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Introduction

The Bangladeshi population is one of the fastest growing ethnic groups within the United Kingdom (UK). The Bangladeshi population resident in England and Wales is 447,201, or 0.8% of the total UK population; this is an increase of just over 50% from the previous census in 2001 (Office of National Statistics, 2012). Additionally, this group is reported to be one of the most deprived populations in the UK, having high rates of unemployment, social deprivation, and low rates of education (Alexander, Firoz, and Rashid, 2010; Brice, 2008). They also have poorer self-reported and measured health status indicated by higher rates of disability, centralised obesity and chronic diseases such as type 2 diabetes and cardiovascular disease (Sproston and Mindell, 2006). Older Bangladeshi women are particularly affected as they play a lead role in caretaking for multiple generations within relatively large extended families and many struggle to cope with the complex challenges of ageing, poverty, racism, and social exclusion.

The migration of Bangladeshis to Britain has a long history, with the majority of those migrating originating from the Sylhet Region in northeast Bangladesh (Gardner, 2002). Research has been dedicated to understanding how to improve the health of Bangladeshi residents in the UK; however, the majority of this research has concentrated on the Tower Hamlets region of London, limiting the amount of knowledge about those communities living outside of the London area (Brice, 2008). Findings from these studies may not be generalisable to other UK communities; therefore more research is needed to expand our understanding of this minority ethnic group and how to improve their health and well-being and reduce existing health inequalities. MINA was a three-year project that examined ageing, migration, and nutrition across two generations of Bangladeshi women living in Cardiff, UK and Sylhet, Bangladesh. The 2011 Census indicates that the Bangladeshi population living in Cardiff is 4,838, or approximately 45% of the Bangladeshis living in Wales (Office of National Statistics, 2012). This research builds upon the existing literature focusing on migration and ageing amongst UK Bangladeshis (Gardner, 2002; Phillipson, Ahmed, and Latimer, 2003), providing new insights into specifically food, nutrition, and their interactions with ageing and migration amongst UK Bangladeshi families who are living in communities outside of Tower Hamlets, London.

As in the general population, nutrition plays a crucial role in the health status of the Bangladeshi population. Despite this there is no clear understanding of how eating patterns and migration affects this group's nutritional status and experiences of ageing. Without this information we cannot develop effective, culturally tailored interventions. The MINA project addressed these gaps using interdisciplinary approaches, integrating methods and combined expertise not used in previous research to gain an in-depth understanding of Bangladeshi women's nutritional status, food practices, beliefs and experiences of ageing in the UK and Bangladesh.

Aims and Methods

The aim was to investigate migration, nutrition, and ageing via an intergenerational and transnational project incorporating multidisciplinary methodologies. The intergenerational component included recruiting a sample of older women who migrated from Bangladesh to the UK and their adult daughters, who were either UK-born or immigrated to the UK in childhood. The

transnational component included recruiting women of the same two age groups and familial relationship living in Sylhet, Bangladesh, providing a continuum to understand the influence of migration, nutrition, and eating patterns on ageing. Participants in both countries were purposively recruited across the range of socio-economic status. The project's multidisciplinary component is based on the diverse disciplines of the MINA research team, providing expertise in public health nutrition and exercise, biological anthropology, health psychology, public health nursing, ethnobotany, environmental and media design, social gerontology, and social anthropology. We integrated these components via a bio-cultural perspective that gives equal importance to the physical/biological and social/psychological aspects of food, nutrition, migration and ageing.

MINA addressed the following research questions:

- 1) Does migration impact on nutritional status, food practices, and health among first generation Bangladeshi women aged 45 years and older? If so,
- 2) How does migration affect nutritional status, food practices and health of the successive generation of women living in the UK? and
- 3) How does migration affect changes in nutritional status, food practices and health compared with non-migrating women of the same ages and familial relationship in Bangladesh?

