Cultural Adaptations Addressing Diversity and Health Access in the Mediterranean Diet: A Realist Synthesis

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ABSTRACT

Background: The Mediterranean diet (MD) has been studied for its benefits, including metabolic risk factors, since the 1950s. In recent years, debates around barriers to access within cultural and environmental fields have arisen within non-Eurocentric cultural backgrounds. Using data related to health benefits derived from dietary components, this review will produce a map of MD modifications to match various cultures.

Methods: Foods and constituents of the MD were compared and analyzed to assess benefits for both healthy and metabolic disease states using both empirical and theoretical approaches. Databases (PubMed and Cochrane) were searched using terms for cultural diets and metabolic disease outcomes associated with the MD (e.g., HbA1C, cholesterol, waist circumference, weight, AST and ALT). One multicultural diet database was chosen to identify culturally specific foods that match components of the MD to each cultural affinity.

Results: Cultural alternatives to foods and components of the MD exist. However, there is modest research on the specific health effects of most culturally adapted diets.

Conclusion: While some evidence gaps exist, it is feasible to translate most components of the MD to diets suitable for various cultural affinities. Future research is needed to examine the overall effects of these diets based on MD macronutrient presentation and the barriers associated with cultural–religious dietary practices and access to foods. Healthcare practitioners may benefit from this as a resource and to facilitate inclusivity and cultural competency for a broader range of dietary behaviours.

Key Words Traditional diet, African diet, East Asian diet, South Asian diet, Latin American diet, Indigenous diet, metabolic health, heart health, cardiovascular disease

INTRODUCTION

The Mediterranean diet (MD) is well known amongst researchers and healthcare providers for its benefits in metabolic risk factors. Since its characterization in the 1950s, it has been thoroughly studied for its benefits in improving population health, glycemic control, and cardiovascular risk factors, and reducing the incidence of type 2 diabetes.[1] In addition to its health-promoting aspects, the MD is recognised by UNESCO as an Intangible Cultural Heritage of Humanity, due to its structure being one known interculturally for its ability to metabolically preserve health.[2,3] Compared with the Standard American diet (SAD) of refined carbohydrates, fatty meats, excess sodium, and limited-nutrient dense fruits and vegetables,[4] long-term adherence to the MD is shown to be beneficial for metabolic conditions such as hypertension, hyperlipidemia, fatty liver disease, obesity, diabetes, and reducing markers of oxidative stress.[1,5] Due to the exemplary amount of research and positive evidence for this dietary paradigm, it is widely celebrated by medical professionals and recommended to patients in support of their overall health.

Although a well-studied diet, there is some debate about the application of the MD, particularly concerning barriers to access within patient populations of various cultural backgrounds.[6-9] While studies have spoken to the benefits of the diet while eating foods native to Mediterranean regions such as Greece and Southern Italy, this provides a Eurocentric view on promoting healthy living, leading to discounting the possibility of healthy paradigms being constructed with foods native to individuals of other cultural backgrounds such as African, Latin American, Asian, and Indigenous Peoples. Evidence suggests that there is a lower adherence to following the MD in these populations because foods and recipes made popular by the MD are considered either difficult to find or foreign.[6-10] Cooking and preparing meals with unfamiliar foods ultimately leads to increased frustration and lack of desire; this should not be a barrier to health.

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The ease of global movement and high immigration rates to the United States and Canada are two factors that should motivate updates to cultural competency training, knowledge, and expectations for medical and other health professionals. Dietary recommendations must be made to accommodate various cultures if health promotion and dietary adherence is the goal. Research on diet and nutrition is a growing field and resources for patient education must follow suit. Within non-Eurocentric cultural backgrounds, reviews have provided preliminary evidence showing efficacy in adhering to a healthier diet while eating whole foods that are considered traditional and culturally native to the respective populations' regions (known herein as traditional foods).[8] These cultural dietary paradigms follow a similar eating pattern to the MD, but no evidence currently suggests foods contained in the cultural diets promote metabolic health benefits similar to those in the MD. As the MD is what is well known in the research and medical fields, the authors explore how the components of the MD can be adapted to fit various cultures while maintaining beneficial metabolic health outcomes. Information gathering has been suggested as the first phase in a heuristic framework for the cultural adaptations of interventions. As such, the aim of this review is to highlight the scientific evidence for alternatives to MD foods that are found in other cultural diasporas. To accomplish this objective, we created a simple framework of the MD, using its components for healthy eating, to demonstrate where alternatives are possible with the goal of creating a more culturally sensitive resource that could be used by medical and healthcare professionals to educate themselves and their patients.

