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Cardiovascular Disease & Cancer Risk Among South Asians: Impact of Sociocultural Influences on Lifestyle and Behavior

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Abstract

A comprehensive literature review revealed cultural beliefs, societal obligations, and gender roles within the South Asian community to be indirect contributors to the health of South Asian immigrants (SAIs). Health professionals need to increase their work with SAI communities to change less beneficial cultural elements such as misconceptions about health and exercise, and lack of communication when using alternative medicines. Community engaged efforts and continuing medical education are both needed to improve the health of the South Asian immigrant population in a culturally appropriate manner.

Keywords

South Asian; Cardiovascular disease risk; Cancer risk; Culture; Lifestyle; Behaviour

Background

South Asian immigrants (SAIs) in various countries, including the U.S., have demonstrated a markedly increased risk of cardiovascular disease (CVD) compared to non-Hispanic Whites, as well as a high prevalence of CVD risk factors, including type 2 diabetes, obesity, metabolic syndrome, abnormal blood cholesterol and high blood pressure and sugar levels [1–10]. The high prevalence of CVD, along with its risk factors, among SAIs is multi-factorial [11], and likely caused by an interaction of genetic, environmental, and behavioral lifestyle factors [12]. Although lifestyle and behavior have been shown to significantly contribute to these disparities [13], less is known about the specific practices that constitute unhealthy lifestyles among U.S. SAIs or possible interventions to promote healthy behaviors [14–16]. There are significant cultural and religious differences among SAI, which impact lifestyle behaviors. It is important to recognize that most studies are limited to Asian Indian and Pakistani immigrants and findings cannot be generalized across all SAI. Disaggregated data on different SAI groups remains a critical gap in the literature.

Much of the literature on lifestyle behaviors among SAIs examines risk factors for CVD, but epidemiologic evidence also indirectly links lifestyle behaviors with cancer. A 2008 study, the first U.S. epidemiologic study of Indian and Pakistani immigrants with newly diagnosed cancer, found that cancer incidence profiles in these groups changed post-immigration to more closely reflect incidence rates of the general American population [17]. In India and Pakistan the most prevalent cancer sites for men and women are oral and cervical, respectively [17]. In the U.S. however, the top cancer sites for Indian and Pakistani immigrants are prostate and breast [17]. The population has also experienced increasing rates of colon and lung cancer [17]. Researchers attribute this epidemiologic shift to the adoption of several new lifestyle practices, including decreased physical activity, a decreasing rate of childbirth, and changes in diet [17]. Other countries with large South

Asian (SA) populations, including the United Kingdom, have experienced similar changes in cancer incidence trends [18, 19]. A large increase in breast cancer incidence among Indians in the UK has been attributed to obesity, often due to reduced physical activity and dietary changes [18, 20]. Although oral cancer has been surpassed by other cancers in incidence rates, oral cancer remains a major concern among SAIs, and is largely due to the prevalent use of smokeless tobacco products, which are explored in more detail in the Alternative Tobacco Product working group paper [21].

This working group examined the impact of specific behaviors common in the U.S. SA population related to physical activity, diet, fasting, acculturation, religiosity, sleep deprivation, circular migration, and alternative medicine, on CVD, diabetes, and cancer, and determined future research steps to inform policy measures to promote appropriate, healthy lifestyle choices for U.S. SA subgroups.

Methods

Available research on lifestyle and behavioral risk factors for CVD and cancer were catalogued to identify gaps and develop research priorities to address these gaps. A search of NCBI PubMed and Scopus databases using the following primary key terms was conducted: diet OR nutritional status OR nutritional sciences OR eating habits OR eating patterns OR physical activity OR physical training OR recreation OR physical inactivity OR sedentary OR fitness OR leisure OR exercise OR sports OR men only OR women only OR gender specific OR circular migration OR remittances 0R South Asia (n) OR India (n) OR Bangladesh (i) OR Pakistan (i) OR Sri Lanka (n). Additional articles were added based on Steering Committee suggestions. A total of 364 articles were found; articles were excluded from the review if they were not relevant to the working group theme. In addition, all working group members were asked to provide additional documents that related to lifestyle and behavior (white papers and abstracts), and to share programs and organizations addressing these issues, for review.