These questions were addressed through four integrated Work Packages using a participatory, mixed-methods approach to gather and analyse data. Ethical approval was granted by the ethics committee of the College of Human and Health Sciences at Swansea University, Wales. All participants were provided with written information in Bangla and English about the study and written, or where there were literacy issues, recorded verbal consent was obtained. A purposive sample of 40 Bangladeshi women (target age 45+) who migrated to the UK and were residing in Cardiff, 37 of their daughters (target age 18 to 35), and 44 women of the same age groups living in Sylhet, Bangladesh were recruited. The total sample size was therefore 121 women. In addition, a sub-sample of 54 mothers and daughters from the total MINA sample (24 in Bangladesh and 30 in Cardiff) participated in a qualitative interview. Inclusion criteria for this sub-sample included age at migration, evidence of chronic health conditions, marital status and age. The research conducted within Work Package 3 also included additional participants independent of the main MINA sample who were recruited from London and Sylhet; ethics approval for the research conducted for this work package was granted by University College London and Brunel University.

A Community Advisory Committee (CAC) was established in Cardiff, which was comprised of men and women from the Bangladeshi community in Cardiff, as well as Cardiff-based health and local authority representatives who advised on the entire research process. Eleven Bangladeshi women residing in Cardiff and Swansea were recruited and trained as community researchers and participated in all aspects of the study. Their participation enhanced access and recruitment of participants and the quality of data generated, as participants were able to complete the questionnaires and interviews through their preferred language, i.e., Bengali, Sylheti or English. As a token of appreciation a £10 supermarket voucher was provided to participants who agreed to participate in the qualitative interview.

In Cardiff data collection was organised through hosting five community events in a local leisure centre, which included a range of physical and social activities,

lunch, and provided curtained facilities for the anthropometric measurements, ensuring participants' privacy. In Bangladesh, data collection occurred in a host's house in rural villages as well as in urban areas across the Sylhet region. Participants in Bangladesh were given a basket of fruit equivalent to the UK value of £10, which after local enquiries was deemed an appropriate token of appreciation.

The following measurements were used to quantify nutritional status: height, weight, sitting height, knee height, and waist circumference. Physical function was assessed by the Guralnik Short Physical Performance Battery (Guralnik *et al.*, 1994), a standardised set of tests for leg muscle strength, walking speed, and standing balance that can be validly and reliably conducted in the field in older adults. Questions were also asked about age at marriage and age at birth of first child, total number of pregnancies and number of living children. Differences between lifecourse experiences and the typical "food environments" of the Bangladeshi community in the UK and in Bangladesh were assessed using a semi-structured questionnaire, in-depth interviews, participant observation and photo-ethnography. Detailed accounts of migration and biographical experiences were gathered using a semi-structured questionnaire and qualitative interviews to assess their impact on nutritional status, health behaviours and transmission of nutritional knowledge cross-generationally and transnationally. Additionally the influence of cultural beliefs on nutrition, health, and health-seeking behaviours and how this has changed across the lifespan and between generations were examined. The impact of social inequalities on nutrition and health status, changes in the roles, position and responsibilities of women in the household and the impact on their nutrition, the family unit and wider community were also assessed.

Quantitative data were analysed using IBM-SPSS (version 16). All data were double-entered and verified for accuracy. Descriptive statistics were calculated for all variables by the categories of generation (mother or daughter), country of birth and current country of residence. Descriptive statistics (means, standard deviations, ranges, frequencies) were calculated for all quantitative variables. Statistical significance of comparisons between generations, locations, place of birth, and other contrasts were assessed by Mann-Whitney U tests, Kruskal-Wallis tests, Student's t-test, analysis of variance, multiple regression and similar non-parametric and parametric statistics. All interviews were transcribed verbatim and translated. A sub-sample of interviews (n=4) was back-translated to ensure accuracy of the translation. Thematic analysis was used to analyse the qualitative data in order to identify key patterns and themes, which were linked and categorised in order to make inferences (Bowling, 2002). Two researchers coded and categorised the data that was then compared, and any discrepancies discussed and categories revised accordingly to facilitate inter-rater reliability. Deviant cases were identified and reported and the findings were compared with the literature.

