

Medicinal perceptions of vegetables traditionally consumed by South-Asian migrants living in Bradford, Northern England

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Abstract

Dietary habits change rapidly amongst migrant communities in Western countries, and these changes can cause major concerns for public-health policymakers because they frequently lead to increases in diet-related diseases like diabetes. Such is the case in most South-Asian communities in the UK. In this study, we carried out an ethnobiological survey of the vegetables traditionally consumed among the Indian and Pakistani communities of Bradford, in Western Yorkshire, UK. Our purpose was to analyse in depth details of the traditional culinary use of vegetables within these households, and to assess the health perceptions of them.

Semi-structured interviews with a total of 150 South-Asian women were carried out. Twenty-five vegetables were recorded, as well as their traditional culinary use and their frequency of use. We found that a few of these vegetables, particularly those presenting bitter or aromatic tastes, were perceived to have remarkable medicinal value particularly against diabetes. Our study also found important generational differences in the women's knowledge of the culinary processes related to these foods, confirming that the consumption of traditional vegetables is inextricably embedded in cultural heritage and the representation of identity among migrants.

Our findings may offer evidence of a link between the choice of food and the foods' perceived medicinal value among South-Asian migrants. It may also provide important information for health care professionals when designing strategies for improving health care counteracting type 2 diabetes. We strongly believe such strategies should take into account socio-cultural components and *emic* health beliefs, as well as patients' views of traditional dietary ingredients.

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1. Introduction

It is generally agreed that South-Asian migrants living in Western countries are at high risk of developing type 2 diabetes mellitus (Abate and Chandalia, 2001). Venkataraman et al. (2004), for example, have recently exposed a high prevalence of diabetes mellitus and related conditions in Asian Indians living in the United States. Using a community-based survey on more than one thousand Asian-Indian migrants living in and around the metropolitan area of Atlanta, Georgia, they found an overall prevalence of diabetes mellitus of 18.3%, which is much higher than in Whites, Blacks and Hispanics living in the United States.

According to a recent estimate, by 2036 the number of patients affected by type 2 diabetes among the overall British population will rise by at least 20% (Bagust et al., 2002). If this is the case, the disease will become one of the NHS's most crucial challenges, because type 2 diabetes is already four times more common among British South-Asians than among the general population (Mather and Keen, 1985; Scotland, 2004).

A possible explanation for this phenomenon is related to the metabolic impact of the westernised diet (environmental hypothesis) (Heald et al., 2006; McKeigue et al., 1988) on South-Asians, and consequently to the cultural change and adaptation in the dietary habits that this group has had to face after displacement and migration.

Other studies have underlined that the level of physical activity among South-Asians is lower than in the general population, and that may also contribute to their increased risk of diabetes (Fischbacher et al., 2004; Hayes et al., 2002).

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On the other hand, several scholars have emphasised that the high prevalence of type 2 diabetes among all ethnic groups (including Europeans) could be related to relative poverty, inactivity and obesity (Riste et al., 2001), and suggest that the permanence of distinct social classes may strongly affect patterns of health (Williams et al., 1998). Nevertheless, the issue of diabetes among South-Asians is surely a central one for public health in the UK, and, at present, public-health policies are concentrated on improving the efficacy of prevention and the understanding of the socio-cultural backgrounds of this phenomenon within ethnic minorities, as well as the ‘internal strategies’ that these communities put in place to counteract it. On this latter aspect, we would suggest that there could be a strong need for more sensitive socio-medical research.

A recent study (Lawton et al., 2005) has shown, for example, that British Pakistani and British Indian patients in Edinburgh are making deliberate efforts to reduce their intake of oral hypoglycaemic agents (OHAs) without being advised to do so. Reasons for this include perceptions that the drugs work by providing relief of symptoms rather than cures, and concerns that OHAs could be detrimental to health if taken for long periods, in conjunction with other drugs, or without traditional foods, like curries and chapattis, as these foods are perceived as having strengthening and fortifying properties that balance the side-effects of the OHAs.

South-Asians, and in particular the Pakistani community in Bradford, represent one of the largest migrant communities in the UK. Most of the South-Asian migrant community in Bradford originally came from the northern Mirpur area of Pakistan in the 1950s and 1960s (Rees et al., 1995). The 1991 Census indicates that Bradford’s South-Asian population numbered about 65,450, making up 14% of the city’s total population. At that time Bradford had the second highest concentration of people of Pakistani origin in Britain. The latest estimates indicate that the South-Asian population has grown considerably over the last decade to 94,250 and that this population now represents about 19% of the total population of Bradford (Phillips, 2001).

Jamal (1998) has studied how food is perceived among second-generation British-Pakistanis in Bradford, and has found that while first-generation migrants perceive their own food as being traditional and tasty (but problematic for health), they perceive English food as being foreign and bland (and paradoxically more healthy). Jamal also found that younger generations of British-Pakistani increasingly consume English foods. Other studies, however, have pointed out that inter-generational differences in the diets of first- and second-generation Pakistani Muslims in Bradford are minimal (Parsons et al., 1998). Recent research carried out on Asian migrants in Bradford has shown a rising incidence in childhood diabetes (Feltbower et al., 2002). Problems for the Bangladeshi community in accessing diabetes services in Bradford have already been well analysed (Rhodes et al., 2003); however, other authors have showed that there is huge resistance to slimming and healthy diets among these communities (Bush et al., 2001). It is therefore essential to fully understand the *emic* perception of health and well-being related to traditional diets and medicines among South-Asians, because accurate estimations of their perceptions of the medicinal properties

of traditional food ingredients and various different dishes could enable general practitioners and other health-care professionals to provide better care and advice to the Pakistani migrants living in UK and in Western countries generally (Fagerli et al., 2005).

It is well known in the ethnoscience that many plants and foods have been and continue to be ingested because of their *perceived* medicinal and health-benefiting characteristics (Pieroni, 2000, 2001; Pieroni et al., 2005b). Nevertheless, very little research has been carried out in urban Western societies with the purpose of analysing the grey area between food and medicine, and so far almost no research in this area has been conducted in relation to migration phenomena. Instead, most studies have focused on the use of traditional medicines among migrants (Balick et al., 2000; Reiff et al., 2003; Waldstein, 2006), or on food plants uses and migrants’ cuisine (Jonsson et al., 2002a,b; Burnes, 2004; Ray, 2004; Mellin-Olsen and Wandel, 2005), or on more general ethnobotanical issues (Nesheim et al., 2006).