Results

Physical Activity

Insufficient physical activity is recognized as a significant, independent risk factor for CVD and other chronic diseases [22]. Studies of SAI have found that they have significantly lower levels of moderate and vigorous intensity physical activity than other racial/ethnic groups, [22, 23] which may be partly driven by the idea that physical activity should be gentle and fluid and should not put too much stress or strain on the body. These beliefs may not be congruent with physical activity guidelines [24] in the U.S., leading to a mismatch between physical activity counseling and SAs' concepts of physical activity [25]. Several studies link physical inactivity to an increase in CVD risk among SAs, further compounding the increased genetic and biological susceptibility to CVD described in this population [26]. Studies suggest that regular physical activity helps reduce some of these biological risks, including adiposity, lipid and glucose profiles, blood pressure and endothelial and immune function [27–29]. A study conducted among SAs who participated in 5 h of exercise on a weekly basis demonstrated reduced risk of CVD by improving endothelial function,

increasing lipoprotein levels, and decreasing ambulatory blood pressure [30]. Other studies examining physical activity levels and CVD among SAs have also demonstrated a correlation between increased regular physical activity and decreased CVD risk [22, 31, 32].

Physical inactivity is also tied to an increased risk of metabolic syndrome [26]. One of the main risk factors for metabolic syndrome is central adiposity, measured by waist circumference [33]. Central adiposity is correlated with lower levels of physical activity [33]. In a study conducted among SAIs in New Zealand, over 80% of participants had waist circumference measurements that put them at increased risk for metabolic syndrome [33]. Low levels of physical activity among SAs also increase their risk for diabetes [34, 35]. Interventions addressing physical activity, overweight and obesity are important in targeting increased diabetes and CVD risk among SAs [36]. Among SAs who have already developed diabetes, Lawton et al. illustrated the importance of physical activity in the prevention and delay of diabetic complications [34]. Moderate increases in physical activity in diabetic patients can improve glycemic control, cardiovascular health, functional status, and longevity [37]. However, the study by Lawton et al. found that there is a perception in the SA community, especially among type 2 diabetics, that diabetes weakens their bodies in ways which cannot be reversed or delayed [11].

Cultural beliefs and practices often impact participation in physical activity within the SA community [34]. In a review of physical activity levels among SAIs in the U.S., Daniel et al. described cultural beliefs as significantly impacting perceptions of physical activity and its relevance to CVD, diabetes, metabolic syndrome (MetS), and other health issues [38]. Individual participation in regular physical activity is often seen as a violation of the SA cultural norm of putting family before self. Lawton et al. suggests that pressure on SA adults to fulfill social and financial obligations to kin (e.g. long work hours) may place particular demands and constraints on time, leading to a lack of opportunity to participate in physical activity [34]. A study by Zaman et al. correlated low physical activity levels among lower socioeconomic groups, due to limited time and resources [31]. There is also some evidence that SA Muslims consider the daily prayer or *namaaz* to be a form of exercise that promotes health [39].

Customary gender roles in SA groups also have a significant influence on physical activity levels. Some SA women participate less in recreational physical activity, in part because of religious modesty, avoidance of mixed-sex activity, and fear of going out alone [40–42]. Furthermore, women can face cultural stigma from their community and families if they participate in what is perceived of as leisurely or recreational physical activity [32]. Many women fulfill roles of caring for children and the home; exercise and personal time spent outside of the home is often viewed as culturally inappropriate [32]. For those women who do participate in physical activity, the primary motivating factors include weight loss, improving body image, and maintaining independence and mobility [32]. In a qualitative study of SA women in Chicago, women said that different life stages strongly influenced their physical activity [43]. Barriers to physical activity among younger women were family disapproval and perceptions that physical activity is unnecessary if you are “skinny”, physical activity decreased after marriage and having children, and chronic diseases constrained older women from more vigorous activity [43]. All women agreed that physical

activity is not a priority within SA culture, and that interventions must take into account cultural, religious, and family context [43]. Culturally salient intervention strategies might include programs in trusted community settings where women can exercise in women-only classes with their children, and targeted education campaigns to increase awareness about the benefits of physical activity across life stages [43].

