



Food Sovereignty Indicators for Indigenous Community Capacity Building and Health

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Food insecurity, defined as a lack of stable access to sufficient and nutritious food, is a global public health priority due to its relationships with diminished mental and physical human health. Indigenous communities experience disproportionality high rates of food insecurity as a byproduct of settler-colonial activities, which included forced relocation to rural reservation lands and degradation of traditional subsistence patterns. Many Indigenous communities have worked to revitalize their local food systems by pursuing food sovereignty, regularly expressed as the right and responsibility of people to have access to healthy and culturally appropriate foods, while defining their own food systems. Food sovereignty is a promising approach for improving health. However, limited literature is available that identifies the diverse practices of food sovereignty or strategies communities can implement to strengthen their food sovereignty efforts. This article reviews the scientific literature and highlights key indicators that may support community capacity building for food sovereignty and health. The seven indicators are: (1) access to resources, (2) production, (3) trade, (4) food consumption, (5) policy, (6) community involvement, and (7) culture. A total of 25 sub-indicators are outlined to allow communities to understand how an indicator is operationalized as well as explore their own community's progress within each indicator. It is not expected that every indicator and their subcategories will apply fully to any given Indigenous community, and the application of these indicators must be adapted for each community's local context, however the indicators may provide support for building and assessing efforts to create more sustainable Indigenous food systems.

Keywords: food sovereignty, indigenous food sovereignty, food system, public health, health promotion

INTRODUCTION

Indigenous communities are disproportionately impacted by food insecurity, defined by the US Department of Agriculture (USDA) as the lack of access to enough food to ensure a healthy and active life (Coleman-Jensen et al., 2020). Food insecurity is associated with a number of diet-related chronic diseases (Seligman et al., 2007, 2010; Laraia, 2013; Gundersen and Ziliak, 2015). Among Indigenous people surveyed in Oklahoma, nearly 60% were food insecure, and, compared to those who were food secure, the prevalence of obesity, diabetes, and hypertension was higher among

those who were food insecure, even after adjustment for age, gender, study site, education, and income (Jernigan et al., 2017).

Food assistance programs such as the Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and Food Distribution Program on Indian Reservations, were developed to assist people with food insecurity by providing them additional resources to purchase fruits, vegetables, and other healthy foods. However, these programs were developed to augment household food supplies, not serve as the primary source of food for a household. Thus, households that experience more acute food insecurity, characterized by disrupted eating patterns and reduced food intake, are unlikely to receive enough food from these programs to become food secure (United States Department of Agriculture, 2006). In addition, these programs do not adequately address the root causes of food insecurity and may not be highly utilized in Indigenous communities (Jernigan et al., 2017). For example, one study found that WIC was used 16% less frequently by individuals living on reservations compared to individuals living off reservation (McLaury et al., 2016). This may, in part, be related to the limited food retail outlets on many reservations (O'Connell et al., 2011). Yet, these findings were consistent even among individuals who lived in communities where there was access to fresh foods, suggesting other additional barriers may hinder program usage (McLaury et al., 2016; Kelli et al., 2017).

Many Indigenous communities concerned about food insecurity, growing rates of diet-related disease, and inequities present in mainstream food systems, are actively working to restore their food systems through a food sovereignty approach. Food sovereignty is regularly expressed using the 1996 definition from La Via Campesina, a global activist group focused on the rights of Indigenous farmers, as “the right of people to have access to healthy and culturally appropriate foods, while defining their own food systems” (Global Small-Scale Farmers' Movement Developing New Trade Regimes, 2005). In 2007, at The World Forum for Food Sovereignty, over 80 countries signed a declaration stating:

“Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers. Food sovereignty prioritizes local and national economies and markets and empowers peasant and family farmer-driven agriculture, artisanal fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social and economic sustainability” (Declaration of Nyéléni, 2007).

