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Food access interventions in American Indian and Alaska Native communities: A scoping review

Tribal Food Systems Research Fellowship

FIRST NATIONS DEVELOPMENT INSTITUTE

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Abstract

American Indian and Alaska Native (AI/AN) communities in the United States represent culturally rich food landscapes and traditions. Yet, food access in AI/AN communities remains a public health issue. Food access is influenced by a myriad of factors that may interact at different levels of the social ecological model (SEM). Using a scoping review methodology, we aimed to map the existing Indigenous community food access literature in the U.S. to the SEM to identify common SEM impact

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The authors declare no competing interests.

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Conceptualization, D.C., and N.R.; Methodology, D.C, and N.R; Investigation, D.C., L.M.P., and N.R; Data Curation, D.C; Writing – Original Draft Preparation, D.C.; Writing – Review and Editing, D.C., L.M.P., and N.R. All authors have read and approved the manuscript.

leve ls that food access interventions are targeting. We further reflected on AI/AN community food access intervention gaps to inform future intervention targets. A systematic search strategy was developed and carried out in the following electronic databases with search dates from 1988 to 2023: PubMed, CINAHL, SocIndex, Academic Search Premier, ERIC, and Google Scholar. We then carried out deductive content analysis through the lens of the SEM using qualitative software. Intervention targets were identified based on what changes were highlighted in articles at each SEM level. Fourteen articles met the inclusion criteria for the review. Interventions targeted the 'intrapersonal' and 'community' SEM levels the most, while the 'institutional' and 'public policy' levels were the least targeted. Food access was promoted in various intervention formats, including supporting community and/or school gardens; providing seeds; providing traditional foods at school, family, and community events; and providing meals to families. Our review found that valuable research has been conducted on AI/AN food access interventions with many interventions targeting multiple levels of the SEM. Our review highlights the importance of leveraging strengths in AI/AN communities to enhance food access, including through culturally aligned programs and traditional foods. Further collaboration between AI/AN communities and researchers may lead to the development of more informed multilevel interventions that further integrate Indigenous methodological and culturally based approaches to improving food access.

Keywords
food access, food insecurity, interventions, social ecological model, SEM, American Indian, Alaska Native, food sovereignty, Indigenous Peoples, scoping review

Introduction

American Indian and Alaska Native (AI/AN) communities in the U.S. represent culturally rich food landscapes and traditions. Yet food access in AI/AN communities remains a public health issue. Food insecurity is a social determinant of health (Blue Bird Jernigan et al., 2017) with higher social determinant burden a known reality in AI/AN communities (Nikolaus et al., 2022). AI/AN households are therefore at higher risk of food insecurity (Blue Bird Jernigan et al., 2017; Nikolaus et al., 2022; Stotz et al., 2022), as demonstrated by over seventy percent of American Indian (AI) individuals living more than a mile from a grocery store (Kaufman et al., 2014). Food insecurity is associated with a plethora of chronic health conditions, including diabetes, heart disease, cancer, and many other diseases (Blue Bird Jernigan et al., 2017). Factors contributing to AI/AN food insecurity include water insecurity, land loss, forced relocation, and environmental pollution—with all these noted factors impacting traditional food practices in Tribal communities (Stotz et al., 2022).

Historical and current public policies stemming from colonization have influenced food access throughout AI/AN communities (Coté, 2016). Colonization, including the forced removal from traditional homelands, forced cultural assimilation, and urbanization have contributed to Indigenous health disparities and inequities (Blue Bird Jernigan et al., 2020) and the prevalence of historical trauma (Coté, 2016). Diet-related diseases such as diabetes and hypertension that have a higher prevalence in AI/AN communities are also directly related to the ability to access healthy food (Coté, 2016). AI/AN food access itself is further impacted by barriers, including distance to food vendors and high cost (Chodur et al., 2016); however, food access does vary between rural and urban AI/AN populations. Tribal reservation areas, for example, often have much fewer healthy food vendors, including grocery stores and produce markets (Chodur et al., 2016). Regardless, food insecurity affects AI/ANs residing in both rural and urban areas. Seventy percent of AI/ANs reside or live near urban areas (National Council on Urban Indian Health [NCUIH], n.d.), yet the food insecurity challenges facing urban AI/AN populations are lacking in the literature (Stotz et al., 2022). Factors affecting food access for urban AI/ANs that have been identified include socioeconomic barriers, lack of transportation, and a need for more food access programs to improve the resources available for healthy food (Stotz et al., 2022).