So far there has been only a few studies that have addressed the issue of the perceived overlap between food and medicine among migrants in Europe (Pieroni et al., 2005a; Sandhu and Heinrich, 2005; Ceuterick et al., 2007; Pieroni and Torry, 2007), even though such knowledge could be crucial to a better understanding of the strategies migrants put in place to maintain their health, prevent illness, and perhaps even manage chronic diseases.

Similarly, a better understanding of the health perceptions and beliefs related to the consumption of traditional plant-based foods within South-Asian migrant communities could be very important in improving the implementation of public-health programmes aimed at preventing diabetes and also offering help to those migrant households that have members affected by the disease. A recent survey (Povlsen et al., 2005) has suggested that public-health projects should involve ethnic minorities as active participants in the development of appropriate educational programs and material. Hence, studies aimed at understanding health and dietary practices and beliefs among migrant communities represent an important starting point for providing timely inputs for improving such policies.

Accordingly, the aims of this study have been:

- to record the culinary use, the frequency of use and the preference for traditional vegetables among the South-Asian community of the Bradford area;
- to determine the perception of taste and the (eventual) medicinal value that migrant women ascribe to these vegetables;
- to briefly discuss eventual implications of this study for public-health policies and dietary and health counselling directed specifically at South-Asian migrants in the UK.

2. Methods

Fieldwork was conducted over a period of 10 weeks from March to May 2005 in local Asian greengrocers in Bradford, where first-generation and second-generation Pakistani and Indian women customers were approached in the morning hours, and asked a few questions using a simple questionnaire and brief semi-structured interviews. Most of the participants were elderly

($n = 93/150$ over 60 years old), female ($n = 140/150$), and first-generation ($n = 124/150$) migrants. Most of the informants were unable to communicate in fluent English, so all the interviews were carried out in Urdu or Punjabi by the authors NA, BH, and SA.

Nineteen interviewees agreed to be visited and interviewed in more depth at home. In-depth interviews were tape recorded, and later transcribed and translated into English.

Prior Informed Consent (PIC) was obtained verbally before commencing each interview. Ethical approval was granted by the University of Bradford Ethics Committee. Ethical guidelines adopted by the American Anthropological Association (AAA, 1998) were rigorously followed.

Questions about the use of various food plants were asked using classical means of ethnobotanical analysis (Alexiades and Sheldon, 1996; Cotton, 1996; Martin, 2004; Berlin and Berlin, 2005).

Participants were asked at the beginning of the semi-structured interviews to free-list traditional vegetables they use in their daily cuisine. In the context of this study, we have defined as “traditional” those ingredients that the interviewees knew and/or had been used in their country of origin. For each named item, we asked for exact details of how the food is prepared, its frequency of use, taste, perceived healthiness, (eventual) medicinal properties, and the (eventual) presence of food taboos. In determining the vegetables’ perceived healthiness, we used the following scale, which the main author (AP) had already developed in a previous ethnobiological study (Pieroni, 2001):

- 1: no recognised health value;
- 2: middle-low health value (“that food is healthy”);
- 3: middle-high health value (“that food is very healthy”);
- 4: high health value (“that food is almost like a medicine”);
- 5: very high health value (“that food is a medicine!”).

We deliberately avoided asking specifically and directly about “medicinal foods”, in order to limit bias.

One hundred and fifty women informants were interviewed in total, 55% ($n = 82/150$) of whom were Indian and 45% ($n = 68/150$) were Pakistani. Each named plant item was collected, photographed, identified, dried, and deposited at the Herbarium of the Laboratory of Pharmacognosy at the University of Bradford (PSGB). Botanical nomenclature followed the rules of Mansfeld’s World Database of Agricultural and Horticultural Crops (IPK, 2005).

Some of the informants quoted spices; these data were however not analysed, as the focus of the research was to investigate vegetables; moreover, the perceived medicinal properties of many traditional spices used in the cuisine of the South-Asian sub-continent are already very well known in both ethnobotany and phytopharmacology.

When recording the participants’ perceptions of the medicinal properties of the vegetables, the original *emic* descriptions and definitions were retained in order to avoid translating them into bio-medical Western concepts. Information regarding the main issues addressed during the interviews was analysed and elaborated using ANTHROPAC (Borgatti, 1992).

3. Results

Table 1 reports all the recorded vegetables, together with the vernacular names they are known by among migrant communities in Bradford, their botanical Latin names, the parts of the plant that are used in the kitchen, their most common culinary preparations – as quoted by at least five informants, and the frequency of their consumption (based on the average of the quotes given by all the informants). Most of the recorded vegetables are consumed fresh or cooked with vegetable oil and in the presence of a variety of different spices. Many of the youngest informants were unable to describe in detail the culinary processes used for each named taxa, suggesting that their traditional knowledge of vegetables is mainly passive.

These data show clearly that traditional knowledge (TK) related to culinary uses of vegetables among South-Asian migrants is quite sophisticated; for each given vegetable it was possible to trace a specific preferred culinary preparation. Also, no significant differences were detected among the culinary practices of British Pakistani and British Indian women, except for the Indian women’s slight preference for pickling fragrant manjack fruits (*Cordia dichotoma*, Boraginaceae).

Table 2 reports the most-quoted vegetables. No significant differences were found between the data provided by the British Pakistani and the British Indian women. Similarly, no qualitative differences regarding the kind of quoted vegetables were found among different generations of interviewed women. Bitter melon (karela, *Momordica charantia*) and okra (bhindi, *Hibiscus esculentus*) represented the most cited vegetables by nearly the half of the interviewees. The prevalence of these two vegetables is not surprising since their culinary use is very popular and widespread throughout the South-Asian sub-continent (van Wyk, 2005).

Table 3 documents the perceived taste and the medicinal properties of the selected vegetables. Most of the quoted plants have been defined as having either a “soft, bland or a sweet” taste, while only five vegetables were perceived as having a “bitter” taste. Two vegetables were described as having an “aniseed-like taste”. This perception was categorized with a unique cognitive/linguistic label.

Fig. 1 shows the different medicinal properties attributed to the quoted vegetables. Most of the plants are thought to have anti-diabetic properties or to aid digestion. A discrete portion of the vegetables is simply considered to be “healthy”, or good for strengthening the body, or suitable as a tonic. Others are reputed to be “good for the blood”. The frequent citation of presumed anti-diabetic properties of a few vegetables (especially bitter melon) suggests that South-Asian women are well aware of the health problems in their households, and perhaps adopt their own strategies for preventing or counteracting diabetes. These strategies may be very different from those followed by Western bio-medical schools, or even by the South-Asian traditional practitioners, who are also widespread in the area.