The 2007 definition was more expansive to account for the power structures and governance that shape local food systems (Delormier et al., 2017). This declaration provided a widely accepted definition used by the United Nations and the World

Bank (Global Small-Scale Farmers' Movement Developing New Trade Regimes, 2005).

Similar to food sovereignty is the concept of Indigenous food sovereignty, which extends the focus of food sovereignty in a number of ways, including primarily by emphasizing not only a community's right but also their relational responsibilities to care for their food systems according to their traditional practices and beliefs (Morrison, 2011; Coté, 2016). The Indigenous food sovereignty movement, though based upon Indigenous knowledge developed over thousands of years, began to gain national and international recognition in the early 2000's, with the development of various groups such as the Working Group on Indigenous Food Sovereignty (WGIFS) in 2006. The WGIFS was developed based upon the need to recognize Indigenous voices in the various discussions taking place within the food security movement as well as within larger efforts of Indigenous peoples to exert their rights as sovereign peoples (Morrison, 2011), another key distinction between Indigenous food sovereignty and food sovereignty. The WGIFS was created to increase awareness of the underlying issues, concerns and strategies impacting food security in Indigenous communities and to apply culturally appropriate protocols and ways of knowing to issues regarding Indigenous food, land, culture, health, economics, and sustainability.

Food Sovereignty and Health Promotion

Indigenous food systems are considered a sacred gift from Creator to support the health and well-being of their communities (Coté, 2016). Indigenous food systems are ancestral, linking all people to their Creator, to each other, and other forms of life. Fishing, hunting, and foraging for Indigenous peoples are more than activities to fulfill nutritional needs; they help to promote health, emotional balance, mental clarity, and spiritual health. Exercising Indigenous food sovereignty supports communities taking greater control over their food systems by increasing traditional and healthy food access and reducing dependence on externally produced, packaged, and fast foods.

Indigenous food sovereignty mirrors many public health initiatives to address diet-related disparities through food system changes while also being a culturally-centered Indigenous model of health, making it an important area of focus for public health research (Story et al., 2009; Weiler et al., 2014). In recent years groups such as the Native American Food Sovereignty Alliance and the National Congress of American Indians Tribal Food Sovereignty Advancement Initiative have emerged to advocate for Indigenous communities seeking to achieve food sovereignty, building upon previous efforts, and strengthening the movement in the United States (National Congress of American Indians, 2021; US Food Sovereignty Alliance, 2021).

Indigenous food sovereignty can and does take on different meanings and approaches across different Indigenous communities. The First Nations Development Institute developed the Food Sovereignty Assessment Tool as a way to assess the food sovereignty of Indigenous communities (Bell-Shetter, 2004). This tool systematically examines community food assets in Indigenous communities including: access to healthy foods that are culturally appropriate; the ability to

produce food in a way that is sustainable; the ability to ensure that the food reaches all members of the community; provision of support for individuals providing the food; and policies in place that ensure control of the food systems and protect the resources needed to provide for the community. This tool is adaptive to different community settings, but does not produce quantified findings or provide methods to prioritize strategies to achieve specific goals. Other food sovereignty assessment tools provide checklist style assessments, but do not provide guidance for direct action or a way to evaluate progress (Woodley et al., 2006; Binimelis et al., 2014; Weiler et al., 2014).

This review aims to develop an improved understanding of the diversity of practices related to Indigenous food sovereignty and its potential to improve Indigenous community health. To accomplish this, we conducted a review of scientific literature, primarily in the area of public health, and identified publications where food sovereignty was used as part of a health-related initiative. We then reviewed and analyzed our findings to identify key indicators of food sovereignty that Indigenous communities can use to build their community food systems and improve health. Within each indicator we developed sub-indicators to allow communities to understand how an indicator is operationalized as well as assess their progress within that indicator.