Findings

The findings presented here are organised into the four work packages for ease of reporting. For conciseness, the Bangladeshi mothers and daughters residing in Cardiff are referred to as CM and CD, respectively, and their counterparts residing in Bangladesh as BM and BD. We follow these **with** an overview of implications for policy, practice and product development, and conclude with a brief discussion highlighting areas needing further exploration in future research.

Work Package 1: Community Engagement and Conceptual Development

The aims of this work package were to develop a common conceptual framework, to review the existing evidence, and to develop methods for community engagement. These aims were achieved via: 1) the successful establishment of Community Advisory Committee (CAC) that included local Bangladeshi people and other key stakeholders as members; 2) establishment of a Scientific Advisory Committee (SAC) including experts in migration/social anthropology (Professor Katy Gardner, Sussex University) and social gerontology (Professor Christina Victor, Brunel University); 3) frequent meetings (face-to-face and conference calls) to exploit the synergy of the different disciplines and maintain cohesion within the research team; 4) recruitment and training of two Bangladeshi research assistants, one Bangladeshi post-doctoral fellow, and 11 Bangladeshi community researchers from the Cardiff and Swansea areas; and 5) a thorough review of existing secondary datasets from the UK Data Archive that include health information on Bangladeshis, and summarised in the MINA Data Map for Health Information Amongst Bangladeshis (Harper *et al.*, 2011).

Work Package 2: Nutritional Status and Physical Function

The aims of this work package were to assess the nutritional status and physical function of two generations of Bangladeshi women. The underlying premise for the proposed biological and functional measures is based on the Intergenerational Influences Hypothesis (IIH) proposed by Emanuel (1986, p. 27) and defined as, “...those factors, conditions, exposures and environments experienced by one generation that relate to the health, growth and development of the next generation.” In the context of this study, the IIH relates to the existence of a non-genomic mechanism in which the nutritional status of the mother during her early development will have health and ageing consequences both for the mother and her offspring.

The descriptive characteristics of all participants are reported in Table 1. CM and BM ranged in age from 40-70 years, while CD and BD ranged in age from 17-36 years. All participants were short in stature (mean height; mothers = 148 cm, daughters = 153 cm; no significant difference between age groups, $p > 0.05$). CM were older, and CM and CD were shorter and had higher levels of overweight and obesity than the general UK-Bangladeshi population as assessed in the Health Survey of England (Sproston and Mindell, 2006). As expected, UK-residing women had higher rates of overweight, obesity, and centralised obesity than women residing in Bangladesh. Obesity was particularly high in CM, with 65% having body mass index (BMI) values indicative of obesity as compared to 27.3% of BM using definitions for South Asians (World Health Organization, 2004). Similarly, 42.5% of CD had BMI values indicative of obesity as compared to 13.6% of BD. Conversely, about one-fifth of all women living in Bangladesh were underweight, whereas none of the UK-residing participants were underweight.

<<Insert Table 1 about here>>

In addition to high rates of overweight and obesity in the Cardiff participants, the CM exhibited average physical function scores indicative of an increased risk for frailty, with 8 unable to perform most elements of the SPPB test. Physical function in CM was significantly lower than in BM. Even the BM participants of higher socio-economic status who did not engage in physical work and had servants assisting with household activities achieved higher physical function

scores than CM. The cultural norm to honour one's elders by encouraging limited physical movement was described by both CM and CD, in addition to many CM reporting being socially isolated (discussed later in this chapter). Previous research indicates that limited engagement in physical and social activities outside of the home is associated with low physical function in older adults (Davis *et al.*, 2011). Physical activity levels were not measured in the MINA project, but during qualitative interviews participants were asked about types of activities they participated in during a 'typical day.' CM described lifestyles that were much more sedentary and less socially engaged than BM; limited opportunities for CM to get 'out and about' on a daily basis likely contributed to their low levels of physical function. CD described leading busy lives focusing on family duties, work, and education, but few reported participating in physical activities that promote health.