METHODS

This realist synthesis highlights the components of the MD by isolating variables with purported health benefits and searching for scientific evidence showing where those variables can be found within other cultural affinities. Foods and constituents were analyzed to assess benefits for both healthy and metabolic disease states. Databases used include PubMed, Cochrane, and PMC, from inception to May 1, 2022. To account for major demographic groups, cultural diet paradigms are divided into six major groups outlined by the OldWays cultural affinity diet database.[11] Search terms include "traditional diet" in combination with the cultural groups and possible health markers such as BMI OR weight OR "waist circumference" OR cholesterol OR LDL OR HDL, as outlined below in Table 1. Different combinations of dietary components and regions as search terms were included to gather as many studies as possible to ensure that each cultural dietary paradigm was thoroughly researched. Health outcomes for people consuming their respective cultural diet paradigm were then compared with the SAD. Health outcomes used for comparing dietary paradigms include diabetes, heart disease, cardiovascular health, metabolic syndrome/disease, and weight maintenance. Metabolic disease state outcome measures may include hemoglobin A1C (HbA1C), triglycerides (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), total cholesterol (TC), waist circumference, overall weight, aspartate aminotransferase (AST), and alanine aminotransferase (ALT). Exclusion criteria for this review include nutritional supplements (i.e., natural health products or dietary supplements) used as therapeutic interventions, diets as clinical trials including dietary changes, and regions outside the six major cultural groups specified by OldWays. Each cultural dietary paradigm chosen for this phase of the research is outlined and defined by its respective traditional foods native to and eaten within the cultural region at present day. Reference tables were created using the cultural food information found throughout the studies to create a comprehensive list of foods that can be adapted for the MD framework.

RESULTS

Cultural Diet Paradigms

Mediterranean Diet: Evidence for Components

The MD was believed to have been first characterized in the scientific literature in 1958 as part of the first phase of the Seven Countries Study[12] observing cardiovascular health. Researchers

TABLE 1 Summary of Included Regions and Corresponding Research

Cultural Regions	Articles		
	Elicited with search terms	Met inclusion criteria	Used within this review and food charts
East Asia (Includes China, Hong Kong, Japan, Macau, Mongolia, North Korea, South Korea, and Taiwan)	5,544	92	12
Africa (Includes Ghana, Tanzania, Kenya, Sudan, and Cameroon)	167	60	18
Mediterranean (Includes Greece, Italy)	3,965	23	11
South Asia (Includes Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka)	113	25	9
Indigenous (Includes North and South American Native/Indigenous tribes)	457	104	13
Latin America (Includes Belize, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, and Panama)	48	30	14

surveyed middle-aged men from seven countries between 1958 and 1983 with a 5- and 10-year follow-up to assess mortality rates among the participants.[12] Although members from various continents were included, the study concluded that dietary patterns from both the Mediterranean and Japan showed lower rates of coronary heart disease and all-cause mortality.[12] This initiated decades of research to determine the validity of this study and hypothesize new conclusions surrounding metabolic health. Table 2 demonstrates dietary options in the MD commonly recommended by healthcare practitioners. The MD promotes a mostly plant-based diet abundant in fruits and vegetables, whole grains, proteins such as lean meats and high-omega fatty fish, olive oils, nuts, and seeds. Small amounts of red wine, dairy, sweets, and red meat are acceptable though not main staples of the dietary paradigm.[1,5,13] Herbs and spices are used and recommended to reduce the use of sodium to enhance flavour along with certain probiotic foods to support gut microbiota.[14] Most research describes the components necessary to designate a diet as Mediterranean, but few discuss the ratio of components. Based on various resources, the MD can be structured into the following macronutrient ratios:[5,15-17]