Fig. 2 illustrates the correspondence among the recorded perceived healthiness, the number of medicinal claims, and the perceived taste of the recorded South-Asian vegetables. As can be seen, vegetables perceived as bitter are mostly considered

Table 1
Traditional vegetables consumed by South-Asian migrants in Bradford

Botanical name and family	English name	Recorded "folk" name	Plant part(s) used	Traditional culinary preparation(s)	Frequency of consumption
<i>Anethum sowa</i> Roxb. ex Flem. (Apiaceae)	Indian dill	Soyah	Aerial parts	The aerial parts are chopped and added to spinach and fenugreek leaves, fried garlic, chillies and turmeric	b
<i>Asparagus racemosus</i> Willd. (Liliaceae)	Indian asparagus/Shatavari	Garmar	Roots	The roots can be peeled and eaten raw, or they can be washed and peeled, cut into strips and placed in an airtight container along with washed lemons and limes, sliced carrots, salt, cumin. The mixture is then covered with mustard oil, and stored for at least a month before eating	c
<i>Brassica juncea</i> (L.) Czern. (Brassicaceae)	Indian mustard	Sarson ka sag (sag)	Leaves	The leaves are chopped, and then boiled in water with green chillies for a few hours. At the end of the cooking time, chopped ginger and garlic, previously fried in oil, are added together with fresh coriander leaves	b
<i>Brassica rapa</i> L. var. <i>rapa</i> (Brassicaceae)	Turnip	Shalgum	Roots	Onion, garlic and ginger are fried in sunflower oil, spices are added and then the meat. Once the meat is tender, the peeled and chopped turnips are added. The mixture is then cooked on low heat	b
<i>Carica papaya</i> L. (Caricaceae)	Papaya	Papita	Fruit	The fruit is cut in half and the seeds are removed, then it is cooked in oil for one hour with onions and spices	a
<i>Cicer arietinum</i> L. (Leguminosae)	Chickpea	Katchay/Channay	Fruit and seeds	The fresh chickpeas are removed from the pods and fried with onions, garlic and spices. Water can be added to make a soup, or the peas can be eaten with chapattis. They can also be eaten with potatoes or meat, or added to salads after being boiled. Entire chickpea pods can be fried or roasted in the oven	c
<i>Coccinea grandis</i> (L.) Voigt (Cucurbitaceae)	Ivy gourd	Tandoori gilora	Unripe (green) fruit	The fruit is peeled and chopped, and fried in oil with garlic and ginger paste, and sometimes tomatoes and spices. The mixture is often served with yoghurt	a
<i>Colocasia esculenta</i> (L.) Schott. (Araceae)	Elephant's ear	Patra	Leaves	The leaves are washed and left to dry, then chickpeas paste is spread on the leaves and they are rolled up, sliced, and deep fried in oil	c
<i>Colocasia esculenta</i> (L.) Schott. (Araceae)	Taro	Arvi	Roots	The arvi is peeled, washed and diced, and fried in oil along with onions and garlic, various spices, and/or other vegetables or meat. They can also be peeled and sliced and deep-fried as chips	b
<i>Cordia dichotoma</i> G. Forst. (Boraginaceae)	Fragrant manjack	Lasoor	Fruit	Lasooras are cut in half, the seeds are removed, and the fruit is washed to remove the stickiness. Then they are boiled and pickled in oil with spices. They are stored in jars with whole chillies and green lemon/lime segments	a
<i>Cucurbita maxima</i> Duch. ex Lam. (Cucurbitaceae)	Pumpkin	Kadoo	Fruit	The kadoo is peeled, chopped into little pieces and fried with onions, garlic and spices. Lentils that have been previously been boiled can also be added	b
<i>Cyamopsis tetranogloba</i> (L.) Taub. (Fabaceae)	Cluster bean	Guar/Gavar	Fruit (pods)	The beans are chopped and cooked with onions and garlic in oil. Often tomatoes and turmeric or sugar and peas are added. These legumes are generally served with boiled rice	c
<i>Daucus carota</i> L. (Apiaceae)	Carrot	Gajar	Roots	Peeled and chopped, carrots are fried alone or with onions, garlic and spices. These can be added to other vegetables, or potatoes, or meat. Alternatively, the carrots can be boiled in water with salt and pepper. They can also be ground and cooked for over 4–5 h with plenty of milk and sugar to make a dessert. After thickening, the mixture is placed in the fridge to cool	c

<i>Hibiscus esculentus</i> L. (Malvaceae)	Okra/Lady's finger	Bhindi	Fruit	Once the tops are chopped off, the fruit is cooked in oil or ghee with garlic, onions, ginger and turmeric. It can also be added to meat dishes once the meat is tender. Lemon juice is often squeezed on bhindi to prevent them sticking together. At other times these vegetables are simply boiled in salted water and eaten, or they can be split in half and filled with gram flour, crushed peanuts and onions, and gently cooked in oil	c
<i>Luffa acutangula</i> (L.) Roxb. (Cucurbitaceae)	Angular loofah	Lambi thori	Fruit	The fruit is stuffed with raw onions, garlic, ginger, chillies, and coriander, and then gently fried in oil, with more onions and tomatoes. It can be also diced into small pieces and sautéed with chopped onions, and flavoured with garlic, ginger and turmeric with small pieces of chopped potatoes added	a
<i>Momordica charantia</i> L. (Cucurbitaceae)	Bitter melon	Karela	Fruit	The vegetable is peeled and then cut in half lengthwise, and the internal parts are scooped out. These are mixed with spices and salt, and the two halves are put back together, tied with string and gently fried with onions in oil. The fruit can be also split in half and filled with gram flour, peanuts, crushed onions, garlic, and sometimes sugar (to sweeten the karela). It is then cooked slowly. The bitter melon can also chopped up into a pulp, a pinch of salt is added, and the liquid is given to diabetic patients to drink	c
<i>Moringa oleifera</i> Lam. (Moringaceae)	Drumsticks	Dodi	Fruit	Once washed, the outer husk is peeled off and the fruit is fried with onions, ginger, turmeric, chillies and often, tomatoes and aubergines. This fruit is often served with yoghurt. Sometimes the entire fruit is used, and their outer layers are spat out	b
<i>Musa paradisiaca</i> L. (Musaceae)	Plantain	Matoki	Fruit	The fruit is peeled, sliced and boiled, and once it is soft enough, it is fried in oil with various spices	a
<i>Praecitrullus fistulosus</i> (Stocks) Pang. (Cucurbitaceae)	Round melon	Tindi	Unripe fruit	If eaten with meat, first onions are fried in oil along with spices, ginger and garlic, and then the meat is added. Once the meat is cooked, the sliced melon is added. If used by itself, the melon is sliced, gently fried in oil and spices, and often served with yoghurt	a
<i>Raphanus caudatus</i> L. (Brassicaceae)	Rat-tailed radish	Mougri	Fruit	Mougri is chopped and cooked in oil with onions and spices. It is generally eaten with meat but it can also be chopped up and eaten raw with yoghurt and cucumber	c during the winter season
<i>Raphanus sativus</i> L. (Brassicaceae)	Radish	White mooli	Roots	These can be peeled and eaten raw or added to salads. They can also be grated, left for half an hour to remove excess water, then added to finely chopped onions, green chillies, salt and coriander. The mixture is then cooked in butter and used to stuff chapattis. Radishes can also be pickled. First they are cut in large chunks, green chillies and salt are added, and the mixture is covered with vinegar and left to sit for 1–2 h. Radish pickles can be eaten the same day	b
<i>Solanum melongena</i> L. (Solanaceae)	Aubergine	Baingan	Fruit	The aubergine is washed, the top is removed and the rest is chopped into little pieces. It is then fried in oil or butter with tomatoes, onions and sometimes garlic. Spices are also added. Sometimes the chopped aubergine is cooked with potatoes or peas. It is often served with squeezed lemon juice, or sliced in half lengthwise and filled with flour and crushed onions, then fried in oil with various spices	a
<i>Spinacia oleracea</i> L. (Chenopodiaceae)	Spinach	Palak	Leaves	The leaves are chopped, and then fried in sunflower or corn oil, together with garlic, onions and spices (generally turmeric, ginger and chillies). Often potatoes or peas, or chicken or lamb pieces are also added	c