For SA men, gender-linked barriers to physical activity may mirror some of those of women. A 2009 Canadian study examined the role of masculinity among senior SA men, identifying a wide spectrum of gender-linked health beliefs [44]. The study highlighted the view held by many SA men of vigorous activity as a means of paid labor; less vigorous activity, primarily walking, was seen as a social activity rather than as a health practice [44].

According to Daniel et al. cultural norms are less influential on SA individuals who are younger and have higher income, contributing to higher levels of physical activity, and, subsequently, lower blood pressure, lower BMI, and better mental health among these groups [38]. Additional reports, consistent with U.S. national statistics on socioeconomic status and its impact on health behaviors, describe that SA Indians' physical activity levels tended to be higher in men, younger individuals, and those with higher socioeconomic status [45]. However, low physical activity levels still exist for many. Among SA youth, Brophy et al. found that lack of encouragement and support from family members are barriers to participation in recreational sports and physical activity [46]. In in-depth interviews with male and female Bangladeshi teenagers, all participants indicated that family, school, and society in general were not supportive of participation in exercise [46]. Exercise was not seen as important for girls, there was fear of injury or illness for boys, and there was a general belief that both males and females should spend more time on school or working [46]. Participants further emphasized that more education and information on the benefits of physical activity need to be presented within a health context to parents and to the community, which should be encouraged to develop community level interventions [46].

In recent years, SA organizations and community clinics have implemented interventions aimed to increase physical activity levels, while simultaneously improving dietary intake and access to healthcare. The El Camino Hospital South Asian Heart Center in California operates a Heart Health Coaching Program that has demonstrated success in the community [47]. Trained volunteers regularly coach participants with culturally competent education on physical activity, diet, and stress reduction [47]. An evaluation of the program found that participants who were fully coached were more likely to have improved lipid values than those who were only partially coached or those who opted out of the program [47]. In addition, there are a handful of studies on culturally tailored physical activity interventions for SAI women which have shown some evidence of benefit. These studies illustrate the importance of religion, education, and immigrant generation when designing physical activity programs for the SAI community. There remain gaps in understanding the best way to deliver interventions to increase and sustain physical activity in different segments of the U.S. SA population [48–50].

Diet

There is significant variety in SAI dietary patterns depending on region of SA, religion, and immigrant generation. One study which focused on macronutrient intake among first generation SAIs to the U.S. showed BMI to be significantly related to total fat intake, physical activity, and Indian region of origin [51]. This study focused on migrants from north and south India where patterns of dietary intake of fat and/or energy nutrients differ [51]. Specifically, the data illustrate that immigrants from north India had higher mean BMIs and higher fat intake which could predispose them to more adverse health conditions [51]. A deficiency in fiber-rich food was noted among migrants from both north and south India [51]. SAI diets also include a high intake of fat spreads such as butter and margarine, and fried chicken [51]. A study conducted among the SAI Gujarati community in Atlanta and Detroit found that carbohydrate intake met dietary recommendations, while total fat intake was above recommendations and total protein intake was below recommendations.