METHODS

Author Positionality

This manuscript and described procedures were led by a Choctaw researcher and public health practitioner. In 2019, this researcher mentored two graduate students in the College of Public Health at the University of Oklahoma as they initiated the review of relevant literature. In 2020 and 2021 two additional graduate students in Oklahoma and California, both Indigenous, also assisted in conducting this review. The resulting Indigenous food sovereignty indicators were then reviewed and revised by a larger group of 7 Indigenous and 3 non-Indigenous scholars and practitioners working in the areas of Indigenous food sovereignty and health across the US and Canada. This diverse and inter-disciplinary collaboration provided value in considerations, utility, and implications of the produced indicators.

Narrative Review

This review took the form of a three-phase narrative review. A narrative review includes a comprehensive review of the previously published literature on a specific topic and narrative synthesis of this literature (Slavin, 1995). This format was chosen because it allows for presenting a broad overview of a topic, as well as varied perspectives on said topic. The review was conducted in 2019 and finalized in 2020. The findings were summarized and submitted for publication in 2021. The phases of the review are as follows: (1) article collection and exclusion; (2) content analysis; and (3) face and community validity review.

Phase One: Article Collection and Exclusion

Searches were conducted in English language using PubMed and ProQuest. Due to author language limitations this review was limited to English language publications in the geographic areas of the US and Canada. Urban, rural, and reservation communities were included in this search. The following search terms were used: Tribe OR First Nation OR Alaska Natives OR Indigenous OR Native American OR American Indian AND Food Sovereignty OR Food System OR Food Justice. These searches resulted in 1,126 sources. An additional 72 sources were then identified from a manual search of the identified article's references and cited reference searches.

The titles and abstracts of all of the articles were reviewed for relevance to food sovereignty, Indigenous communities, and health. Duplicate articles were removed ($n = 112$). Articles that described only food or agricultural growing practices, which comprised the vast majority of the publications, but were not related to Indigenous communities and health, wellness, or health promotion were excluded ($n = 832$). This left 182 articles, all of which were independently reviewed in full text by both students and the lead author.

Using Q-sorting methodology (Brown, 1996), each of the three reviewers sorted the 182 articles into "high," "medium," and "low" piles in terms of their (a) relevance to the search terms and (b) level of detail provided. The three reviewers then met in person and presented their articles and their rankings. Articles ranked as "low" by all three reviewers were excluded. These articles were those that, after full review by all authors, were determined to lack relevance to the study objective and/or sufficient detail. For example, articles that were heavily agriculture-focused and not related to health, and brief summaries that made only minimal reference to the concept of food sovereignty without describing its application or use within that particular publication or study, were assigned a "low" or "medium" ranking ($n = 103$). All articles that were rated "high" by at least two of the three reviewers were included in the next phase of the review. Articles ranked as "medium" were limited and their inclusion was determined on a case-by-case basis. This process resulted in 79 articles, all primary articles, that were included in the content analysis.

Phase Two: Content Analysis

A content analysis of the 79 included articles was conducted by the original three reviewers as well as two additional Indigenous graduate students and co-authors of this manuscript. The five reviewers assessed each article for descriptions of Indigenous food sovereignty and ways in which the concept was operationalized for health purposes within an Indigenous community. This phase, as well as the next phase, face validity, was guided by a community-based participatory research orientation used in previous research to build upon and identify new constructs and frameworks (Belone et al., 2016). Specifically, qualitative concepts within the articles were identified, sorted, and described by each reviewer independently and then discussed as a group. Concepts that were referenced repeatedly across most articles were deemed fundamental to operationalizing

Indigenous food sovereignty and identified as primary indicators. Reviewers then organized repeated related concepts as sub-indicators. Finally, the drafted indicators were compared to the four previously published food sovereignty assessment tools for general consistency (Bell-Shetter, 2004; Woodley et al., 2006; Binimelis et al., 2014; Weiler et al., 2014). A final list of indicators was then adapted to be comprehensive of all of concepts.