Table 1 (Continued)

Botanical name and family	English name	Recorded "folk" name	Plant part(s) used	Traditional culinary preparation(s)	Frequency of consumption
<i>Trapa natans</i> L. (Trapaceae)	Indian water chestnut	Singhara	Seeds	The nuts are boiled in water, and once cooked they are allowed to cool. Then they are cut in half, the inside is scooped out and eaten. Alternatively, the outer part of the nut is peeled and the kernel is boiled in water to make it less bitter. It is then cooked with oil, onions and spices. Sometimes tomatoes and other vegetables are also added	b
<i>Trigonella foenum-graecum</i> L. (Fabaceae)	Fenugreek	Methi	Leaves	The leaves are chopped and fried in oil with garlic. They are also often used to garnish many curry dishes	c

^a Consumed once or twice a year.

^b Consumed once or twice a month.

^c Consumed once or twice a week.

Table 2

Most quoted traditional vegetables consumed in South-Asian households

Vegetable	% of quotations
Bitter melon	21
Okra	16
Carrot	10
Aubergine	10
Spinach	9
Taro	8
Fenugreek	8
Chickpea	6
Fragrant manjack	5
Radish	4
Others	5

"healthy", even if they are not necessarily the most quoted ones (the exception being bitter melon).

4. Discussion

4.1. Traditional vegetables in the South-Asian migrant diet

In this study, we recorded twenty-five vegetables that were quoted by South-Asian women. Among the more uncommon recorded food items we listed were drumstick (*Moringa oleifera*, Moringaceae), fragrant manjack (*Cordia dichotoma*, Boraginaceae), rat-tailed radish (*Raphanus caudatus*, Brassicaceae), and Indian asparagus (*Asparagus racemosus*, Liliaceae s.l.). Most of the recorded vegetables are still very frequently consumed in South-Asian migrant households.

The majority of the quoted vegetables were perceived to have medicinal properties (Fig. 1 and Table 2). It is interesting to underline, however, that more than half of the perceived medicinal properties of the quoted vegetables refer to specific pathologies. In other words they represent real *food-medicines* or *medicinal foods*. Moreover, most of the quoted vegetables were perceived as *folk functional foods* (Pieroni and Quave, 2006)

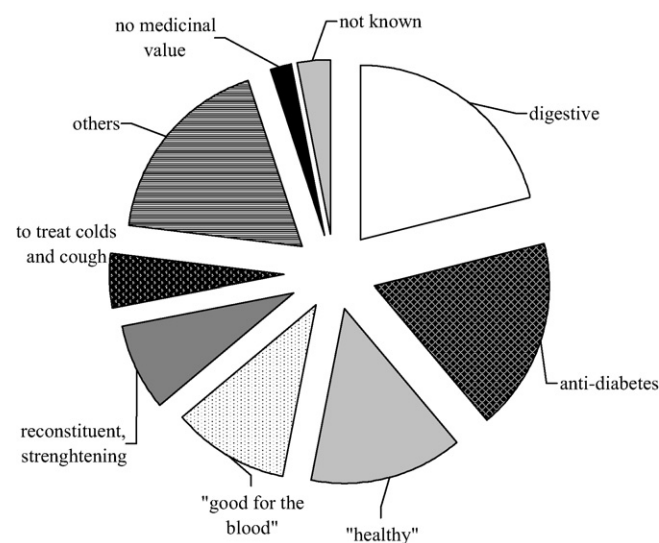


Fig. 1. Perceived (*emic*) medicinal character of the recorded traditional South-Asian vegetables.

Table 3
Perception of taste, healthiness and medicinal properties of the recorded vegetables