Food access is influenced by a myriad of factors that may interact at different impact levels.

Individual health behaviors, for example, are affected by the interdependence and interaction between multiple levels of influence across the social and physical environment (Stotz et al., 2022). Given this, understanding food access from a holistic perspective may give better insights into formulating more effective intervention points. It is currently unclear, however, whether interventions conducted across AI/AN communities targeting food access have been addressing one or more levels of influence. Ecological models such as the Social Ecological Model (SEM) recognize that identifying different types of social and environmental influences is key to developing appropriate interventions. The SEM developed by McLeroy et al. (1988) has become the standard for public health and health promotion as it employs a comprehensive approach to addressing health behavior. The SEM levels include intrapersonal factors, interpersonal processes and primary groups, institutional factors, community factors, and public policy (McLeroy et al., 1988). Examining food access in AI/AN communities through the SEM may provide greater insights into current areas of impact.

There is evidence that some food interventions carried out in AI/AN communities have targeted different levels of the SEM (Ahmed et al., 2020; Kapayou et al., 2023; Morshed et al., 2016). For example, the CHILE (Child Health Initiative for Lifelong Eating and Exercise) randomized control trial intervention that was carried out with AI and Hispanic children attending Head Starts in rural New Mexico (Morshed et al., 2016). The CHILE study specifically aimed to increase healthy food access and nutrition at the family, institutional, and community levels. In another community-based program, a multidisciplinary team developed a community science approach to develop a collaborative research agenda with four Mid-western AI Tribes (Kapayou et al., 2023). The project aimed to promote community-level capacity to increase the growing of culturally important foods such as the Three Sisters through intercropping and soil health (Kapayou et al., 2023). The Eat Fresh intervention was conducted on the Flathead Reservation in Montana, and it aimed to improve food access through weekly fruit and vegetable boxes and in-person education sessions that targeted individuals and families (Ahmed et al., 2020).

The SEM may be one avenue to explore food access interventions in AI/AN communities as it opens up the ability to identify various levels of influence while being able to assess for intervention gaps present in current food access programs (Sallis et al., 2008). Identifying the most targeted levels within the SEM as it pertains to AI/AN food access interventions may be critical to better understand how communities are formulating impact. Progress has been made in working to address food access issues through programming, resources, and interventions in Tribal communities; however, gaps still exist. Therefore, there is a need to better understand the existing food access interventions in AI/AN communities to help inform future efforts. Although there are established food access programs anecdotally in many AI/AN communities, there is a lack of clarity on how such programs are implemented, what levels of impact they may be targeting, and the types of interventions that have been commonly employed for food access. Given this, a scoping review methodology was engaged to gain a better understanding of the food access landscape in AI/AN communities through the lens of the SEM. The objectives for this research were to:

1. Map the existing Indigenous community food access literature to the SEM to identify common SEM impact levels that food access interventions are targeting, and
2. Reflect on AI/AN community food access intervention and SEM impact gaps to inform future intervention targets.

Positionality

There is substantial need for more acknowledgement and recognition of Indigenous knowledge systems and methodologies that include the platforming and highlighting of the positionality of those writing by, with, for, or about Indigenous Peoples (Lock et al., 2022; Roach & McMillan, 2022). Therefore, the authors of this review position themselves as Indigenous scholars committed to working to improve the health outcomes of Indigenous Peoples and communities. The first author (DC) is from the Diné and White Mountain

Apache Tribal Nations in the U.S. The second author (LMP) is a member of the Aamskapi Pikuni (Blackfeet Nation) in the U.S., and the senior author (NR) is an Indigenous health scholar and a member of the Deninu K'ue First Nation from Denendeh in northern Canada.