Phase Three: Face Validity

The key Indigenous food sovereignty indicators were then reviewed independently by a group of 7 Indigenous and 3 non-Indigenous scholars and practitioners. This group has expertise in nutrition, food security, cultural competence, traditional Indigenous foods, health disparities, food systems, and research design. These scholars hail from various communities across the U.S., providing diversity in lived experiences, cultural practices, and geographical considerations. Participants validated and expanded on the Indicators based on “real-world” praxis, resulting in the final Indigenous food sovereignty indicators.

RESULTS

Food Sovereignty Indicators

The synthesis of articles and participatory process resulted in a total of seven food sovereignty indicators: (1) access to resources; (2) production; (3) trade; (4) food consumption; (5) policy; (6) community involvement; and (7) culture (Table 1). The indicators include a total of 25 sub-indicators that operationalize the overall indicator and support communities to assess their efforts within each indicator. The indicators and sub-indicators are intended to be adapted to different Indigenous communities and circumstances, though applicability will vary based on a community’s cultural values, history, traditions, geography, governance, beliefs, resources, capacity, and goals. Some of the indicators may not be relevant to a given community and should be disregarded if they are not applicable.

Indicator 1. Access to Resources

Access to resources encompasses resources that are not just physical, but also the knowledge of the individuals living in a community. The physical resources of the community should provide sufficient farm-able land, water sources, and natural resources to ensure availability of culturally appropriate foods for the entire community (Woodley et al., 2006; Patel, 2009; Alkon and Agyeman, 2011; Alkon, 2012, 2013; Bernstein, 2013; Binimelis et al., 2014; Vesely, 2014; Gupta, 2015; IAASTD, 2016; Parraguez-Vergara et al., 2018). The applicability of this indicator will change depending on each community’s resources. For the Oneida people, the water sources are key, but for the Osage Nation, the tall grass prairie may hold a more significant place culturally than water sources. When looking at land, a community should have access to agriculturally viable and culturally significant land, and ensure that the land can be used for food production or to support traditional hunting, fishing, or gathering practices (Woodley et al., 2006; Creswell et al., 2011; Ehrhart, 2013; Meisner, 2013; Binimelis et al., 2014; Weiler et al., 2014; Carmen, 2016; Moreno-Calles et al., 2016; Peña, 2016).

Thus, access to land and decision-making with regards to land is significant. While food production is not the only focus or outcome of Indigenous food sovereignty, if food production is of a high importance to a community, it is necessary to use food-producing land for that purpose.

An important aspect of Indigenous food sovereignty is a push against corporate and industrial farming, which can damage land and hurt smaller farming operations (Global Small-Scale Farmers’ Movement Developing New Trade Regimes, 2005). Wildlife is another component of the resources that may be culturally significant. It is imperative that culturally significant wildlife be present on community lands and protected from overuse (Woodley et al., 2006; Patel, 2009; Creswell et al., 2011; Binimelis et al., 2014; Vesely, 2014; Weiler et al., 2014; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). Water sources should be kept pollution free and support long-term food production (Woodley et al., 2006; Creswell et al., 2011; Cherofsky, 2013; Binimelis et al., 2014; Vesely, 2014; Carmen, 2016; Moreno-Calles et al., 2016). This production is shaped by the individual Indigenous community; for example, a water-based community with cultural links to fishing may use water sources for fishing, being careful not to overfish, but another community may emphasize farming and use water sources to irrigate farmlands (Vesely, 2014). In order to plant and maintain food crops, it is necessary to have access to seeds for culturally significant crops accessible and available for exchange by local farmers and the community, not controlled by corporate agriculture (Woodley et al., 2006; Cherofsky, 2013; Binimelis et al., 2014; Breen, 2015; Carmen, 2016; Moreno-Calles et al., 2016; Peña, 2016; Daigle, 2019). An Indigenous community seeking to strengthen food sovereignty should also include individuals in the community that have agrobiodiversity knowledge and agroecological skills, including traditional Indigenous knowledge, to grow crops or tend to wildlife (Woodley et al., 2006; Patel, 2009; Altieri et al., 2012; Chappell et al., 2013; Cherofsky, 2013; Ehrhart, 2013; Binimelis et al., 2014; Vesely, 2014; Weiler et al., 2014; Jones et al., 2015; Moreno-Calles et al., 2016; Ellena and Nongkynrih, 2017). It is not enough to have access to the physical resources. Individuals must be present in the community that hold the knowledge and skills needed to use and maintain right relationships with those resources (Woodley et al., 2006).