English name	Code	Perceived taste	Perceived medicinal properties (and number of informants claiming them)
Angular loofah	ANI	Bland	Treats diabetes (2)
Aubergine	AUB	Soft, sweet, bland	“Strengthens the body” (6); <i>Garam</i> (“it makes you warm when you are feeling cold inside”) (2); good for general health (2); “helps the mind” (1); “good for the joints” (1)
Bitter melon	BIM	<i>Very bitter, hot, spicy and tangy</i>	Treats diabetes (19); heals constipation (1); good for general health (1); provides vitamins (1)
Carrot	CAR	Sweet, soft	“Good for the eyes” (9); prevents diabetes (1); “good for the blood” (1); “good for the brain” (1); good for general health (1)
Cassava	CAS	Soft, starchy	Strengthening food (“good if you are feeling low”) (2); prevents diabetes (1)
Chickpea	CHI	Bland, dry	Prevents the flu (3); good for general health (2); “good for the joints” (1)
Cluster bean	CLB	Bitter	Treats diabetes (2); anti-arthritic (1)
Drumstick	DRU	<i>Slightly bitter</i>	Treats diabetes (1); anti-arthritic (1); relieves back pains (1)
Elephant’s ear	ELE	Bland	Good for general health (2)
Fenugreek	FEN	<i>Leafy, with a slightly bitter taste</i>	Good for general health (7); <i>Garam</i> (“It makes you warm when you are feeling cold inside”) (1)
Fragrant manjack	FRM	Bland	Treats coughs and colds (4)
Indian asparagus	INA	Bland	Digestive (2)
Indian dill	IND	<i>Bitter</i>	Digestive (2)
Indian mustard	INM	Bland	Digestive, good source of iron (2)
Indian water chestnut	IWC	Bitter, potatoe-like texture	Treat back pains in the elderly (1); Digestive (1); “Good for pregnant women” (1)
Ivy gourd	IVG	Bland	Digestive (2)
Okra	OKR	Soft, tangy, bland	Heals constipation (5); reconstituent (4); strengthen joints (2); anti-arthritic (1); good for general health (1); digestive (1)
Papaya	PAP	Bland	“It has contraceptive properties; should be avoided by women of child bearing age” (1)
Plantain	PLA	Bland, sometime sweet	Good for general health (2)
Pumpkin	PUM	Sweet	Good for general health (1); “helps stomach acid” (1); “liquefies fat” (1)
Radish	RAD	Watery, aniseed-like	Prevents diabetes (4); diuretic (1)
Rat-tailed radish	RTR	Hot, aniseed-like	Digestive (4); to treat diabetes (2); anti-arthritis (1)
Round melon	ROM	Bland	Good for general health (1)
Spinach	SPI	<i>“Strong”, slightly bitter</i>	Strengthening food (4); good for general health (2); treats constipation (1); “provides vitamins” (1); “good for the blood” (1)
Taro	TAR	Sweet, soft, slippery	Good for general health (3); treats constipations (2); relieves stomach-aches (1); “good for the joints” and for treating arthritis (1)
Turnip	TUR	–	“Good for blood flow” (1); anti-cholesterolemic (1)

In italics are marked taste perceptions that refer to bitter taste.

and many of the women told us that “*all vegetables are good for general health*”.

Ethnoscience studies carried out during the last decade have pointed out the inextricable connection between food and ethnomedical practices (Etkin and Ross, 1982; Johns, 1990; Johns et al., 1996; Pieroni et al., 2002; Pieroni and Price, 2006). This has been confirmed in our study, and we strongly feel that besides their taste, the perceived medicinal value of vegetables is also crucial in their appreciation.

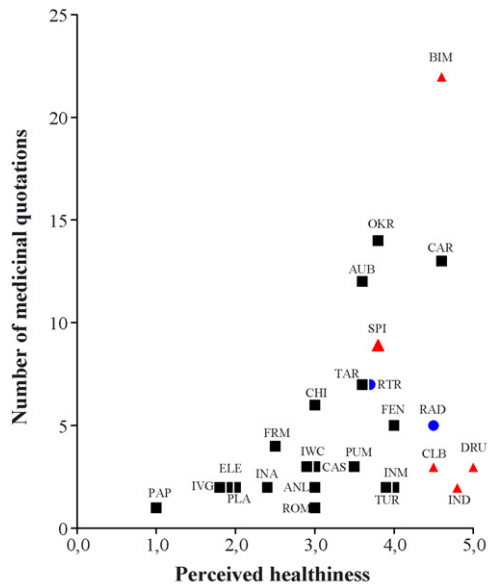
4.2. Traditional strategies to manage diabetes

Our informants were clearly very concerned about the prevalence of diabetes among their family members and neighbours. In the mind of our informants diabetes was often associated with obesity; however, cases of it were always confirmed as a result

of diagnostic tests carried out by the usual health primary care actors (GPs and hospitals). Nevertheless, most of interviewed migrants felt that they needed to also adopt their own healing strategies to be used in conjunction with allopathic medications prescribed by their GPs. Most of the women interviewed seemed to believe that the “healing” properties ascribed to specific plant foods could also have a more general, preventive effect on other (apparently healthy) family members.

While carrots, cassava and radish are thought to prevent diabetes, angular loofah (*Luffa acutangola*), cluster beans (*Cyamopsis tetranogloba*), drumsticks, rat-tailed radish, and especially bitter melon were quoted by the South-Asians women as botanicals that are able to be used to “treat” diabetes.

The ascribed anti-diabetic properties of bitter melon in particular are well known in the medical ethnography of the South-Asian subcontinent (Jain, 1991; Williamson, 2002), and



■ Vegetables whose taste is perceived as "soft, bland, sweet". ▲ Vegetables whose taste is perceived as bitter. ● Vegetables whose taste is perceived as aromatic ("like aniseeds"). Plant codes are reported in Table 2.

Fig. 2. Correspondence among perceived healthiness, number of medicinal claims, and perceived taste of the recorded South-Asian vegetables: (■) vegetables whose taste is perceived as "soft, bland, sweet"; (▲) vegetables whose taste is perceived as bitter; (●) vegetables whose taste is perceived as aromatic ("like aniseeds"). Plant codes are reported in Table 2.

many bio-scientific studies conducted during the last decade have confirmed them (Grover and Yadav, 2004; Chaturvedi, 2005).

4.3. Does the taste matter?

Studies of *emic* perception of taste in ethnobotany have shown that taste is culturally determined, and can strongly influence the use and medicinal perception of the plants (Johns, 1990; Pieroni et al., 2002). In Fig. 2 we show how the four vegetables considered to be bitter are reputed to be very healthy, even when a large number of medicinal quotations or a high perceived medicinal value was not indicated. This could be due to the fact that all bitter vegetables with the exception of Indian dill are considered to be important for counteracting diabetes, hence they have a very specific "medicinal" perception.

Informants often explained us that the anti-diabetic properties of bitter vegetables are due to the fact that "bitter foods counteract the sugars (sweet) in the blood".

It is also evident that the two vegetables that were indicated by the people as having an aromatic taste (radish and rat-tailed radish) are among those that were rated most highly for healthiness.

This could suggest that there is a specific role played by taste in the adaptive behaviour of human beings, especially in their cognitive categorisation of "medicinal plants" (Brett and Heinrich, 1998; Leonti et al., 2002; Pieroni et al., 2002; Pieroni and Torry, 2007).