Methods

The framework outlined by Arksey and O'Malley (2005) was engaged for this scoping review, and the scoping review protocol was registered on the Open Science Framework (OSF) (Carroll & Redvers, 2022). We chose a scoping review format specifically due to its strengths in being able to scope the existing literature landscape on the given issue including the identification of key gaps. Additionally, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) reporting guidelines were followed for this review as it provides standardized guidance (e.g. a checklist) and enhances reporting quality (Tricco et al., 2018).

Search and Sampling Strategy

A systematic search strategy was co-developed with a research and education librarian from the University of North Dakota School of Medicine and Health Sciences. The following electronic databases were searched for relevant articles: PubMed, CINAHL, SocIndex, Academic Search Premier, and ERIC. Google Scholar was additionally searched through a review of two pages at a time until there were two pages with nothing of relevance found. Manual searches were conducted in the International Journal of Indigenous Health; the Journal of Agriculture, Food Systems, and Community Development; the Journal of Indigenous Wellbeing: Te Mauri-Pimatisiwin; and the UNM Native Health Database (see Table A1 in the Appendix for example search terms). Search terms were used that encompassed varying concepts in relation to food insecurity as well as interventions with AI/AN Peoples (see Appendix). All articles identified in the search strategy were exported into the Covidence (Covidence software, 2023) review software to facilitate the article screening process. Reference lists of key articles were additionally reviewed for relevant articles of interest.

Inclusion Criteria and Article Selection Process

Articles were included in the review if they were peer-reviewed English language articles with a research intervention design (i.e., quantitative, qualitative, mixed methods), rather than theory-based articles, that described interventions where participants were >50% AI/AN. Since the SEM was introduced as a key model in 1988, we included articles published from 1988 onwards. We included articles with intervention studies that aimed to address food access within AI/AN communities, and that additionally provided participants with any type of food (e.g., cultural/traditional foods, fruits, vegetables, seeds) as a result of their participation in the intervention.

A two-stage process was implemented to determine article inclusion. First, the titles and abstracts of 100% of the articles identified through the search strategy were screened by two reviewers (DC, LMP) and any discrepancies were resolved by discussion with a third reviewer (NR). One reviewer then screened 100% of the full text articles identified in the first stage of the article selection process (DC), with a second reviewer screening 25% of the full-text articles to ensure consistency (LMP). A third reviewer was brought in to resolve any discrepancies by discussion (NR).

Data Extraction and Analysis

One reviewer completed 100% of the data extraction from the included full text articles (DC), with a second reviewer cross checking a random sample of 10% of the articles (LMP). Data charting was completed in Excel 365 and included the following elements: general article information (citation, year); level(s) of SEM targeted; evidence of SEM level(s) targeted; type of food access; rural or urban setting (if known); geographic location; specific AI/AN Tribe (if specified); total number of participants, including number of AI/AN; type of intervention design; source of funding; intervention aims and outcomes; and whether the article was open access. See the supplemental file to this article for full details.

The overarching methodology outlined by Golden and Earp (2012) guided our data analysis to identify intervention activities and their specific targets for change within the SEM. An *a priori* cod-

ing system was developed that was intended to capture intervention activities and outcomes, targets for change, program settings, and any theoretical bases mentioned in the included articles (Golden & Earp, 2012). Intervention targets were identified based on what changes were highlighted in articles at each SEM level (see Table 1). Two reviewers developed and pre-trialed the coding system to ensure consistency (DC, NR). We then carried out deductive content analysis through the method described by Kyngäs and Kaakinen (2019) through the lens of the SEM. One reviewer coded 100% of the data (DC) within NVivo 14, with a second reviewer performing regular coding audits to ensure agreement within the data analysis process (NR).