Vegetarianism is common in South Asia; however, it is unclear if the SA vegetarian diet, which varies in components depending on region, leads to better cardiometabolic health. In some studies vegetarianism has been linked to reduced risk of insulin resistance, CVD, and breast cancer among SAs [52–54]. In a 2012 study, SA women were assessed for vegetarian status, BMI, insulin resistance, and vitamin B12 deficiency [52]. Results showed vegetarian women to have greater vitamin B12 deficiency, but less insulin resistance [52]. Non-vegetarian women were more likely to be insulin resistant; however, this trend disappeared when adjusting for BMI, indicating that overweight/obesity was a greater predictor of insulin resistance than vegetarian status [52]. A dietary pattern analysis in 892 SAIs in California and Illinois found two major dietary patterns: “animal protein”; “fried snacks, sweets, and high-fat dairy”; and “fruits, vegetables, nuts, and legumes.” A diet high in fried snacks, sweets, and high-fat dairy pattern was associated with higher homeostasis model assessment of insulin resistance (HOMA-IR) (β: 1.88 mmol/L uIU/L) and lower HDL cholesterol (β: −4.48 mg/dL) in a model adjusted for age, sex, study site, and caloric intake ($P < 0.05$). The animal protein pattern was associated with higher body mass index (β: 0.73 m/kg^2), waist circumference (β: 0.84 cm), total cholesterol (β: 8.16 mg/dL), and LDL cholesterol (β: 5.69 mg/dL) (all $P < 0.05$). The fruits, vegetables, nuts, and legumes pattern was associated with lower odds of hypertension (OR 0.63) and metabolic syndrome (OR 0.53), and lower HOMA-IR (β: 1.95 mmol/L · uIU/L) ($P < 0.05$). The study concluded that modification of major components of the animal protein and fried snacks, sweets, and high fat dairy dietary patterns may ameliorate metabolic risk factors. A study by Anthony et al. in the UK suggests that Asian Indians have better fruit and vegetable intake in comparison to their Caucasian counterparts but use more salt, which may be linked to high blood pressure [55]. A British study found that macronutrient intake was a greater predictor of breast cancer risk than general vegetarianism status [53]. Among breast cancer cases among SA women and matched controls, results showed that greater fruit and vegetable, as well as legume consumption, was associated with decreased breast cancer risk, more so than vegetarian status [53].

Dietary habits among SA diabetic patients and their perceptions of the barriers and facilitators to dietary change, and related social and cultural factors, are a current area of

research within the UK [35] and the U.S [56]. One study found that type 2 diabetic patients were reluctant to change their SA diet as they described the food as strength giving and highlighted a cultural expectation to participate in this diet along with their family members [35]. The study suggested that providers should focus on developing culturally appropriate healthy diet alternatives [35]. In a study of Asian Indians in California, researchers found that Asian Indian patients perceived their doctor's advice as "irrelevant" or "missing the mark" because the advice did not take into account the social and cultural relevance of food. Diet was not viewed simply as a behavior, but rather, food was seen as an important means through which Indians maintained a sense of continuity of their identity [56].

Changes in dietary patterns have played a major role in the growing incidence of colon, prostate, and breast cancers among SAIs in the U.S. and UK [17–19]. Researchers in both countries have emphasized that a dietary intake higher in fat, alcohol, and meat than typical SA diets have increased cancer risks [17, 18, 20]. One 2012 study from the UK assessed incidence of cancer among SAs using national cancer registry data, and attributed both rising colorectal and breast cancer incidence to changing dietary habits, especially among SA youth [18].

A large number of SAI will fast, either on a regular basis (for example, many Hindu people may fast 1 day each week) or as part of a religious observance (for example, Muslim people during Ramadan). Most of the health research on the SA community and fasting is related to dietary and metabolic patterns during the month of Ramadan [57]. During Ramadan, which is one month long, Muslims who adhere to the fast abstain from food and water from dawn to dusk; some individuals may also choose to abstain from medication [58]. Shariatpanahi et al. described that fasting resulted in less energy intake and increased insulin sensitivity in participants with metabolic syndrome [57]. Studies conducted with male type 2 diabetics in Iran found a significant reduction in patients' weight during Ramadan [58]. Another Iranian study of type 2 diabetics linked Ramadan fasting with beneficial effects on glycemia and lipoprotein levels when previous control was good and deleterious effects when previous control was poor [58]. This study found that plasma fasting glucose and serum fructosamine increased during Ramadan and returned to normal only after fasting ended [59].

Ziaee et al. evaluated weight, body mass index, glucose, triglyceride, cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), and very low high density lipoprotein (VLDL) in both male and female healthy volunteers ages 18–29 before and after Ramadan [60]. The results indicated a decrease in body weight and BMI during fasting in both genders. Glucose levels also significantly decreased in both genders [60]. There was no significant change in cholesterol and triglyceride levels. HDL levels decreased while LDL levels increased and no significant change was seen in VLDL [60]. Ziaee et al. discussed the consistency of his findings with other studies conducted on healthy volunteers fasting during Ramadan. Weight reduction and a decrease in BMI was consistent across both genders and across studies [60]. However, Ziaee et al. attributed discrepancies between studies on the effect of Ramadan fasting on lipid profiles to differences in dietary and physical activity profiles of study populations [60].