4.4. Consumption of traditional vegetables and generational differences

Ethnic food traditions tend to be one of the cultural traits that pose the most resistance to change in terms of modernisation and adaptation to the host country. From our interviews, we found that older South-Asian migrants tend to prefer a typically Asian diet, whereas younger migrants tend to adapt to the British way of life more quickly. During the interviews, the elderly informants were able to immediately identify traditional methods of preparing the vegetables, which unfortunately the second generation migrants were unfamiliar with. One elderly Indian informant described how bitter melon was cut up and the inside scooped out, pulped, and then simply drunk with salt in order "to treat diabetes". In this case the frequency of consumption apparently depends on the individual's perceived level of need for diabetic control (individuals assess this need after regular blood tests they had carried out within the NHS structures, generally after periodic visits to their local GP).

Another interesting concept that was explained during the interviews was the classification of *garam*. Fenugreek (*Trigonella foenum-graecum*) and aubergine (*Solanum melongena*) were both described as having *garam* properties. The concept of *garam* originates from the humoral concept that poor health results from a lack of equilibrium between 'hot' and 'cold', hence a cold food will be used to treat a hot illness. One informant explained how aubergine could be used to exert a 'garam effect' on joint pain in arthritis. Indians classify rheumatoid conditions as being a cold, windy illness caused by cold, windy food, cold and windy weather, and cold activities. They therefore believe these conditions should be treated with warm food.

4.5. Dynamics and changes of traditional diets among South-Asians in Bradford

Cooking and consuming traditional vegetables is seen among the elderly generations as a central part of cultural heritage, hence traditional vegetables may be a means of strengthening their cultural identity and representing it to the autochthonous population (Jonsson et al., 2002b; Pieroni et al., 2005a; Pieroni and Vandebroek, 2007). In contrast to the results of other field studies (Jamal, 1998; Mellin-Olsen and Wandel, 2005), we found that the elderly South-Asian migrants in Bradford continue to be conscious of the importance of traditional diet, and cultural adaptation processes have not yet dramatically changed the way they feed their families as they may have done in other areas in Europe.

Since ethnicity is also the result of a social process (Barth, 1969; Baumann, 1999) and cultural boundaries are very dynamic, it would be well worthwhile to follow changes in the appreciation of traditional vegetables among the South-Asian migrants of Bradford and elsewhere. On the other hand, we cannot forget that cultural boundaries are also partly constructs created by our own processes of representation (Clifford and Marcus, 1986; Marcus, 1998) and that food habits are highly

dynamic and therefore able to change very rapidly in response to continuously moving cultural negotiations.

4.6. Traditional consumption of South-Asian vegetables: implications for public-health issues

Our findings could be interesting for those involved in improving health care policies targeting South-Asian migrants in Europe, as our data provide valuable insights into concepts and views surrounding the health-giving properties of foods in the traditional diet within the domestic arenas. This information could be crucial to both understanding the dietary habits and improving the provision of health care through dietary consultation that takes into account *emic* views and concepts regarding “healthy foods”. This would be especially beneficial for patients with type 2 diabetes.

Lawton et al. (2006) recently had this to say when commenting on their study that focused on the barriers to physical activity amongst people of Pakistan and Indian origin with type 2 diabetes in Edinburgh: “*health promoters may need to work with – rather than against – cultural norms and individual perceptions*”. To this end, a culturally competent educational intervention in patients with type 2 diabetes from ethnic minority groups living in Glasgow has been recently documented (Baradaran et al., 2006).

Other works have stressed the importance of culturally sensitive means in primary health care of South-Asians in the US (Ahmed and Lemkau, 2000).

Lower rates of hospitalisation for diabetic Indian-born patients have been shown in New York City (Muennig and Fahs, 2002) and we should perhaps seriously begin to consider the way, for example, type 2 diabetes is managed within the health institutions in our countries.

The study that we have presented is a contribution to the discussion on the complex issue of migrant health (Mackebach, 2006) and offers a few insights that may provide a better understanding of the *emic* concepts of *well-being* and of traditional practices that are believed to preserve health among migrant communities in Western countries.

4.7. Limitations of the study

We have to underline here that the methods we chose to elicit field data on traditionally used vegetables (free-listing) did not allow us to include other categories of food plants (fruits, mushrooms, wild herbs, etc.) which could be important in the overall food scenario of the South-Asians migrants living in Bradford, hence it could be said that we have overestimated the role of the cultivated vegetables. In other words, a limitation of our study is that we cannot consider the collected data on frequency of consumption as absolute values and/or objective nutritional measurements for all the recorded botanicals. Another possible limitation of this study is that we focused particularly on women’s knowledge, since we know that in many human societies women are the health-care providers within the household, and the ones who are in charge of the domestic arena and their families’ diet (Pennartz and Niehof, 1999).

The women we interviewed free-listed vegetables they generally process in their households. We suggest that the reasons why they quoted these particular few ingredients instead of others could have been due to a variety of factors; for example, these species could be the ones they use most often in their kitchens, or they could be seen as “most traditional” or culturally important, and therefore they are seen as being very important in strengthening cultural identity. On the other hand, the women may simply prefer their taste or their functional aspects such as their “healthiness”. These species could also have been quoted also since they were in season (the survey was undertaken in the spring) and were readily available in Bradford’s South-Asian markets at the time the survey was undertaken.

A final major limitation of this study has been that it has been conceived from its beginning as urban ethnobotanical survey, and it has maybe underestimated the medical anthropological issues (e.g. *emic* views of illnesses and concepts of “well being”) that are surely crucial, if we want to more holistically analyse phenomena related to the migrants’ health.

5. Conclusion

This survey has shown how the consumption of traditional vegetables still plays a crucial role in the dietary habits of South-Asian migrants in Bradford, and how an important proportion of the quoted vegetables are perceived as having some medicinal properties, particularly in counteracting diabetes, whereas others are seen just as being “good for the health”. Food items with bitter or aromatic tastes are often associated with much stronger medicinal values. If traditional cuisines are an integral part of complex cultural heritage systems, and if they are used by migrant communities as a means of representing cultural identities, it is clear that public-health researchers and policy-makers need to have a much better understanding of migrants’ concepts and views regarding the health-promoting properties of traditional foods so that these can be utilized in future primary health care programmes.

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References

- AAA, 1998. Code of Ethics of the American Anthropological Association; available at: <http://www.aaanet.org/committees/ethics/ethcode.htm>, last accessed 13th March, 2007.
- Abate, N., Chandalia, M., 2001. Ethnicity and type 2 diabetes: focus on Asian Indians. *Journal of Diabetes and its Complications* 17, 39–58.
- Ahmed, S.M., Lemkau, J.P., 2000. Cultural issues in the primary care of South Asians. *Journal of Immigrant Health* 2, 89–96.
- Alexiades, M.N., Sheldon, J.W., 1996. *Selected Guidelines for Ethnobotanical Research: A Field Manual*. New York Botanical Garden, Bronx, NY, USA.