- 40–50% carbohydrates, including cereal beta-glucan, grains, fruits or vegetables rich in soluble and insoluble fibres, and flavonoids
- 10–20% proteins, primarily from fatty fish, lean animal meats, whey and plant sources
- 30–40% fats, from monounsaturated fats such as olive oil and polyunsaturated fats such as omega-3 fatty acids.

Greater adherence to the MD has shown to not only benefit cardiovascular health but also cognitive, endocrine, and metabolic conditions.[1,18-20] Studies repeatedly show that consistent consumers of the MD are more likely to have decreased levels of systemic inflammation, improved glycemic control lowering the incidence of type 2 diabetes, and a healthy body weight based on waist circumference. Romagnolo & Selmin[5] found adherence to the MD to be preventive, decreasing the incidence of atrial fibrillation and breast cancer in study participants, while Tosti et al.[14] highlighted the MD for its lipid-lowering effects and influence on the gut microbiota–mediated production of metabolites to support metabolic health. The volume of evidence is clear in support of the MD being a diet that promotes healthful lifestyles.

TABLE 2 Mediterranean Eating Paradigm Framework – Benefit derived for each component of the diet

	Fibre (whole grains)	MUFAs and omega-3 PUFAs	Lean protein	Flavonoids (fresh produce)	Probiotics	Seasoning	Drinks
Benefit derived	Reduced inflammation, increased viscosity, slowed glucose absorption	Reduced LDL-C, TGs and increased HDL-C	Improved weight loss and inflammatory markers Improved satiety hormones	Reduced oxidative stress	Reduced inflammatory markers and incidence of ulcerative colitis		
Mediterranean diet	barley buckwheat bulgur farro millet amaranth oats polenta rice non-refined bread couscous pasta	extra virgin olive oil local nuts and seeds avocado almond fish sesame seed	local seafood (mainly fish) clam flounder lobster mussel salmon shrimp squid tilapia tuna legume bean chicken duck egg	arugula spinach beet broccoli Brussel sprout carrot celery chicory cucumber eggplant kale leek mushroom onion potato radish rutabaga scallion sweet pepper turnip zucchini apple apricot blueberry cherry clementine fig grapefruit grape lemon melon peach pear strawberry tomato	ricotta goat cheese Greek yogurt brie feta halloumi	oregano basil clove bay leaf garlic mint parsley fennel cumin anise thyme tarragon rosemary sage pepper	red wine

MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid; LDL-C = low-density lipoprotein-cholesterol; TG = triglycerides; HDL-C = high-density lipoprotein-cholesterol.

African Diets

Research for the African dietary paradigm highlights the foods of rural Ghana, Tanzania, Kenya, Sudan, and Cameroon. The foods in this diet consist mainly of root vegetables as starches, local fruits, legumes, and animal proteins. The countries of origin for the dietary paradigm align well with the background of many Africans and Black Americans living in North America. In the United States, research showed Black Americans have a higher prevalence of uncontrolled blood glucose levels and unmanaged high cholesterol, and many also struggle with obesity and hypertension compared with White Americans.[11,21] Research in Tanzania showed that, as the population incorporated more Western, processed foods into their diet and decreased the proportion of traditional foods eaten, such as fresh fish, the prevalence of metabolic syndrome increased.[23] This research also showed how fishing from the local lake and consuming fish cooked in a traditional manner led to increased HDL levels and decreased ischemic heart disease markers.[23] When dietary interventions that included cultural foods and cooking methods were presented to African Americans, it was found that they had a positive impact on their mental health, helping them feel that they could not only manage, but reach their cardiovascular health goals and improve their health overall.[24] Research shows that this population has consistently received incorrect and inapplicable dietary recommendations.[21] Inappropriate dietary interventions show a lack of understanding of foods that are typically included in both Black cultures and African diets; promoting physician education on traditional African foods can be an asset to supporting improved cardiovascular outcomes for their patients. Dietary options are noted in Table 3.