Indicator 2. Production

Production looks at the steps in the process of the food supply chain from farm to table. It is necessary for the proportion of food producers in the community be high enough to ensure sufficient production (Woodley et al., 2006; Patel, 2009; Alkon and Agyeman, 2011; Binimelis et al., 2014). This often appears as localized production and consumption efforts, restoring sustainability to the community (Jones et al., 2015). Allowing for small farms to sustain production provides community members an opportunity to provide food for their communities without sacrificing their own financial well-being. It is not necessary for all food production to come from within the community, but it is key that the decisions to bring in outside food sources be made by the community

TABLE 1 | Food sovereignty indicators.**Indicator 1: Access to Resources**

Sub-indicator question/statements used for discussion and to operationalize the indicator:

Our community has access to enough farmland, water sources, and natural resources to ensure the production of culturally appropriate foods for the entire community.

The costs allow for small farms to develop and sustain food production in our community.

Culturally significant wildlife is present in our community and protected from overuse.

In our community water sources are kept pollution free and used for long-term agricultural production.

In our community there is access to seeds for culturally significant crops that are easily accessible by local farmers.

Individuals in our community have the knowledge and skills to grow crops and tend to wildlife.

Indicator 2: Production

Sub-indicator question/statements used for discussion and to operationalize the indicator:

There are enough food producers within our community to maintain adequate production for the community.

Food production, from farm to table, is controlled and regulated by the community.

Indicator 3: Trade

Sub-indicator questions/statements used for discussion and to operationalize the indicator:

In our community food prices are fair and affordable for all community members.

Food markets are profitable enough to maintain long-term success.

There is a balance of food items that are coming into the community and going out of the community.

Indicator 4: Food Consumption

Sub-indicator questions/statements used for discussion and to operationalize the indicator:

In our community we maintain sufficient access to affordable healthy foods and minimize processed food and fast food consumption.

All community members have sufficient food access, and food distribution systems are in place to provide for low-income individuals.

In our community adequate food options are available to all community members to ensure the health needs of each individual are met.

Indicator 5: Policy

Sub-indicator questions/statements used for discussion and to operationalize the indicator:

In our community, policies are in place to ensure local farms are able to access the resources needed to maintain production, and the over-use of natural resources are regulated.

Policies are in place in the schools in our community to ensure school menus are nutritious; the schools are making efforts to provide healthy and traditional foods to children.

Our community has policies in place to ensure sustainability of food resources, wildlife, and natural resources that are culturally significant.

Food councils are in place within the towns in our community to investigate food production, food security, and health.

Indicator 6: Community Involvement

Sub-indicator questions/statements used for discussion and to operationalize the indicator:

Our community has many knowledge holders, such as elders, who are able and willing to pass on knowledge.

In our community we provide pathways to transfer food knowledge and restore traditional food practices.

Educational activities and programs are in place to pass on traditional knowledge, nutrition, and food practices to youth in our community.

Our community supports women's rights and equality to promote well-being and traditional agricultural practices among youth.

Indicator 7: Culture

Sub-indicator questions/statements used for discussion and to operationalize the indicator:

Culturally appropriate foods are prioritized in our community.

The crops and wildlife needed for cultural foods and traditions are available and affordable to all in our community.

There are adequate opportunities for traditional ecological knowledge to be shared amongst the community.