Results

A total of 395 articles were screened for this scoping review with fourteen articles meeting the inclusion criteria for further analysis (see Figure 1). Twelve of the studies were published after 2016, indicating that most of the food access literature in AI/AN communities has been carried out within the last seven years. Authorship overlap was noted in four of the fourteen included studies (Haslam et al., 2023; Ornelas et al., 2021; Ornelas et al., 2017; Taniguchi et al., 2022), with additional noted overlap in funding sources between studies with nine being federally funded. Many of the studies occurred in the Southwest region of the U.S. (n = 5), with studies also occurring in the Northern Plains region (n = 3), Alaska (n = 2), the Pacific Northwest (n = 2), and in Oklahoma (n = 2).

Five of the studies recruited from two or more Tribes, including the Traditional Foods Program study (DeBruyn et al., 2020) that was carried out with seventeen unique Tribal partners. All studies were carried out in rural areas, while two studies additionally included urban areas in addition to being rurally focused (Davis et al., 2003; DeBruyn et al., 2020). Six of the studies utilized a mixed methods design that included both quantitative and qualitative data collection processes; another six of the studies utilized quantitative methods; and the remaining two studies used a qualitative method design. The number of participants greatly varied among the studies, with study sample sizes ranging from 12 in the Yéego Gardening intervention (Ornelas et al., 2017) to 1,704 in the Pathways study (Davis et al., 2003). Surveys and focus groups were the most used data collection methods used across the 14 studies. See Table 2 for the full data characterization of the included studies.

Type of Food Access and Key Findings from the Interventions

The type of food access interventions varied across the included studies. Food access was promoted in the studies through various means, including sup-

Table 1. Social Ecological Model (SEM) Intervention Categories and Targets for Change

	Intrapersonal	Interpersonal	Institutional	Community	Public Policy
What are the targets for change among AI/AN interventions across SEM levels?	- Eating behaviors - Traditional foods consumption - Attitudes toward traditional foods - Self-efficacy for eating fruits and vegetables and growing food - Knowledge on gardening, food preparation, and nutrition - Perceptions of traditional foods - Goal setting	- Knowledge on food choices, cooking, and preservation - Role modeling healthy food behaviors - Gardening capabilities - Increasing cultural identity - Self-monitoring behaviors	- Fostering food access and healthy meals - Promoting positive organizational attitudes toward traditional foods - Organizational capability to promote food access and/or gardening	- Enhancing social norms around gardening and traditional foods - Increasing knowledge on food plants - Positive perception of community change - Increased collective efficacy for gardening/farming	- Addressing barriers to gardening and food access - Increased community engagement and knowledge on policy - Tribal support for policy change that supports food access

porting community and/or school gardens; providing seeds; providing traditional foods at school, family, and community events; and providing meals to families. Food was directly provided to children in schools, as well as to families through early childhood education programs in some studies (Davis et al., 2003; Mattingly & Andresen, 2016; Taniguchi et al., 2022). Vouchers were also prescribed to participants to access fresh and frozen produce as well as traditional foods in the Produce Prescription programs (Budd Nugent et al., 2022).

Food access interventions were found to have varied impacts, including increasing traditional food intake, increasing capacity for gardening and/or farming, as well as overall increases in access to food (Armstrong, 2000; Bersamin et al., 2019; Cueva et al., 2020; DeBruyn et al., 2020; Ornelas et al., 2017). Increased access to fresher and healthier foods through vouchers and educational sessions were also found to be important in some of the studies (Budd Nugent et al., 2022; Haslam et al., 2023; Mylant et al., 2021, 2021;