Latin American Diets

The Latin American diets we discuss highlight foods consumed by people in Cuba, Mexico, Puerto Rico, and South America, as noted in Table 4. Traditional foods farmed and consumed in these regions include maize, beans, squash, turkey, chicken, fish, and local fruits and vegetables.[34] A traditional Mexican diet for example, favours fruits, vegetables and complex carbohydrates including legumes as a source of protein and fibre.[35] When people of Mexican descent adhered to a traditional Mexican dietary paradigm, they showed increased insulin sensitivity and decreased circulating concentrations of breast cancer risk markers in the blood.[35] Furthermore, it was seen that when Mexican descendants in America also consumed a more traditional dietary paradigm compared with those who consumed a SAD dietary paradigm, they had decreased inflammation (measured by serum C-reactive

TABLE 3 African Heritage Diet Eating Paradigm Framework – Equivalent foods for each component of the Mediterranean Diet[25-32]

Fibre (whole grains)	MUFAs and omega-3 PUFAs	Lean protein	Flavonoids (fresh produce)	Probiotics	Seasoning	Drinks
maize (cornmeal), millet sorghum rice amaranth Starches: plantain cassava yam cocoyam (taro) fufu (dough made of the above starches) potato	palm oil, peanut (ground nut) Fish: silver cyprinid (dagaa/ mukene/omena)	Plant-based: Lentil, bean pulse Fish: silver cyprinid (dagaa/ mukene/omena)	Leafy greens: kontomire/cocoyam leaves cowpea leaves collard greens (sukuma) amaranth leaves (aleefu) jute leaves (ayoyo, ewedu) cassava leaves bitter leaf (ndoleh) kale Vegetables: cabbage pea/green bean okra tomato palm nut/fruit corn Fruits: mango cape gooseberry papaya loquat passionfruit guava watermelon orange jackfruit banana plantain avocado pineapple lemon tamarind custard apple mulberry soursop	fermented maize products (banku, kenkey)		

MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid.

protein [CRP] and serum interleukin [IL]-6 levels) and lowered their risk of type 2 diabetes.[35] The traditional Mexican dietary paradigm has nearly identical proportions to the MD, and therefore appears to yield similar outcomes. Both dietary paradigms include a majority of fruits and vegetables, legumes, and whole grains, with a selection of healthy sources of fat, protein, and probiotics.

East Asian Diets

The East Asian dietary paradigm we review highlights foods of Hong Kong, Japan, China, Macau, Mongolia, North Korea, South Korea, and Taiwan. The most prominent traditional foods in these regions include seafood, local fruits and vegetables, legumes such as soya beans, rice, kimchi, and teas as described in Table 5. People adhering to the traditional Japanese diet showed healthy body mass indices, serum triglyceride levels, and low serum LDL cholesterol levels in addition to high HDL cholesterol and serum magnesium levels.[36] In China, it was found that a traditional diet favoured white meats, fish and seafood over processed or organ meats, all of which led to the population's low obesity rates.[37] This pattern mimics the MD in terms of the types of meats preferred to get the desired health outcomes due to their omega-3 polyunsaturated fat content. Green tea appears to be the most prominent drink in all the regions and has been shown to decrease cardiovascular disease risk.[38] In traditional Japanese diets, however, the sources of probiotics and fermented foods differ.[38] Asian Americans who assimilated in the United States and were consuming standard American diets were found to have a significant improvement in their insulin sensitivity and glucose metabolism once they adapted a traditional Asian diet.[39] Improvements were also seen in South Korea when the government mandated that all dieticians, nutrition specialists, and physicians alter dietary recommendations to preserve the traditional diet in their dietary interventions; results of this initiative included decreased risk of obesity and cholesterol levels within the country.[40]

TABLE 4 Traditional Latin American Diet Eating Paradigm Framework – Equivalent foods for each component of the Mediterranean Diet[33]