All mothers (CM and BM) were married or widowed; according to their demographic history all had completed fertility (defined as age over 45 years and at least 5 years since last birth). Mothers in both countries had, on average, an equal number of pregnancies, number of live born children, pregnancy loss, and relatively high fertility. Data on age at marriage and number of children for the daughters (CD and BD) indicate that 24 of the 37 CD were married or divorced, and only 7 of 22 BD were married at the time of data collection. The lower number of married BD reflects their younger age and our decision to interview the Bangladesh-residing women who lived in the same geographic region of Sylhet; in Bangladesh, married daughters typically live with their spouse and parents-in-law and in this study most of the married daughters did not live in close proximity to their mothers.

Work Package 3: Food Ethnobotany and "Food Environments"- A Comparative Study between the UK and Bangladesh

Initial research related to food ethnobotany was conducted in Cardiff to provide a formative assessment and allow for the piloting of questions for subsequent focus groups and interviews. The food ethnobotany-related research questions examined in this work package were: 1) What foods and medicines are used therapeutically among Bangladeshis in the UK and Bangladesh? 2) How do food and medicine overlap? 3) What is the nature of global links (and exchange between families) and their contribution to the therapeutic food-scape of the home? 4) What impact do these links have on the plants and foods consumed therapeutically in the homes of families in the UK and Bangladesh? and 5) What is the nature of knowledge transfer across the two generations regarding plants and food?

Research took place in both Sylhet and London exploring the above questions, and comparisons were made between the two places. Some of the key findings of our research were (Jennings, Heinrich, and Thompson, in press):

- Various plants are taken as medicine or 'healthy' food among Bengalis in the UK and Bangladesh. Therapeutic plant use is more common among older Bengalis in the UK, with both older and younger Bengalis engaging in therapeutic plant use in Bangladesh. However use also depended on family dynamics as well as individual preferences and beliefs related to medicinal plant use.
- In the UK, plants are most frequently used to promote general health, and to treat minor upper respiratory ailments and type 2 diabetes. Most of the

plants used therapeutically are considered 'Bengali,' and medicinal plant use is strongly identified with Bangladesh.

- UK-based links and exchanges with Bangladesh, through word of mouth as well as physical exchanges of food stuff and seeds, are important to maintaining existing food-medicine knowledge.
- Transnational links play out in each place differently. In the UK, Bangladesh is viewed as the source of medicinal plant knowledge and food related to home. In Bangladesh, foods associated with wealth and pleasure are sent from the UK.
- The conceptualisations of 'food' and 'medicine' are used interchangeably across countries and generations. What plant is consumed as well as how it is prepared, and the reasons for its consumption, help determine whether it is taken as a food or a medicine, and the boundary between the two is often blurred.
- Knowledge transfer between generations is complex. While daughters in both countries learn from their mothers about food-medicine, there are other important knowledge sources including peers, other family members, local and global networks, formal education, books and practitioners. The acquisition and transmission of knowledge are also part of much larger processes with age/ageing, power structures, access to different forms of health care and migration all being important contributors.

In addition to exploring food ethnobotany, another aim of this work package was to document, analyse and compare the typical "food-environments" used by the Bangladeshi communities in Cardiff and London with those used in Bangladesh. The term "food environments" implies four domains: a) the types of food in the diet; b) the environment in which food is acquired (e.g. supermarket, allotment); c) the environment in which food is prepared (e.g. kitchen); and d) the environment in which food is consumed (e.g. dining room). Focusing on women across two generations, but also considering the society at large, the research employed the methods of photo-ethnography and qualitative interviews. The findings were summarised in a collection of 69 photographs and accompanying short stories; these provide an overview of the food habits in the two countries (see Figure 1) (Garaj, Hunt and Thompson, 2012). The photographs and the stories (Garaj, 2012) have been presented to the Bangladeshi community and general public through numerous exhibitions in different locations across the UK. These include a month-long exhibit that took place between 15 November and 15 December 2011 in The Cardiff Story - the new museum of Cardiff history (BBC News, 2011; Chamberlain, 2011), and the New Dynamics of Ageing and Age UK dissemination 'Event of the Decade' held 23 October 2013 in London at the Business Design Centre, Islington, London (New Dynamics of Ageing Programme, 2013).