Figure 1. Adapted PRISMA Diagram

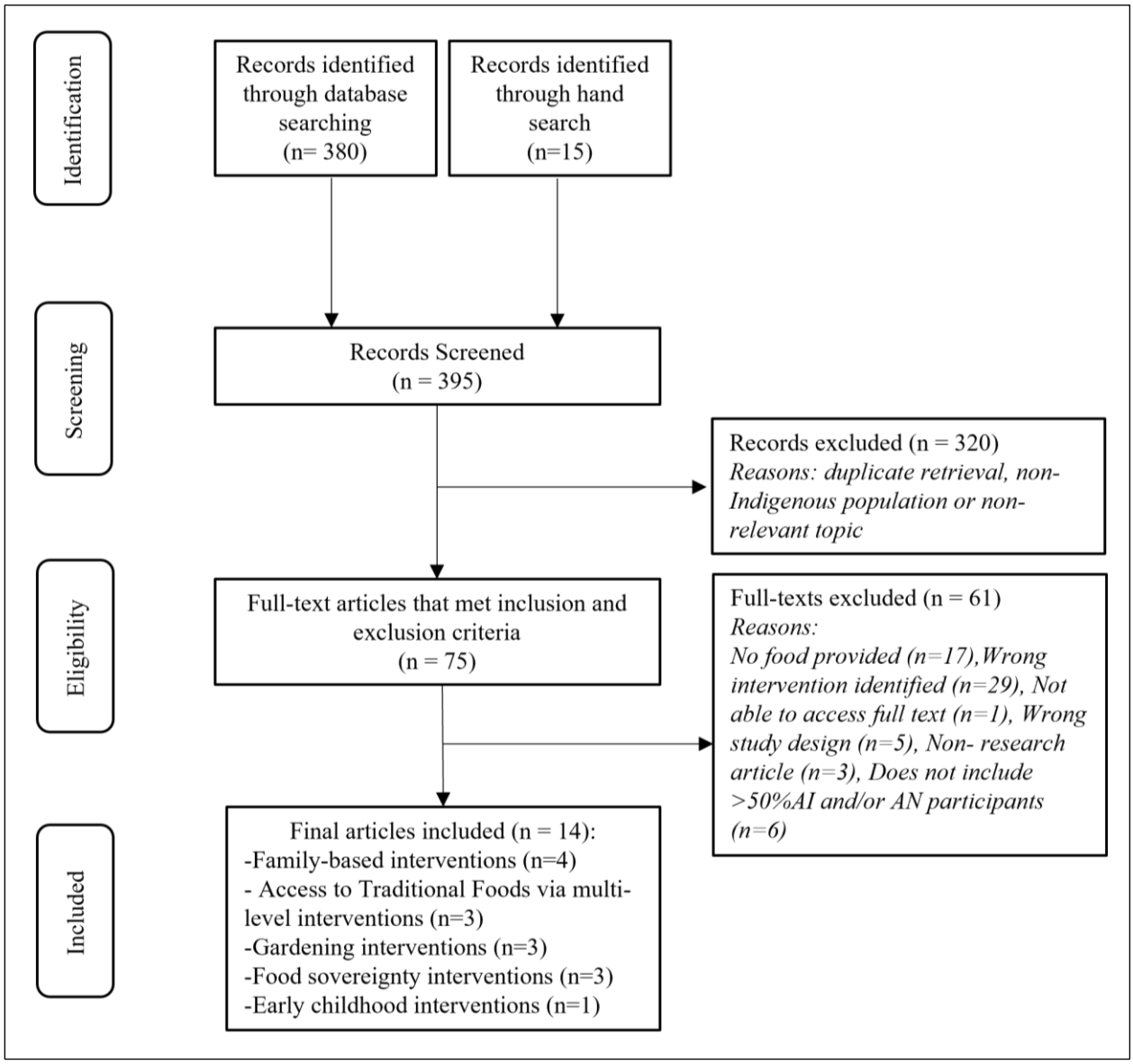

Table 2. Descriptive Characteristics of the Included American Indian/Alaska Native (AI/AN) Food Access Interventions Studies