Fibre (whole grains)	MUFAs and omega-3 PUFAs	Lean protein	Flavonoids (fresh produce)	Probiotics	Seasoning	Drinks
maize amaranth quinoa teff	avocado pumpkin seed chia seed peanut	fish shrimp chicken turkey duck insect	tomato onion spirulina algae squash ouelite mushroom banana guanabana citrus fruit zapote anona prickly pear tejocote plum capulín guava jicama papaya pineapple mamey	tepache pulque mescal colonche jobo hobo colonche nawait pozol tejuino tesgüino piznate taberna	epazote honey salt onion vanilla	chocolate drinks pulque coffee tea aguas frescas (combination of fruits and flowers blended with sugar and water)

MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid.

TABLE 5 Traditional East Asian Diet Eating Paradigm Framework – Equivalent foods for each component of the Mediterranean Diet

Fibre (whole grains)	MUFAs and omega-3 PUFAs	Lean protein	Flavonoids (fresh produce)	Probiotics	Seasoning	Drinks
brown rice white rice wheat noodles corn corn grits barley oats foxtail millet sorghum	fresh- and salt-water fish dried fish shellfish sesame seed sunflower seed lotus seed peanut walnut almond hazelnut pine nut pistachio cashew	chicken duck goose raw fish fish boiled with soy roast fish boiled fish paste dried fish pork tenderloin rib chops dried legumes: soybean flour dried bean bean flour roasted broad bean tofu tofu product red/mung bean paste	spinach bok choy cabbage cauliflower tomato cucumber zucchini mushroom soybean sprout pea with pod mung bean sprout fresh or dried seaweed	miso soup seaweed pickle kimchi	soy sauce	green tea sanpin jasmine tea coffee awamori (millet brandy)

MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid.

South Asian Diets

South Asian diets discussed highlight the food of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Diasporic South Asians living in Western countries, such as the United Kingdom, are 1.5 times as likely to die of coronary heart disease compared with the Caucasian population when consuming similar diets to that of the Caucasian population.[41] This is because the European/Western dietary paradigm leads to increased LDL and decreased HDL in addition to increased insulin resistance and central adiposity.[41] Researchers explained that traditional South Asian dietary paradigms include a wide variety of lentils, which are a great source of fibre and low in fat, helping to regulate blood glucose levels, and such foods consumed by South Asians in Western countries led to significant delays in the development of hyperglycemia, hyperinsulinemia, dyslipidemia, glucose intolerance, and oxidative stress.[42,43] When glycemic responses were tested in South Asian individuals consuming traditional grains rather than Western grains, it was found that glycemic response to pearl millet (bajra) and barley, but not corn, was significantly lower than the glycemic response to white bread.[44] Research into why South Asian populations have such a high prevalence of unmanaged diabetes found that patients were not receiving diabetic diets customized to the traditional South Asian dietary paradigm, which decreased adherence to the prescribed diets.[45] When patients are encouraged to choose familiar foods that are cooked using familiar spices, they can retain their heritage and still achieve health parameters set out by the healthcare provider. Dietary options for this group are noted in Table 6.

Diets of the Indigenous Peoples of North America

The Indigenous cultural dietary paradigms include Indigenous Peoples/Nations living in North America (NA). While the term Indigenous may apply to any group of people native to a body of land, such as the Aboriginal and Torres Strait Islander, of Australia,[46] this section will discuss those of North America. The "Pima Indians," more appropriately named the people of the Akimel O'odham region, are the peoples most researched within the parameters of our literature search.[47-49] Additional papers were published on the Apache, Caddo, Comanche, Delaware, Ft. Sill Apache, Kiowa, and Wichita nations,[49] and the Cheyenne River Sioux.[48] Indigenous principles and practices described by and shared through stories of the Anishinaabe people were also documented.[9] Findings were therefore derived from these populations. The Indigenous peoples share similar natural resources as well as hunting and harvesting principles across various nations.[9]