- Bagust, A., Hopkinson, P.K., Maslove, L., Currie, C.J., 2002. The projected health care burden of type 2 diabetes in the UK from 2000 to 2060. *Diabetic Medicine* 19, 1–5.
- Balick, M., Kronenberg, F., Ososki, A., Reiff, M., Fugh-Berman, A., O'Connor, B., Roble, M., Lohr, P., Atha, D., 2000. Medicinal plants used by Latino healers for women's health conditions in New York City. *Economic Botany* 54, 344–357.
- Baradaran, H.R., Knill-Jones, R.P., Wallia, S., Rodgers, A., 2006. A controlled trial of the effectiveness of a diabetes education programme in a multi-ethnic community in Glasgow. *BMC Public Health* 6, 134.
- Barth, F., 1969. *Ethnic Groups and Boundaries: the Social Organization of Culture Difference*. Allen & Unwin, London.
- Baumann, G., 1999. *The Multicultural Riddle: Rethinking National, Ethnic and Religious Identities*. Routledge, New York/London.
- Berlin, E.A., Berlin, B., 2005. Some field methods in medical ethnobiology. *Field Methods* 17, 235–268.
- Borgatti, S.P., 1992. *ANTHROPAC 4.0: Methods Guide*. Analytic Technologies, Columbia, USA.
- Brett, J., Heinrich, M., 1998. Culture, perception, and the environment. *Journal of Applied Botany* 72, 67–69.
- Burnes, C., 2004. Effect of migration on food habits of Somali women living as refugees in Australia. *Ecology of Food and Nutrition* 43, 213–229.
- Bush, H.M., Williams, R.G., Lean, M.E., Anderson, A.S., 2001. Body image and weight consciousness among South Asian, Italian and general population women in Britain. *Appetite* 37, 207–215.
- Ceuterick, M., Vandebroek, I., Torry, B., Pieroni, A., 2007. The use of home-remedies for health care and well-being by Spanish Latino immigrants in London: a reflection on acculturation. In: Pieroni, A., Vandebroek, I. (Eds.), *Traveling Plants and Cultures. The Ethnobiology and Ethnopharmacy of Migrations*. Berghahn, Oxford.
- Chaturvedi, P., 2005. Role of *Momordica charantia* in maintaining the normal levels of lipids and glucose in diabetic rats fed a high-fat and low-carbohydrate diet. *British Journal of Biomedical Science* 62, 124–126.
- Clifford, J., Marcus, G.E., 1986. *Writing Culture: The Poetics and Politics of Ethnography*. University of California Press, Berkeley/London.
- Cotton, C.M., 1996. *Ethnobotany: Principles and Applications*. Wiley, Chichester, UK.
- Etkin, N.L., Ross, P.J., 1982. Food as medicine and medicine as food. An adaptive framework for the interpretation of plant utilization among the Hausa of Northern Nigeria. *Social Science and Medicine* 16, 1559–1573.
- Fagerli, R.A., Lien, M.E., Wandel, M., 2005. Experience of dietary advice among Pakistani-born persons with type 2 diabetes in Oslo. *Appetite* 45, 295–304.
- Feltbower, R.G., Bodansky, H.J., McKinney, P.A., Houghton, J., Stephenson, C.R., Haigh, D., 2002. Trends in the incidence of childhood diabetes in south Asians and other children in Bradford, UK. *Diabetics Medicine* 19, 162–166.
- Fischbacher, C.M., Hunt, S., Alexander, L., 2004. How physically active are South Asians in the United Kingdom? A literature review. *Journal Public Health (Oxford)* 26, 250–258.
- Grover, J.K., Yadav, S.P., 2004. Pharmacological actions and potential uses of *Momordica charantia*: a review. *Journal of Ethnopharmacology* 93, 123–132.
- Hayes, L., White, M., Unwin, N., Bhopal, R., Fischbacher, C., Harland, J., Alberti, K.G., 2002. Patterns of physical activity and relationship with risk markers for cardiovascular disease and diabetes in Indian, Pakistani, Bangladeshi and European adults in a UK population. *Journal of Public Health Medicine* 24, 170–178.
- Heald, A., Stephens, R., Gibson, J.M., 2006. The insulin-like growth factor system and diabetes—an overview. *Diabetic Medicine* 23, 19–24.
- IPK, 2005. Mansfeld's World Database of Agricultural and Horticultural Crops; available at: <http://mansfeld.ipk-gatersleben.de/mansfeld/Query.htm>, last accessed 13th March, 2007.
- Jain, S.K., 1991. *Dictionary of Folk Medicine and Ethnobotany*. Deep Publications, New Delhi.
- Jamal, A., 1998. Food consumption among ethnic minorities: the case of the British-Pakistani in Bradford, UK. *British Food Journal* 10, 221–227.
- Johns, T., 1990. *With Bitter Herbs they shall Eat it: Chemical Ecology and the Origins of Human Diet and Medicine*. University of Arizona Press.
- Johns, T., Mhoro, E.B., Sanaya, P., 1996. Food plants and masticants of the Batemi of Ngorongoro District, Tanzania. *Economic Botany* 50, 115–121.
- Jonsson, I.M., Wallin, A.M., Hallberg, H.R.M., Gustafsson, I.B., 2002a. Cultural foodways in Sweden: repeated focus group interviews with Somalian women. *International Journal of Consumer Studies*, 26.
- Jonsson, I.M., Wallin, A.M., Hallberg, L.R., Gustafsson, I.B., 2002b. Choice of food and food traditions in pre-war Bosnia-Herzegovina: focus group interviews with immigrant women in Sweden. *Ethnicity and Health* 7, 149–161.
- Lawton, J., Ahmad, N., Hallowell, N., Hanna, L., Douglas, M., 2005. Perceptions and experiences of taking oral hypoglycaemic agents among people of Pakistani and Indian origin: qualitative study. *BMJ* 330, 1247.
- Lawton, J., Ahmad, N., Hanna, L., Douglas, M., Hallowell, N., 2006. 'I can't do any serious exercise': barriers to physical activity amongst people of Pakistani and Indian origin with type 2 diabetes. *Health Education Research* 21, 43–54.
- Leonti, M., Sticher, O., Heinrich, M., 2002. Medicinal plants of the Popoluca, Mexico: organoleptic properties as indigenous selection criteria. *Journal of Ethnopharmacology* 81, 307–315.
- Mackenbach, J.P., 2006. Migrant health: new challenges for European public health research. *The European Journal of Public Health* 16, 345.
- Marcus, G.E., 1998. *Ethnography Through Thick and Thin*. Princeton University Press, Princeton, NJ, USA.
- Martin, G.J., 2004. *Ethnobotany: A Methods Manual*. Earthscan, London.
- Mather, H.M., Keen, H., 1985. The Southall diabetes survey: prevalence of known diabetes in Asians and Europeans. *British Medical Journal (Clinical Research and Education)* 291, 1081–1084.
- McKeigue, P.M., Marmot, M.G., Syndercombe Court, Y.D., Cottier, D.E., Rahman, S., Riemersma, R.A., 1988. Diabetes, hyperinsulinaemia, and coronary risk factors in Bangladeshi in east London. *British Heart Journal* 60, 390–396.
- Mellin-Olsen, T., Wandel, M., 2005. Changes in food habits among Pakistani immigrant women in Oslo, Norway. *Ethnicity and Health* 10, 311–339.
- Muennig, P., Fahs, M.C., 2002. Health status and hospital utilization of recent immigrants to New York City. *Preventive Medicine* 35, 225–231.
- Nesheim, I., Dhillion, S.S., Stolen, K.A., 2006. What happens to traditional knowledge and use of natural resources when people migrate? *Human Ecology* 34, 99–131.
- Parsons, S., Godson, J.H., Williams, S.A., Cade, J.E., 1998. Are there inter-generational differences in the diets of young children born to first- and second-generation Pakistani Muslims in Bradford, West Yorkshire, UK? *Journal of Human Nutrition and Dietetics*, 112.
- Pennartz, P.J.J., Niehof, A., 1999. *The Domestic Domain: Chances, Choices and Strategies of Family Households*. Ashgate, UK, Aldershot.
- Phillips, D., 2001. *The Changing Geography of South-Asian in Bradford*; available at: <http://www.bradford2020.com/pride/docs/Section5.doc>, last accessed 28th February, 2007.
- Pieroni, A., 2000. Medicinal plants and food medicines in the folk traditions of the upper Lucca Province, Italy. *Journal of Ethnopharmacology* 70, 235–273.
- Pieroni, A., 2001. Evaluation of the cultural significance of wild food botanicals traditionally gathered in Northwestern Tuscany, Italy. *Journal of Ethnobiology* 21, 89–104.
- Pieroni, A., Muenz, H., Akbulut, M., Baser, K.H., Durmuskahya, C., 2005a. Traditional phytotherapy and trans-cultural pharmacy among Turkish migrants living in Cologne, Germany. *Journal of Ethnopharmacology* 102, 69–88.
- Pieroni, A., Nebel, S., Quave, C., Munz, H., Heinrich, M., 2002. Ethnopharmacology of liakra: traditional weedy vegetables of the Arbereshe of the Vulture area in southern Italy. *Journal of Ethnopharmacology* 81, 165–185.
- Pieroni, A., Nebel, S., Santoro, R.F., Heinrich, M., 2005b. Food for two seasons: culinary uses of non-cultivated local vegetables and mushrooms in a south Italian village. *International Journal of Food Sciences and Nutrition* 56, 245–272.
- Pieroni, A., Price, L.L., 2006. *Eating and Healing: Traditional Food as Medicine*. Haworth Press, Binghamton, NY, USA.
- Pieroni, A., Quave, C.L., 2006. Functional foods or food-medicines? On the consumption of wild plants among Albanians and Southern Italians in Lucania. In: Pieroni, A., Price, L.L. (Eds.), *Eating and Healing: Traditional Food as Medicine*. Haworth Press, Binghamton (New York, USA), pp. 101–129.