Author	Year	Geographic Location	Intervention Design	*n*	Level of Social Ecological Model (SEM) Targeted	Type of Food Access	Key Findings
Armstrong	2000	Northwest American Indian Tribe	Quantitative	Undisclosed	Intrapersonal, community	Community garden produce	Workshops designed to be social, Informational and involve community. Community garden established to improve access for participants and elders to fresh produce and encourage exercise.
Bersamin et al.	2019	AK	Quantitative	76	Intrapersonal, institutional, community	Traditional foods at school, and family and community events	Participants in the intervention group consumed more servings of fish (traditional food). Results also indicated positive association between traditional way of life and beliefs regarding skills to harvest and store salmon.
Brown et al.	2020	Northern Plains American Indian Tribe	Mixed methods	25	Intrapersonal, interpersonal, institutional, community, public policy	Vouchers for produce, garden produce, seeds	Community gardening and traditional ways of being were motivating factors for participants to grow food. The POMS* Inventory showed positive change for intervention participants in the gardening group. Food access was promoted for participants at sessions.
Budd Nugent et al.	2022	AZ, NM, UT, AK	Quantitative	Undisclosed	Intrapersonal, interpersonal, community	Food prescription vouchers (produce/ traditional foods)	Food access promoted through prescription vouchers. Vouchers supported the promotion of family- and community-level food access. Produce options increased to meet redemption needs by participants and also the general community.
Cueva et al.	2020	~US	Mixed methods	43 (interviews), 350 youth per year	Intrapersonal, interpersonal, institutional, community, public policy	Gardens, traditional foods	Feast for Future has supported cultural connectedness, intergenerational learning, the revitalization of farming and gardening, increased access to healthy foods, and positive changes among involved individuals and communities.
Davis et al.	2003	AZ, SD	Mixed methods	1,704 youth, 2,544 caregivers	Intrapersonal, interpersonal, community	Foods in classrooms, food at family and community events	Pathways curricula designed specifically for American Indians, deemed successful in introducing children and their families to healthful living, increasing their cultural identity, and promoting food access at family events.
DeBruyn et al.	2020	~US	Mixed methods	17 Tribal partners	Interpersonal, community, public policy	Garden, farming, traditional foods	The Traditional Foods Project (TFP) addressed social support and healthy diet factors associated with individual and community health. Partners developed local programs promoting food access in their communities. Results indicated that gardening, availability of healthy foods, and new health practices occurred and supported food access.

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Haslam et al.	2023	OK	Quantitative	94	Intrapersonal, interpersonal community	Meals at in-person sessions, food for parents	Primary outcome was an increase in vegetable and fruit intake among children. Researchers developed and implemented a hybrid curriculum. Modest participation in online component and more parent participation for in-person meetings where meals were provided. Food access was promoted at in-person sessions.
Mattingly & Andresen	2016	SD	Quantitative	12 staff, 15 Head Start sites	Intrapersonal, interpersonal, institutional, public policy	Food incentives, food in classrooms	NAP SACC** program focused on environmental policies and best practices promoting healthy weight development through healthy food access for children. Program successfully implemented across 15 Head Start sites.
Mylant et al.	2021	~US	Mixed methods	25	Intrapersonal, interpersonal, community	Family meals at sessions	Obesity rates among intervention groups remained the same while waitlist group increased by 20%. Focus groups revealed positive child behaviors to be strengths and adult disconnect to be a weakness. Food access promoted at sessions.
Ornelas et al.	2017	NM	Qualitative	12	Intrapersonal, interpersonal, community	School/community gardens, traditional foods, workshops	Community input was essential throughout the intervention. Community garden Intervention improved access to fruits and vegetables and traditional foods for participants.
Ornelas et al.	2021	NM	Qualitative	28 (focus groups), 2 youth classrooms	Intrapersonal, interpersonal, community	Meals, school garden, traditional foods	Traditional food activities and teachings emerged as key components of intervention. Community garden intervention improved food access for participants and local residents.
Sowerwine et al.	2019	CA, OR	Mixed methods	711 (surveys), 162 (interviews), 128 (focus groups)	Intrapersonal, interpersonal, community, public policy	Workshops, food camps	More than 1,300 educational events. Increased stakeholder knowledge and capacity to engage in transformative food system change. Native food workshops increased access to local foods. Pikyav Field Institute established to increase capacity to promote and sustain capacity for food access.
Taniguchi et al.	2022	OK	Quantitative	284	Intrapersonal, interpersonal, community	Family recipe kits	Changes noted in dietary intake, BMI, health status, systolic blood pressure, and food insecurity. Vegetable consumption significantly increased for intervention children. Access to local produce increased at ECEs.***