TABLE 6 Traditional South Asian Diet Eating Paradigm Framework – Equivalent foods for each component of the Mediterranean Diet

Fibre (whole grains)	MUFAs and omega-3 PUFAs	Lean protein	Flavonoids (fresh produce)	Probiotics	Seasoning	Drinks
cereals and pulses: *khichdi/pongal/* *idli/dosa/* *dhokla/dal* *baati/zunka* *pitla bhakar/dal* *dhokli/handvo/* *thalipeet/puttu* *kadala/dal* *paratha* pseudocereals: buckwheat bamboo rice amaranth millet soybean semolina rice: white basmati parboiled brown wheat maize amaranth barley jackfruit flour plantain flour	Seeds: melon watermelon pumpkin cucumber flaxseed sesame groundnut mustard coconut clarified butter (ghee) nuts: peanut cashew almond walnut pistachio pine nut foxnut	lentil egg fish: salmon sardine hilsa other seafood goat meat beef lamb chicken paneer legume/pulse: groundnut chickpea pea green/ Bengal gram black/split gram kidney beans piegon pea horse gram moth bean black-eyed bean	Starchy vegetable: potato sweet potato corn yam taro root (colocasia) plantain jackfruit leafy vegetable: spinach fenugreek mustard amaranth	yogurt raita buttermilk cottage cheese/ soft cheese (paneer) curd pickled vegetable: gooseberry garlic mixed vegetable raw mango fermented vegetables fermented foods: *idli/dosa/dhokla/* *enduri pitha/curd/* *selroti/ambeli/* *khaman/sez/adai/* *vada/pakhala, panta* *bhaat*	pepper cumin cardamom lemon tamarind kokum vinegar onion garlic, fresh/dry raw mango powdered dried mango coriander ginger mint dill curry leaf turmeric saffron cinnamon, fenugreek seed mustard seed carom bay leaf nutmeg mace clove asafoetida fennel dried pomegranate seed nigella seed chile star anise chutney (dip)	buttermilk milk rasam jal jeera aam pora sattu drink lassi kanji nannari coconut water kashmiri kahwa torani

MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid.

A notable difference between nations was their location and whether they could farm, hunt, or harvest throughout the continent. Research showed that common practices of Indigenous peoples include farming, hunting, and harvesting based on sustainable practices and working to integrate spiritual beliefs into their food preparation.[9,47] In the scientific literature, there is a strong correlation between Indigenous Peoples of North America's traditional diets and better health outcomes, compared with worse metabolic health measures when consuming the SAD.[48,49] It is noted that various nations are in different stages of integrating SAD foods into their traditional diets, so data are presented for each end of the spectrum. Swinburn et al., explain that the SAD, compared with traditional dietary paradigms, is associated with a decrease in oral glucose tolerance and higher plasma cholesterol concentrations.[48] A study by Williams et al., reinforces this by stating that the Indigenous diet is associated with a lower risk of diabetes over the 6-year period studied.[49] These health benefits are associated with various Indigenous dietary paradigms favouring seasonally harvested plants and incorporating meats in limited quantities to ensure survival of the animals hunted in the regions.[47] Each nation chooses their farming, hunting, or harvesting practices based on availability of foods and resources in local areas and bioregions. All studies found that adhering to traditional diets and limiting integration of SAD foods improved health markers.[47-49] Dietary options for this group are noted in Table 7.

DISCUSSION

It is important to clarify boundaries between cultural diet paradigms and match them with groups based on location due to similar access to foods and natural resources. Each region shares similarities in resources and hence foods. By grouping nearby regions together, broad recommendations can be provided to patients by healthcare providers, allowing the patient's specific diet to be personalized based on variables such as religion, allergies, food intolerances, socioeconomic status, and seasonal availability of food sources. When dietary interventions aimed at improving health do not take cultural background into account, they rob the individual of this source of connection to their family and their people.[22] Educating healthcare providers on how to have a conversation about cultural diet results in prescribing customized dietary interventions that celebrate the patient's culture and are inclusive of their traditions. Physicians can feel confident when prescribing a patient's cultural diet, and patients can receive the same benefits when instructed to eat their cultural foods within the parameters of the MD. This may lend support to meso (community) and macro (policy and system) level factors that enable more widespread and specific considerations for food culture in public health initiatives.[50] For example, although both Canadian[51] and American[52] Dietary Guidelines promote individualized food choices, practitioners and patients may benefit from more detailed awareness and supportive tools to support shared decisions or adaptations around health-promoting diets.