<<Insert Figure 1 about here>>

The final aim of the work package was to establish the best ways of using digital media to promote the importance of healthy food habits among the Bangladeshi women living in the United Kingdom. The questionnaire-based study involved 28 women of Bangladeshi origin residing in London and Cardiff and focused on the distribution language/s, media format/s, and content types needed and preferred when presenting nutritional information. The results suggest that print and digital resources should be made available. Participants also want information provided digitally on the Internet and in DVD format, emphasising the need for information

that is presented in the spoken word format, using the oral dialect of Sylheti to accompany English and Bengali print information. This flexibility is to ensure that the health promotion content reaches the widest possible pool of targeted users and their family members (Garaj *et al.*, 2010).

Work Package 4 – Migration, Nutrition and Ageing: Health Beliefs, Health Behaviours and Health Status

The aims of this work package were to explore the influence of migration on health beliefs, health behaviours and health status across the lifespan and in two generations of Bangladeshi women. Using methods described previously, we: 1) obtained detailed accounts of the women's migration and biographical experiences and explored the impact on nutritional status, health behaviours and transmission of nutritional knowledge; 2) explored the influence of cultural beliefs on nutrition, health, and health seeking behaviours and how this has changed across the lifespan and between generations; 3) examined the impact of social inequalities on nutrition and health status; 4) explored changes in the roles, position and responsibilities of women in the household and the impact on their nutrition, the family unit and wider community; 5) obtained detailed accounts of the women's perceptions and expectations of an older person in their community; and 6) gained an understanding of the extent and nature of transnational ties and their influence on issues related to nutrition and ageing.

Results indicated that the majority of participants migrated from villages in the Sylhet region to Cardiff during the 1980s, although due to the age range of participants the period of migration ranged from 1972 to 2005. This migration pattern is consistent with other published studies (e.g. Gardner, 1995; Phillipson, Ahmed & Latimer, 2003) that have reported Bangladeshi women's migration to the UK. Similar to these studies, most of our participants migrated not as individuals but as members of transnational communities and households, and over two-thirds had resided in Cardiff for more than 21 years. In contrast to Burholt's (2004) study conducted in Birmingham on Bangladeshi women's migration patterns, most of the MINA participants migrated directly to Cardiff rather than experiencing several moves within the UK before finally settling. The main reasons for migration were to accompany family (58%), economic reasons (26%) and for marriage (14%). The CMs mean age at migration was 30 years (SD=9.4), and most had born and were raising children in Sylhet prior to migration. Seventeen (46%) of the CDs were born in Bangladesh, and as the mean age at migration was 8.2 years (SD=6.8) accompanying family was their main reason for migration. The majority reported regular contact with family in Bangladesh maintained through frequent phone calls and regular visits. The varied migration histories of participants exert differential effects on nutritional and health status (both in childhood and adulthood), personal food preferences, the role that traditional food and cooking practices plays in one's daily life, and perspectives on ageing.

In terms of cooking practices, the BMs and BDs were more likely to report following the cooking practices of their mothers than the two generations of women living in Cardiff, although the CDs were the least likely to cook like their mothers. Whilst some CMs and **BMs** were adapting their cooking to promote health (for example, reducing fat and salt content), they consistently emphasised that this negatively impacted on the taste, and for some family members this raised issues of palatability:

*“In this country (Wales) you need to put a bit more oil in cooking. In our country you need less oil. In this country if you don't put a bit more oil, everything tastes **bland**” (CM13).*

Adding salt to cooking was the norm amongst participants. There was evidence of behaviour change by some CMs as, for example, five out of the seven who reported reducing their salt intake had self-reported being diagnosed with hypertension. Their daughters had not been influenced by this behaviour change to the same extent, despite reporting wider access to a range of nutritional information sources, including school based education and the Internet. Whilst addition of spices were acknowledged as enhancing taste, several of the CMs reported reducing spice content because of gastrointestinal problems.