~ United States (U.S.) is used when the geographic location in the U.S. is undisclosed or there are a group of geographic locations; * POMS = Profile of Mood States;
** NAP SACC = Nutrition and Physical Activity Self-Assessment for Child Care; *** ECE = Early Childhood Education programs.

Ornelas et al., 2017). Food was brought into classrooms in studies targeting children (Davis et al., 2003; Mattingly & Andresen, 2016), with cultural connectedness, intergenerational learning, and overall capacity building to improve local food systems also noted in some of the studies (Cueva et al., 2020; Davis et al., 2003; DeBruyn et al., 2020; Sowerwine et al., 2019).

The Social Ecological Model (SEM) Levels Targeted by Interventions

When we examined the included articles through the SEM, we found that some explicitly stated which level(s) of impact they were targeting while others did not. We determined, however, that all of the articles described an intervention where multiple levels of SEM impact were identified. Notably, two of the interventions targeted all the SEM levels (Brown et al., 2020; Cueva et al., 2020). Thirteen of the fourteen included articles targeted the 'intrapersonal' level, while the 'community' level had twelve articles. The 'intrapersonal' and 'community' levels were the most targeted levels of the SEM among all the interventions. Twelve of the included articles targeted the 'interpersonal' level of the SEM. The 'institutional' and 'public policy' levels of the SEM were found to be the least targeted levels in our review. Table 3 depicts the SEM impact levels identified within the included articles which are further detailed below.

Intrapersonal level factors include individual level knowledge, attitudes, behavior, skills, and self-efficacy (McLeroy et al., 1988). Food access interventions targeting the intrapersonal level more specifically addressed eating behaviors, attitudes, and perceptions toward traditional foods and the consumption of traditional foods. The self-efficacy around eating fruits and vegetables and growing food were targeted as well as the knowledge of gardening, food preparation, and nutrition.

Interpersonal level factors may include family and kinship structures, which are important in AI/AN communities. Interpersonal processes and groups may include both formal and informal social networks and support systems (McLeroy et al., 1988). Interpersonal level food access intervention targets included knowledge on food choices, cooking, and food preservation. Role modeling and self-monitoring behaviors were also found to be important changes targeted at the interpersonal level.

Institutional level factors include social organizational characteristics and both formal and informal rules and regulations (McLeroy et al., 1988). Institutional level food access intervention targets included fostering food access and positive organizational attitudes toward traditional foods. Enhancing organizational capacity to promote food access and/or gardening was also found to be targeted from within institutions such as schools and Tribal & early childhood education facilities (Bersamin et al., 2019; Brown et al., 2020; Cueva et al., 2020; Mattingly & Andresen, 2016).