(Global Small-Scale Farmers' Movement Developing New Trade Regimes, 2005; Vesely, 2014). It is also important that farms have reasonable costs and high enough income to maintain production long-term and to adequately support food producers (Woodley et al., 2006; Holt-Giménez and Shattuck, 2011; Binimelis et al., 2014; Peña, 2016; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). In this context, long-term production is viewed as production that continues beyond the foreseeable future, providing sustainability for generations to come (Native American Food Sovereignty Alliance, 2018). The next piece in the supply chain is processing and distribution. Crops should

be efficiently distributed to processing facilities or to vendors and community members (Woodley et al., 2006; Blain, 2010; Creswell et al., 2011; Meisner, 2013; Ruelle and Kassam, 2013; Binimelis et al., 2014). The underlying principle with processing and production is that the community is in control of the process and able to dictate the entirety of the food production process, whether this includes only internal resources or involves coordinating with external resources (Woodley et al., 2006; Creswell et al., 2011; Ehrhart, 2013; Meisner, 2013; Ruelle and Kassam, 2013; Binimelis et al., 2014; Peña, 2016; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018).

Indicator 3. Trade

The trading of food products is another key component of food sovereignty. Food prices should be fair and affordable for all community members; however, it is important that food markets are profitable enough to maintain long-term success (Woodley et al., 2006; Freedman and Bell, 2009; Patel, 2009; Alkon, 2012, 2013; Meisner, 2013; Binimelis et al., 2014; Peña, 2016; Grey and Newman, 2018). This balance is not easy to achieve, but high levels of food production can drive prices down while maintaining profits by externally selling surpluses (Freedman and Bell, 2009; Caspi et al., 2012). There should be a fair, transparent trading balance of food items that are coming into the community and leaving it (Woodley et al., 2006; Creswell et al., 2011; Holt-Giménez and Shattuck, 2011; Alkon, 2012; Ehrhart, 2013; Meisner, 2013; Peña, 2016). This balance can help lower consumer prices while allowing businesses to profit. Again, the community either controls or has access to decision-making to determine these aspects of the food trade.

Indicator 4. Food Consumption

Food consumption primarily focuses on food-related health of individuals within the community. Maintaining sufficient access to affordable healthy foods will minimize the consumption of processed food and fast foods (Woodley et al., 2006; Meisner, 2013; Binimelis et al., 2014; Goad, 2014). These processed and fast food items are prevalent in food deserts and food swamps (i.e., urban low-income areas), but can be replaced with fresh, local, healthy foods if production can sustain consumption and demand within the community (Blain, 2010; Ratcliffe et al., 2011; Leroy et al., 2015). It is also necessary to reduce and ultimately eliminate food insecurity amongst community members. All members should have access to sufficient food to maintain a healthy lifestyle, and food distribution processes should be in place to provide for low-income individuals (Woodley et al., 2006; Patel, 2009; Adamson, 2011; Alkon and Agyeman, 2011; Creswell et al., 2011; Holt-Giménez and Shattuck, 2011; Alkon, 2012; McMichael, 2013; Binimelis et al., 2014; Vesely, 2014; Weiler et al., 2014; Cidro et al., 2015; Leroy et al., 2015; Peña, 2016). In addition to having sufficient quantities of food, it is necessary that foods be nutritious to ensure healthy food consumption throughout the community (Woodley et al., 2006; Altieri, 2009; Patel, 2009; Adamson, 2011; Alkon, 2012; Bernstein, 2013; Kaufman et al., 2014; Weiler et al., 2014; Delormier et al., 2017; Food Sovereignty, 2018; Native American Food Sovereignty Alliance, 2018). Adequate healthy food options should be available to all community members to ensure individuals' health needs are met (Woodley et al., 2006; Adamson, 2011; Holt-Giménez and Shattuck, 2011; Leroy et al., 2015; Peña, 2016).