Similarities to the Mediterranean Diet

The breadth of research available on the MD and its health benefits continues to grow with randomized trials and meta-analyses continuing beyond the date parameters set by this paper. The MD being the primary diet prescribed by healthcare providers to their patients may be due to its research and benefits being so thoroughly documented.[53] Other countries are now catching up

TABLE 7 Indigenous (Traditional Native American Diet) Eating Paradigm Framework – Equivalent foods for each component of the Mediterranean Diet

Fibre (whole grains)	MUFAs and omega-3 PUFAs	Lean protein	Flavonoids (fresh produce)	Probiotics	Seasoning	Drinks
amaranth corn flour mesquite wheat wild rice	salmon trout sunflower seed egg turkey	elk salmon trout mussel oyster chicken egg crab deer seal turkey pinto bean lima bean tepary bean bison	squash melon tomato local berries pepper bean turnip cabbage corn parsnip carrot swiss chard chile eggplant beet sugar snap pea zucchini rutabaga cholla (cactus) saguaro cactus fruit prickly pear wild greens: spinach lettuce cushaw squash	sufkee mikigaq fermented meat: walrus whale fish seal caribou bird egg	sage, sweetgrass onion cilantro garlic chile	tea plants: nettle, marsh tea horsetail red clover berries (leaves) fireweed devil's club yarrow plantain wild rose

MUFA = monounsaturated fatty acid; PUFA = polyunsaturated fatty acid.

and researching the effects of traditional diets on their respective populations, and the results are regularly positive towards traditional diets.[40] Based on the findings from this study, each cultural region reviewed shows evidence in supporting health outcomes similar to the MD. Metabolic markers such as HDL, LDL, blood glucose, and insulin sensitivity seem to all show improvements when eating whole foods present in all diet paradigms, and it is noted that cases of hypertension and type 2 diabetes decrease, especially among Black Americans of African descent where the prevalence of such conditions are higher.[7,8,11] Just as the MD has been broken down into its basic tenets, a similar approach can be taken with the traditional diets of the various regions discussed. Each cultural diet promotes a balance of whole grains, flavonoids and fibre from fruits and vegetables, lean proteins, and healthy fats to support the health of those who eat in this style. Various forms of probiotics and seasonings can also be added based on the specific cultural diet to support decreased sodium intake and a healthy gut microbiome.

Health Sustainability

While the results from the research outlined above demonstrate positive health outcomes with traditional dietary paradigms, the results also translate to those who share respective cultural backgrounds and who have immigrated to North America from their respective native country. When culturally relevant dietary interventions were introduced within African American study groups, not only did metabolic markers decrease as they pertain to cardiovascular disease risk, but there were also positive influences on psychological variables.[24] The participants felt a closer connection to their culture and thus had stronger adherence to the diet, including a stronger likelihood of continuing the dietary pattern once the study was completed.[24] This was also seen in Latin American populations.[41] Multiple studies have shown that dietary interventions with foods that are foreign, new, or difficult to include lead to lower adherence.[6-10] By allowing patients to connect to a culture, we go beyond the health benefits that come from a healthy diet to also include the mental and emotional connectedness that they feel when eating foods that have origins in their cultural background.[7,8] With the ease of transcontinental travel, not only is it wise, but it is becoming necessary, for patients to learn how to properly diversify their diet to ensure healthy dietary patterns wherever they reside. Culturally competent suggestions for diet patterns made by medical and healthcare professionals can not only help improve metabolic health outcomes, but also create trust in the guidance being given in order to sustain a healthy lifestyle. The MD no longer needs to be seen as simply suggestions that are strongly Eurocentric in nature, but rather as a framework that can be used to model a dietary paradigm to support metabolic health. Highlighting foods that fit within the framework that match the patient's cultural dietary habits can be seen as a jumping off point for healthcare providers to become more culturally aware and responsive to their patients' needs and decrease the barrier to access for both a healthy diet and positive metabolic outcomes.