All participants recognised that food is crucial to promoting good health and understood the importance of good nutrition. However, a diagnosis of a risk factor or disease was a key motivator or ‘a cue for action’ (Glanz, Rimer, and Lewis, 2002) for behaviour change. For example, participants diagnosed with type 2 diabetes were more likely to report eating fewer ready meals, savoury snacks and sweet foods and were less likely to use salt or add sugar to hot drinks. Our findings suggest that participants were more likely to alter food choices or modify their cooking habits as a result of the diagnosis of disease rather than as a preventative measure.

Consumption of fruit was low for all groups, with the highest consumption reported by CDs, of whom just over a quarter (27%) ate fruit more than 3 to 4 times a day. Just under a fifth of participants in Bangladesh rarely or never ate fruit. Although widely available, the cost of fruit in Bangladesh was a barrier to its consumption. Vegetable and rice consumption was lower in Cardiff-residing participants than their counterparts in Bangladesh. Cultural factors also influenced food consumption as indicated in the following quote:

“Never to waste anything away, I think that's a cultural thing, never throw anything away, eat everything that you got on your plate, I think that's a cultural thing. They [parents] would say, ‘there are poor people and we left Bangladesh to have all this food,’ and I think that's the key. Culturally, the social eating means you eat more. We grew up in a large family and we all ate more. There was always somebody making different things and it's almost rude not to eat when somebody offers you something.” (CD14)

Whilst avoidance of waste is not specific to Bangladeshi culture, the practice of cooking and eating communally tends to be more common in Asian than Western cultures. However this practice is now changing as the roles of second-generation Bangladeshi women are expanding due to wider opportunities outside the home become accessible to them. In an environment of communal cooking and food consumption, participants emphasised that trying to introduce changes in dietary habits was challenging, as it impacted on all family members. This approach to cooking and eating is also quite challenging for researchers and participants in monitoring individual food intake.

Consistent with the findings from Work Package 3, participants reported frequent exchange of nutritional and health information, especially from Wales to Bangladesh. For older CMs, health professionals, especially doctors, were the main source of nutritional information, whilst their daughters accessed wider information sources. In this sample, 75% of the CMs and CDs reported receiving healthy eating advice; however a fifth of CMs and one of the CDs reported that

this information was not helpful. As previously discussed, Cardiff-residing participants emphasised that there is a need for health promotion information in oral Sylheti, and for bilingual information sources, placed side-by-side on the same page in both Bengali and English as this aids intergenerational exchange of information.

Distinct differences were evident in self-reported health, emotional wellbeing, and level of social participation between generations and transnationally. Both generations residing in Bangladesh reported better health status than Cardiff-residing mothers and daughters, who were more likely to report their own health as poor or very poor. CMs were also more likely than BMs to report poor emotional wellbeing. Conversely, CDs reported better emotional wellbeing than their counterparts in Bangladesh. Many of the CMs reported feelings of isolation and loneliness, as reported by others (Victor, Burholt, and Martin, 2012; Phillipson, Ahmed and Latimer, 2003), although only one CM reported living alone. Lack of English proficiency, a paucity of culturally acceptable social activities and community spaces, and concerns regarding cold weather, physical safety, vulnerability and racism severely limit many older women's social connectivity and engagement with wider society.

For CDs, particularly those who are bi-lingual, most have benefited from gaining a UK-based formal education and engage fully in paid or voluntary work, further education, and in social activities connected with their children and the wider community. BDs who had also been provided with such educational opportunities acknowledged the benefits in terms of enhancing social mobility, connectivity, and life opportunities, but these opportunities were not accessible to all living in Bangladesh.