Nematy et al. conducted an observational study which examined whether Ramadan fasting has any beneficial effects on CVD risk factors among Muslim Iranians [58]. The study followed 82 volunteers with a history of coronary heart disease, metabolic syndrome, or cerebro-vascular disease [58]. Subjects attended a metabolic unit before Ramadan (baseline) and after 10 days of fasting [58]. A blood sample was obtained, along with measurements of blood pressure and BMI. After 10 days of fasting, the total cholesterol, triglycerides, VLDL-c, and LDL-c, significantly decreased, as did systolic blood pressure, and anthropometric measures including body weight and BMI [58].

It has been indicated that fasting has significant meaning to patients, and an important consideration for clinicians is how to care for patients with diabetes who may be fasting for the month of Ramadan [61]. Abstinence from food and liquid during daylight hours is observed by Muslim individuals during the month of Ramadan. Fasting can lead to hypo- or hyperglycemia and dehydration; in addition, some patients may not want to take oral medications during a fast. It is important to counsel patients with diabetes who intend to fast about how to fast safely and to adjust their diabetes medication prior to beginning any fast. Structured educational sessions specific to Ramadan have been shown to be effective. In an observational study, patients who fasted without attending a structured education session had a fourfold increase in hypoglycemic events, whereas those who attended a Ramadan-focused education program had a significant decrease in hypoglycemic events [61]. Fasting is not recommended for patients with poorly controlled type I diabetes or pregnant women with diabetes [62, 63] Resources for practitioners and patients are available through the American Diabetes Association [64].

Acculturation & Identity

Acculturation is an important determinant of successful integration into new societies. It incorporates adoption of the values, beliefs and behaviors of the host country while retaining those of the home country [65, 66]. Lack of acculturation among immigrants to “new” countries has a strong positive correlation with the development of acculturative stress, which is linked to psychological models of anxiety [65–67], but the link between acculturation and physiological outcomes is less evident. A 2011 study by Dodani et al. measured the level of acculturation (using the Suinn-Lew Asian Self-Identity Acculturation Scale-SL-ASIA) and its association with coronary artery disease (CAD) among SAs in the U.S [68]. In this cross-sectional study, researchers found type 2 diabetes to be significantly associated with higher acculturation [68]. After adjusting for age, duration of stay in the U.S. of 10 years or more was also found to be associated with CAD [68]. In an assessment of over 2000 Asian Indians living in the U.S. by Patel et al., women who lived a majority of their lifetime in the U.S. had slightly greater odds of being tobacco users (OR 1.02) [69].

Some evidence suggests that less acculturation to the U.S. may predict disbelief in one’s own ability to prevent chronic diseases, including cardiovascular disease and cancer. A 2006 study found that a U.S. sample of Hispanic women were more likely than non-Hispanic white women to believe that nothing could be done to prevent themselves from acquiring cardiovascular disease (22 vs. 11%, $p < 0.05$) [70]. With respect to SAs, Kandula et al. [15] found that, among a sample of Pakistani and Asian Indian participants, low levels of

acculturation were positively associated with the belief that heart attacks cannot be prevented (p value < 0.05). Another study also showed that, among SA women in Chicago, low levels of acculturation were positively associated with holding the belief that nothing could be done to prevent heart attacks [71]. The misconceptions regarding CVD prevention found in these studies among less acculturated participants may be explained by lack of knowledge, beliefs about fate [72], immigration [73], or gender roles [74]. For example, interviews of SA women in Canada found that many participants claimed their breast cancer was “in the hands of others,” explaining that other’s careless or malicious actions or divine power could have caused their cancer [72].

Religiosity & Spirituality

Religiosity and spirituality, important determinants of lifestyle and behavior, are distinct constructs, with the former associated with organized religious practice, and the latter associated with individualized practice [75]. Often used interchangeably, religiosity and spirituality are culturally-linked determinants of health beliefs and behaviors. Studies conducted in the general U.S. population provide evidence linking biological pathways (cardiovascular, neuroendocrine, and immune function) to religiosity and spirituality [76]. These studies have demonstrated that spirituality, religiosity, and meditation practices are often linked to less hypertension prevalence, lower cholesterol levels, and lower levels of stress hormones [76].