- Pieroni, A., Torry, B., 2007. Does the taste matter? Taste and medicinal perceptions associated with five selected herbal drugs among three ethnic groups in West Yorkshire, Northern England. *Journal of Ethnobiology and Ethnomedicine* 3, 21.
- Pieroni, A., Vandebroek, I. (Eds.), 2007. *Traveling Plants and Cultures. The Ethnobiology and Ethnopharmacy of Migrations*. Berghahn, Oxford.
- Povlsen, L., Olsen, B., Ladelund, S., 2005. Educating families from ethnic minorities in type 1 diabetes-experiences from a Danish intervention study. *Patient Education and Counseling* 59, 164–170.
- Ray, K., 2004. *The Migrant's Table: Meals and Memories in Bengali-American Households*. Temple University Press, Philadelphia.
- Rees, P., Phillips, D., Medway, D., 1995. The socio-economic geography of ethnic groups in two northern cities. *Environment and Planning* 27, 557–591.
- Reiff, M., O'Connor, B., Kronenberg, F., Balick, M.J., Lohr, P., Roble, M., Fugh-Berman, A., Johnson, K.D., 2003. Ethnomedicine in the urban environment: Dominican healers in New York City. *Human Organization* 62, 12–26.
- Rhodes, P., Nocon, A., Wright, J., 2003. Access to diabetes services: the experiences of Bangladeshi people in Bradford, UK. *Ethnicity and Health* 8, 171–188.
- Riste, L., Khan, F., Cruickshank, K., 2001. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city: relative poverty, history, inactivity, or 21st century Europe? *Diabetes Care* 24, 1377–1383.
- Sandhu, D.S., Heinrich, M., 2005. The use of health foods, spices and other botanicals in the Sikh community in London. *Phytotherapy Research* 19, 633–642.
- Scotland, N.H., 2004. Diabetes in minority ethnic groups in Scotland. NHS Health Scotland.
- van Wyk, B.E., 2005. *Food Plants of the World*. Briza, Pretoria (South Africa).
- Venkataraman, R., Nanda, N.C., Baweja, G., Parikh, N., Bhatia, V., 2004. Prevalence of diabetes mellitus and related conditions in Asian Indians living in the United States. *The American Journal of Cardiology* 94, 977–980.
- Waldstein, A., 2006. Mexican migrant ethnopharmacology: pharmacopoeia, classification of medicines and explanations of efficacy. *Journal of Ethnopharmacology* 108, 299–310.
- Williams, R., Wright, W., Hunt, K., 1998. Social class and health: the puzzling counter-example of British South Asians. *Social Science and Medicine* 47, 1277–1288.
- Williamson, E.M., 2002. *Major Herbs of Ayurveda*. Churchill Livingstone, Edinburgh.