetes UK. Measure Up Roadshow. 2011 [cited 2011 20 April]; Available from: http://www.diabetes.org.uk/Riskscore/.
152. South Asian Health Foundation (SAHF). SACHE Campaign. 2011 [cited 2011 20 April]; Available from: http://www.bhf.org.uk/CVC/members_pages/south-asian_health_foundation.htm.

153. Saheli. Saheli Womens Group. 2011 [cited 2011 20 April]; Available from: http://saheli.co.uk/about/.
154. Seek Diabetes Awareness Ltd. Seek Diabetes Awareness: About Us. 2011 [cited 2011 20 April]; Available from: http://www.seekdiabetes.org/about.
155. Dudley PCT. Slimmers Kitchen. 2011 [cited 2011 20 April]; Available from: www.nhsdudley.nhs.uk/WeightManagement.
156. Well London Project. Eatwell. 2011 [cited 2011 20 April]; Available from: http://www.london.gov.uk/welllondon/projects/eatwell/.
157. Anderson LM, Scrimshaw SC, Fullilove MT, Fielding JE, Normand J. Culturally competent healthcare systems. A systematic review. Am J Prev Med. 2003 Apr;24(3 Suppl):68-79.