Among SAs in the U.S. one national study found that greater religiosity among older Asian Indian immigrants predicted less negative affect, allowing for improved coping abilities after stressful life events, including migration [77]. Clinical outcomes or biological impact of religiosity among this cohort was not studied. A 2013 publication by Bharmal et al. reviewed results of a cross-sectional survey evaluating the association of religiosity and overweight/obesity among Asian Indians living in California [78]. Results indicate that highly religious Asian Indians were more likely (OR 1.53) to be overweight or obese than low religiosity Asian Indians. However, the correlation differed by religious affiliation, with Muslims being the only group to have no significant association between BMI and religiosity [78]. Patel et al. found that among 2000 Asian Indians in California, men and women who reported higher levels of religiosity had lower odds of being tobacco users (OR 0.87 men, OR 0.86 women) [69].

Often tied to spirituality and religion, fatalism is a commonly held belief among SAs. In one comparative study of cancer patients, British SAs more frequently used fatalism as a disease coping strategy than British Whites [79]. In a 2012 systematic review of qualitative literature, Horne et al. identified fatalism as one of the core beliefs posing a barrier to engagement in exercise among older SAIs [80].

Sleep Deprivation

Sleep deprivation has been linked to increased risk of cardiometabolic diseases, such as diabetes, obesity, and hypertension [81, 82]. Research in the general population has also shown sleep deprivation to contribute to repeated circadian disruption, and impairment of the immune system, and to be potentially linked to cancer-promoting biological mechanisms

[83]. The effect of sleep deprivation on cancer risk has been shown to be especially relevant among night shift workers [83]. Given the occupations common among many recent SAIs, including taxicab driving [84], this may be a major point of concern. A 2009 study conducted among Gujarati adolescents in India found significantly lower BMI and body fat percentage among youth who were not sleep deprived versus those who were (less than 7 h per night) [85].

Circular Migration

Circular migration refers to the frequent travel of immigrants to and from their countries of origin [86]. Primary reasons for circular migration include access to more affordable healthcare [86]. Most of the literature exploring circular migration examines the behavior among migrant laborers from Mexico [86–88]. Due to their status as migrant laborers and the lack of regularity in their work schedule, many laborers lack health insurance in the U.S. and often return to their country of origin to address health needs [86]. Currently no published research exists exploring the issue of circular migration among SAs.

Complementary and Alternative Medicine (CAM)

According to the World Health Organization (WHO), traditional medicine, a term often used interchangeably with complementary and alternative medicine (CAM), is a set of knowledge and practices that are based on indigenous beliefs and experience and used to prevent, diagnose, and treat both physiological and psychological illnesses [89]. Immigrants often continue to follow traditional healing practices after migration; their health seeking behavior therefore frequently combines alternative treatment methods with Western medicine [90]. Use of CAM is widespread among SAIs, and encompasses several modalities, including Ayurveda and herbal remedies [91].

Strong networks of traditional practitioners in both origin and host countries provide alternative healthcare systems for SAs [91]. The traditional medicine system of India is often referred to as Ayurveda (“science of life”), which has its roots in folk medicine [91]. An extensive review of Ayurveda by Sumantran and Tillu states that the goal of Ayurvedic therapies is to ensure long-term recovery from disease by fortifying and revitalizing major body systems, and that it provides a more appealing, holistic approach for SA patients [91]. Over the last two decades the globalization of Ayurvedic practice has led to its increased popularity in the Western world [92]. Ayurvedic treatments are largely designed to restore the body’s natural defense mechanisms and self healing powers [91]. Additionally, Ayurvedic medication is used to treat various diseases, including obesity, high blood pressure, cardiovascular disease, diabetes, arthritis, and cancer [93].