Indicator 5. Policy

In order to strengthen food sovereignty, Indigenous communities need self-governance or at a minimum the ability to influence policy to protect food resources and food producers (Jones et al., 2015). Land and resource regulations should be in place to provide fair resolutions over access to natural resources, ensuring local farms obtain the resources needed to maintain production

(Woodley et al., 2006; Creswell et al., 2011; Ehrhart, 2013; Binimelis et al., 2014; Addressing household food insecurity in Canada - position statement recommendations - dietitians of Canada, 2016; Carmen, 2016; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). Sustainability is important for maintaining food sovereignty. Sustainability policies should be in place that provide legislative support, secure resources for the future, and maintain community control of said resources (Woodley et al., 2006; Creswell et al., 2011; Alkon, 2012; Bernstein, 2013; McMichael, 2013; Meisner, 2013; Binimelis et al., 2014; Vesely, 2014; Weiler et al., 2014; Cidro et al., 2015; Moreno-Calles et al., 2016; Peña, 2016; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). In order to maintain these policies and monitor the food system, community food councils comprised of community members, smallholder farmers, leadership, and other stakeholders should be in place within the community influencing the local system's food production, food security, and overall health (Woodley et al., 2006; Patel, 2009; Creswell et al., 2011; Binimelis et al., 2014; Cidro et al., 2015; Peña, 2016; Daigle, 2019). These councils should be responsible for adapting policies with changing political environments and the needs of the community (Woodley et al., 2006; Creswell et al., 2011; Binimelis et al., 2014). Many Indigenous communities are fearful of the long-term impacts of genetically modified organisms and toxic contamination, and call for local governance of research on genetically engineered food and genetically-modified natural resources flowing into their communities (McAfee, 2008; Blain, 2010; Ehrhart, 2013; Carmen, 2016; Peña, 2016; Raster and Christina, 2017; Daigle, 2019).

Indicator 6. Community Involvement

Community involvement is a necessity for food sovereignty, providing pathways to transfer knowledge and restore traditional food practices. Women's rights and equality should be ensured, as they are closely connected to the health of children and contribute positively to traditional agricultural practices (Patel, 2009; Rudolph, 2012; Cherofsky, 2013; Ehrhart, 2013; Weiler et al., 2014; Peña, 2016; Delormier et al., 2017; Ellena and Nongkynrih, 2017; Lemke and Delormier, 2017; Daigle, 2019). Youth are key to food sovereignty implementation and sustainability (Gliessman, 2018). Efforts should be put into place to pass traditional knowledge, nutrition, and food practices from knowledge-holders, such as elders, to children and youth (Blain, 2010; Rudolph, 2012; Cherofsky, 2013; Meyer, 2014; Weiler et al., 2014; Cidro et al., 2015; Carmen, 2016). General community education and activities to promote traditional food practices and nutrition is also prevalent in communities working to restore food sovereignty (Blain, 2010; Rudolph, 2012; Goad, 2014; Meyer, 2014; Weiler et al., 2014).

Indicator 7. Culture

The final indicator focuses on the culture of the community, as culture is a right of Indigenous peoples (Carmen, 2016). The policies that are in place should ensure reconnection to culturally significant natural resources, whether these are crops or wildlife

(Woodley et al., 2006; Blain, 2010; Creswell et al., 2011; Breen, 2015; Carmen, 2016; Grey and Newman, 2018; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). These resources should be sustained for long-term use (Woodley et al., 2006; Creswell et al., 2011; Peña, 2016; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). To maintain traditions, natural resources, ancestral food practices, and their spiritual significance needed for cultural foods and traditions should be available and accessible to all community members (Woodley et al., 2006; Alkon, 2012, 2013; Rudolph, 2012; Cherofsky, 2013; Binimelis et al., 2014; Goad, 2014; Vesely, 2014; Weiler et al., 2014; Cidro et al., 2015; Jones et al., 2015; Peña, 2016; Delormier et al., 2017; Lemke and Delormier, 2017). A community will develop a definition for restoring its relationship to the land and make efforts to provide the opportunity for spiritual and physical reconnection to the community members (Meisner, 2013; Meyer, 2014; Cidro et al., 2015; Peña, 2016; Delormier et al., 2017; Lemke and Delormier, 2017). Ultimately, the policies that a community has in place should allow for the maintenance of culture and traditions (Woodley et al., 2006; Patel, 2009; Creswell et al., 2011; Alkon, 2013; McMichael, 2013; Binimelis et al., 2014; Vesely, 2014; Weiler et al., 2014; Native American Food Sovereignty Alliance, 2018; The Six Pillars of Food Sovereignty, 2018). Many Indigenous people feel a responsibility to support environmental conservation and protection (Lane, 2018). Policies should be put into place to sustain the natural environment and agrobiodiversity, achieving both food sovereignty and sustainability efforts (McAfee, 2008; Meisner, 2013; Goad, 2014; Weiler et al., 2014; Breen, 2015; Carmen, 2016; Peña, 2016; Raster and Christina, 2017; Daigle, 2019).