All participants residing in Sylhet lived in large, multi-generational households. Half of the CMs and 61% of CDs lived in nuclear or sub-nuclear structured households. These findings contrast with studies of Sylheti elders residing in Birmingham (Burholt, 2004a and 2004b, Burholt *et al.*, 2000) and London (Phillipson, Ahmed, and Latimer, 2003), where multigenerational households were the most common arrangement. Changes in household structure have important implications for the availability of support and future care of ageing Bangladeshi women in Cardiff. Additionally, adult daughters as opposed to traditionally sons and daughters-in-law are increasingly assuming responsibility for the care of ageing parents as a result of changing family structures, due to global migration of children and grandchildren. As the majority of CMs reported they would stay in the UK for the remainder of their lives, even though this had not been their intention when they initially migrated, some participants expressed concerns about their future care needs, as they may not have adult children living nearby who can provide care at home as they age.

Implications for Policy, Practice, and Product Development

Our findings indicate the importance of health and social care practitioners and policy makers being cognisant of the complexity of factors that influence Bangladeshi women's food behaviours, practices and health status. Cardiff-residing mothers and their daughters were making dietary changes, but often in response to a disease diagnosis rather than as a preventive measure. The diagnosis of disease or a related risk factor acted as the trigger for making dietary changes, often following medical advice. The roles of doctors and other members of the primary health care team in providing culturally tailored nutritional information need to be more clearly defined and enhanced; there is

also a need to provide accessible public health nutrition information in non-clinical, community-based settings. Family members are also an important source of health-related, cooking, food/plant and nutrition information in both countries and they exert a very strong influence on older women and their ability to make dietary changes. This finding emphasises the need for family members across all generations to have access to accurate nutrition information in culturally tailored and accessible formats, and to be involved in research that is conducted with their older Bangladeshi family members.

Applying dietary advice developed for the general population to the Asian diet was also reported by participants to be challenging. The Western ethnocentric concept of the Eatwell plate (National Health Service, 2013) is inappropriate for cultures whose food practices include serving multiple dishes, with individuals filling and refilling their plate several times throughout one meal. It is also the case that social eating can result in eating more, as individuals are less aware of the amount they are eating. These findings support the need for explicit guidance with respect to portion sizes. Providing recommendations with respect to portion sizes for males and females of different ages in ways that are easily implemented and better reflect eating behaviours, such as using 'handfuls,' may be more relevant. Portion size-focused recommendations may also be appropriate for the general population, as portions sizes have been steadily increasing and this trend is especially noticeable in countries such as the United States (US Human and Health Services, 2013), which also has high levels of obesity.

Within the next decade the number of Bangladeshi elders will significantly increase (Burholt, 2004a and 2004b). In Cardiff, daughters are assuming primary responsibility for the care of elderly parents. However, with wider opportunities available to women, changing family and household structures and greater geographical mobility of family members, it cannot be assumed that all families will be able to care for their elderly parents. Planning and provision of healthcare and social services need to take account of the diverse care needs of this growing ageing Bangladeshi population. This may be particularly challenging for cities such as Cardiff, where there is a smaller population density of Bangladeshis than in other areas of the UK (for example, Tower Hamlets and Birmingham, where culturally tailored services have been mainstreamed). Innovative strategies including the co-design and co-production of services (Joyner, 2012), which build upon the knowledge, skills and resources of the Bangladeshi community, may enhance the planning and provision of culturally acceptable health and social care services.

Conclusion

The results of Project MINA indicate that varied migration histories and changing family structures play an important role in influencing nutritional status, perceived and actual health status, and future health and social care needs of ageing Bangladeshis in the UK. There is a clear need for greater access to leisure facilities, day centres, and other social opportunities that can consistently offer culturally appropriate physical and social activities. Providing a social component in conjunction with a physical activity may promote engagement, particularly for older UK residing Bangladeshi women. There is a clear and critical need for further culturally relevant health promotion, disease prevention and public health campaigns for the Bangladeshi community, provided through a range of media and incorporating oral Sylheti. Nutrition-related health promotion messages and materials need to focus more on portion sizes as opposed to the concept of the

Eatwell plate which has limited relevance for communities who eat communally. Changes in family structures, wider employment opportunities for women and increased geographical mobility means that not all families may be able to care for their elderly parents. Future research should focus on the development of validated culturally and linguistically tailored research tools to assess the dietary intake and eating behaviours within this population. Additionally, more research needs to be conducted with family members and other key influences to gain a better understanding of the complex interplay between family dynamics, cultural norms and social influences that impact the ability of older Bangladeshi adults to eat more healthfully and engage in physical and social activities that promote healthy ageing.