Satow et al. conducted a study exploring the prevalence of Ayurveda use among Asian Indian immigrants living in Northern California [94]. 95% of the participants were aware of Ayurveda, 78% had knowledge of Ayurvedic products or treatment, and about 59% had used or were currently using Ayurveda for a range of health conditions [94]. Only 18% of those using Ayurveda had informed their physicians. Another study by Gupta et al. studied patterns and perceptions of CAM use among leukemia patients visiting a hematology clinic in north India and found that 56% of the participants mentioned alternative methods for

diagnosis and treatment and only about 4% of the patients informed their medical doctors about this practice [95]. Potential complications or adverse reactions of CAM and Ayurvedic medicine were not tracked in these studies and the topic has been largely unstudied.

Some SAIs use imported herbal medicines that have been found to contain harmful metals, such as lead, arsenic, and mercury [96, 97]. The New York City (NYC) Department of Health and Mental Hygiene continues to identify lead poisoning cases among NYC's South Asians associated with use of imported health remedies, including certain Ayurvedic supplements intended for a variety of health uses such as for general health, reproductive health concerns and diabetes control [97–99]. The Department also surveys local businesses to determine availability of contaminated products and has found that a range of imported health remedies contain high levels of lead, mercury, and arsenic [96]. In a 2008 UK study by Pieroni et al., Pakistani migrant participants living in the UK reported using herbal medicines for chronic illness, including diabetes and hypertension [100]. Up to 56 different herbal remedies were reported, and two-thirds of participants declared a preference for CAM over Western medicine [101].

The role of religion in CAM use is often significant. Some SA groups participate in traditional healing practices based on religious text and condoned by religious leaders. These practices include spiritual healing, medicinal herbs, mind/body therapies, and customized diets. Religious and cultural beliefs coupled with language barriers contribute to the popularity of faith healers, homeopaths and traditional medicine practitioners among SAIs [102, 103].

Conclusions

Each of the lifestyle behaviors explored in this working group require further integrated research that affect policy and community alike. Community-engaged research methods, which bring together researchers, stakeholders, patients, and community members, can be used to test novel or existing intervention models aimed at initiating and maintaining healthful behaviors among SAI populations. Potential agents include coaches, community health workers, peers, and families; potential settings include religious centers, health care systems, community-based organizations, restaurants, and workplaces; and potential audiences could vary across genders, generations, languages, faiths, and socio-economic status. Biomarker and microbiome data should be collected to evaluate impact and effectiveness. Once successful interventions are identified, SA community leaders and institutions should use their position as culturally and linguistically competent influencers to implement them.

The potential link between dietary patterns and cardiometabolic risk among U.S. SAs is a particularly important topic for further research and intervention implementation. Identifying potential dietary risk factors among U.S. SAs will require a more thorough understanding of diets by country of origin, religion, and immigrant generations. In particular, there is a need for dietary and other lifestyle data on rapidly growing SA groups, such as Bangladeshis and Nepalis. Another important focus of research should be to characterize optimally healthful diets that are culturally tailored for the various SA

subpopulations. Researchers have suggested that encouraging substitution of common SA diet staples (white rice and white flour) with healthier and relatively culturally acceptable items (barley, brown rice, millet, and couscous) is a potentially significant intervention strategy [104]. Partnering with SA restaurants to modify menus to substitute certain items for more nutritious foods is another emerging and potentially impactful approach.

Along with diet, future interventional research should focus on improving physical activity levels to reduce risk for CVD and its related risks. In this process, researchers should characterize physical activity that is both acceptable to SAs and effectively reduces CVD and cancer risk. Addressing the needs and preferences of diverse members of the SA community should be a focus of these efforts. Culturally appropriate interventions, such as unisex exercise classes for women and involving the whole family in exercise, have previously been shown to improve physical activity levels in the SA community [105]. Given the limited number of studies examining the association between physical activity and diet with cancer risk among SAs, further research is also needed in these areas. Cancer incidences among SAIs have evolved to more closely reflect patterns found in the West at the same time that certain SA and Western lifestyle behaviors have hybridized—trends that warrant further exploration [17].

Health professionals also have an important role in improving healthful behaviors in the SA population [105]. Continuing medical education focused on education of health professionals about the health risks and needs of SAs, as well as a heightened understanding of complementary treatments should be a priority. Further, advocacy efforts are needed to raise awareness about SA health among officials at the Office of Minority Health and the Department of Health and Human Services so that appropriate resources can be allocated towards research and programming aimed at improving the health of U.S. SAs.

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