DISCUSSION

This narrative review is one of the first to identify indicators to build community capacity for food sovereignty and health. The indicators aimed to capture a diversity of practices and be adapted for use across the unique geographic, cultural, and political contexts of Indigenous communities. Designed to be implemented in talking circle or focus group formats with different segments of a community, including health planners and community leaders, the discussion of the indicators can support a community in identifying priorities and strategies for achieving community-defined goals. The inclusion of food sovereignty as a public health issue can bring together previously siloed segments of a community (e.g., agriculture, land use, commerce, health departments), fostering broader community engagement and support for the local food system, a process that, in and of itself, builds capacity for health (Jernigan et al., 2018; Bird Jernigan et al., 2019).

This review has several limitations. First, food sovereignty is largely absent from the public health literature. We found few articles that included both a food sovereignty and a health focus. Virtually all of the articles in this review were found in the fields of agriculture, community development, and Indigenous culture and education. Thus, the review likely missed relevant articles due to the review's focus. Food sovereignty, as an Indigenous

approach to food, food systems, and health, has not been included in the health literature to date. However, the potential of a food sovereignty approach to increase healthy food access and consumption and address long-term systemic problems related to food insecurity, poor diet quality, and poor health is significant (Jernigan et al., 2020a,b). Such an approach also responds to calls from Indigenous communities and researchers to support and promote Indigenous ways of knowing and models of health that are culturally-centered and thus more likely to be sustained over time (Jernigan et al., 2020a; Walters et al., 2020). Future research should identify ways that communities have applied a food sovereignty approach to improve health and how food sovereignty can be conceptualized within a larger model of community health promotion.

Secondly, while this review drew from a wide range of literature representing many Indigenous communities from urban, rural, and reservation contexts, these indicators are by no means applicable to all Indigenous communities and are intended to be adapted for each community as appropriate. It is expected that these indicators may lack feasibility or even relevance for some Indigenous communities and are intended only to add to the virtually non-existent literature on Indigenous models of health, within which we consider food sovereignty. Future work must assess the application and evaluation of these indicators and expound upon this effort.

Food sovereignty is of great interest to public health researchers and practitioners as it has the potential to reduce long-standing and pervasive diet-related disparities that have seen limited improvement from Western interventions aimed at improving individual dietary intake. Food sovereignty offers a culturally centered approach to improving a community's food system at the root causes of chronic disease, the inequitable food system, and does so in a way that may be more sustainable than external food security or health interventions. The proposed food sovereignty indicators can be used as a guide to foster discussion, community engagement, and capacity building toward a more sovereign Indigenous food system. The indicators can also provide framing for health promotion initiatives within Indigenous communities, supporting initiatives such as gardening, farming, harvesting, and cooking, all of which are important vehicles for traditional Indigenous knowledge. These efforts may aid in language and cultural revitalization and a much more holistic and integrated model for community health.

AUTHOR CONTRIBUTIONS

VB conceptualized and lead the study. VB, TM, CN, and TTA led the bulk of the writing. TTe and MM conducted early initial review and analysis. TB and SJ conducted a second review and analysis. TJ supervised and edited the manuscript. All authors contributed to writing, editing, and finalizing the manuscript.

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