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Table 1. Descriptive characteristics of Project MINA participants. Values represent mean (standard deviation) or percentages.

	Cardiff Mothers (n=40)	Bangladesh Mothers (n=22)	Cardiff Daughters (n=37)	Bangladesh Daughters (n=22)
Age (yr)	55.3 (8.1)	51.9 (8.8)	27.4 (5.5)*	22.8 (5.1)*
Height (cm)	147.7 (6.2)	148.8 (5.7)	153.2 (5.8)	152.7 (6.0)
Sitting height (cm)	77.4 (3.7)	76.4 (3.4)	81.4 (2.4)*	78.2 (3.0)*
Knee height (cm)	45.9 (2.4)	46.9 (2.4)	46.7 (2.5)	48.2 (2.3)
Weight (kg)	66.0 (13.4)**	53.5 (15.2)**	64.5 (14.5)*	50.8 (10.6)*
Waist circumference (cm)	97.9 (9.6)**	82.5 (14.0)**	82.4 (13.0)*	72.4 (8.3)*
Body Mass Index (BMI) (kg/m ²)	30.1 (5.2)**	24.1 (6.4)**	27.5 (5.7)*	21.8 (4.4)*
BMI category [†]				
Underweight	0%	13.6%	0%	22.7%
Acceptable risk	5%	40.9%	25.0%	40.9%
Increased risk	30%	18.2%	22.5%	22.7%
High risk	65%	27.3%	42%.5	13.6%
Physical function score [‡]	6.3 (3.0)*	9.4 (1.9)*	10.8 (1.1)	11.2 (0.8)
Age at marriage (yr)	16.3 (2.7)	16.5 (3.3)	18.7 (2.3) n=24	18.4 (3.8) n=7
Age when first child was born (yr)	20.8 (4.2)	23.2 (5.5)	21.3 (2.2) n=20	20.5 (2.6) n=6
Total pregnancies	6.6 (2.0)	5.6 (2.1)	2.9 (1.0) N=20	2.9 (2.3) N=7
Number of living children	5.6 (1.8)	4.9 (1.6)	2.6 (0.9). N=20	2.7 (1.5) N=7

*Differences between daughters are statistically significant ($p \leq 0.01$).

**Differences between mothers are statistically significant ($p \leq 0.01$).

[†]WHO BMI cut-off categories for South Asians: Underweight <18.5; Increasing but acceptable risk 18.5-23; Increased risk 23.1-27.5; High risk >27.5.

[‡] Score on the Short Physical Function Battery, maximum score = 12.

Figure Legends

1. **Figure 1** – Two examples of photos and short stories of ‘food environments’ from Project MINA. *Photo A)* Bishwanath, Sylhet Division, Bangladesh: Bengali food is traditionally cooked over a wood fire, and the vast majority of Bangladeshi women still prepare food this way. It’s not only a matter of tradition, but of economic status – cooking with gas is not an option for families in the countryside, and wood remains the cheapest and most readily-available fuel, providing over 60% of the country’s energy. The downside is constant exposure to wood smoke, which can damage the lungs. Salma, aged 22, says she suffers constant headaches, but does not regard this as a sign of illness; *Photo B)* “Londoni” diet in the UK reflects the mingling of the two cultures: a mixture of traditional food, with Bangladeshi herbs and spices, alongside Western snacks and fast food. Traditional Bangladeshi cuisine includes fatty ingredients like oil and ghee, but is generally balanced by fresh fish, fruit and vegetables. When migrants come to the UK, they often end up eating the worst of both worlds – the Western portion of this diet and low physical activity contribute to obesity and heart disease, especially among older women.

Photo A)



Photo B)