Limitations

Limited data were available for analysis. Not all countries across the continents were studied, and the regions selected in this review represent a culmination of the countries and regions that had viable research on traditional dietary patterns with metabolic health outcomes. Many countries in Africa and East Asia, as well as Indigenous nations, have not been studied equally. More specifically the diverse diet of the African diaspora did not retain as many traditional foods as those from the native African countries. Our research infers relationships between geography and culture and does not include all cultures, stable or dynamic. The inclusion of the SAD type foods in the populations' diets must be considered as well. The extent of diversity among Indigenous nations led to varied food options based on land location, local availability, farming, hunting, and fishing practices in North America. The research available cannot report on the entirety of the continents based on these factors or the many Indigenous Peoples globally. Additionally, our synthesis is limited by the selection of scientific evidence sources; a more widespread search of databases or search terms may have increased the volume of information available to inform the framework. Our study did not incorporate traditional knowledge sources, Knowledge Keepers, or knowledge users outside the experiences of the author team. Future research that explores design, testing or refinement of adaptations should look to ethical and appropriate incorporation of traditional knowledge, non-Western/Eurocentric frameworks, and participatory research and evaluation designs.[54,55]

Another limitation in our realist synthesis is a lack of independent, blinded assessment of each of the constituents. It is possible that the open, iterative, and consensus-based approach taken to assessing the evidence may have influenced how elements in the framework were portrayed. However, high stakeholder engagement (in this case, authors) is an important feature of realist syntheses in achieving their goal of unpacking complex interventions.[56]

Our research question chose to prioritize cultural sensitivity; aspects of planetary health and sustainability as outlined by the EAT-Lancet Commission[57] were not specifically featured or factored into the frameworks generated.[53] Furthermore, cooking methods, portion sizes, and relative proportions of dietary macronutrients were not distinguished across all countries and traditional diets. It is likely that this evidence gap or specificity of evidence might reasonably alter the cultural frameworks generated through our review. More research is needed to know whether traditional diets yield similar outcomes with varied macronutrient proportions.

Future Research

Future research is encouraged to explore financial and environmental implications and introduce a culturally inclusive name for this adaptive dietary paradigm. Sustainability of various cultural diet paradigms in the diaspora is a relatively unexplored area of research that can help not only support people eating better but also understand the balance that comes with a more culturally diverse dietary paradigm and environmental consciousness, a

topic that continues to be an area of discussion. Exploring factors that influence access to food such as socioeconomic status, religious or spiritual practices involving food, migration and generational differences may also shed light on the influences to dietary adherence. The authors also propose that the MD prescription be renamed to that of a "Metabolic Wellness Framework" to accommodate and include dietary patterns from all backgrounds. Broadening the name allows for a wider understanding of possible dietary interventions that are relevant to a person's cultural background and includes traditional foods that are native to their cultural diet. This would increase the likelihood of experiencing the benefits of the MD without the risk of exclusion.

CONCLUSION

While the MD has been the primary focus of metabolic and cardiovascular research, there are ways of adapting it to include other cultures' dietary patterns. By adapting recommendations to various cultures and traditional diets, we allow individuals of various backgrounds to access the metabolic benefits of the MD without significantly altering cultural practices. This approach may help patients overcome barriers to health access and improve cultural inclusion within healthcare systems. The culture-specific frameworks generated by this realist synthesis might be used as a guide and a starting point for resources that can be developed for patients and clinicians alike when discussing diet with the goal of decreasing multiple barriers to health access that may arise.

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CONFLICTS OF INTEREST DISCLOSURE

We have read and understood the *CAND Journal*'s policy on conflicts of interest and declare that we have none.

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