Table 3. Social Ecological Model (SEM) Article Distribution among American Indian/Alaska Native (AI/AN) Food Access Interventions

SEM Level	Relevant Articles*
Intrapersonal	(Armstrong, 2000), (Bersamin et al., 2019), (Brown et al., 2020), (Cueva et al., 2020), (Davis et al., 2003), (Haslam et al., 2023), (Mattingly & Andresen, 2016), (Mylant et al., 2021), (Budd Nugent et al., 2022), (Ornelas et al., 2017), (Ornelas et al., 2021), (Sowerwine et al., 2019), (Taniguchi et al., 2022)
Interpersonal	(Brown et al., 2020), (Cueva et al., 2020), (Davis et al., 2003), (DeBruyn et al., 2020), (Haslam et al., 2023), (Mattingly & Andresen, 2016), (Mylant et al., 2021), (Budd Nugent et al., 2022), (Ornelas et al., 2017), (Ornelas et al., 2021), (Sowerwine et al., 2019), (Taniguchi et al., 2022)
Institutional	(Bersamin et al., 2019), (Brown et al., 2020), (Cueva et al., 2020), (Mattingly & Andresen, 2016)
Community	(Armstrong, 2000), (Bersamin et al., 2019), (Brown et al., 2020), (Cueva et al., 2020), (Davis et al., 2003), (DeBruyn et al., 2020), (Haslam et al., 2023), (Budd Nugent et al., 2022), (Ornelas et al., 2017), (Ornelas et al., 2021), (Sowerwine et al., 2019), (Taniguchi et al., 2022)
Public Policy	(Brown et al., 2020), (Cueva et al., 2020), (DeBruyn et al., 2020), (Mattingly & Andresen, 2016), (Sowerwine et al., 2019)

* An article may have had more than one SEM level represented, so the article may be located in multiple SEM level rows in the table.

Community level factors include organizational, institutional, and informal network relationships (McLeroy et al., 1988). The community level food access intervention targets for change included enhancing social norms around gardening and traditional foods, as well as increasing collective knowledge on food plants (Cueva et al., 2020; Sowerwine et al., 2019). At the community level, some interventions additionally noted positive perceptions of community change and increased collective efficacy for gardening and/or farming (Cueva et al., 2020; Sowerwine et al., 2019). As a result of the interventions that targeted the community level, community connectedness, and increased community capacity to improve food access were noted for ten of the total interventions. Overall, the development of community-based interventions through gardens and traditional foods was noted to be critical for gaining further insight into the influential factors and common barriers that may hinder the growing of food (Brown et al., 2020; Cueva et al., 2020; DeBruyn et al., 2020).

The *public policy level* targeted by the food access interventions included addressing policy barriers to food access and gardening at the Tribal and state levels. Public policy level approaches were specifically discussed in five of the included studies (Brown et al., 2020; Cueva et al., 2020; DeBruyn et al., 2020; Mattingly & Andresen, 2016; Sowerwine et al., 2019). Two interventions developed and implemented wellness policies in schools and early childhood education facilities as part of the intervention (Cueva et al., 2020; Mattingly & Andresen, 2016). Community level policies that aimed to improve overall food access and food systems were also developed in two of the larger studies (DeBruyn et al., 2020; Sowerwine et al., 2019). In addition to policy level interventions, increased community engagement and awareness on policy that supports community food access was also discussed in two of the interventions (DeBruyn et al., 2020; Sowerwine et al., 2019). Support from Tribal leadership and policymakers was also noted as important for intervention success and impact on local food access (Haslam et al., 2023; Taniguchi et al., 2022).

Cultural Factors and Food Access

In addition to the noted SEM level findings, it was noted more generally across the included articles that Indigenous culture was an important influence among the food access interventions. Notably, twelve of the interventions discussed culture as an important influence and component of their interventions. Cultural influences and factors in the respective interventions included: the inclusion of Indigenous languages; the inclusions of intergenerational teachings on growing and consuming food; the inclusion of traditional foods; the incorporation of traditional ecological knowledge (TEK); and platforming overall ways of connecting to food, family, and community as part of the intervention. Promoting access to traditional foods in homes, schools, and communities was often discussed across the articles as being important to increasing food access and improving health (Bersamin et al., 2019; Budd Nugent et al., 2022; Cueva et al., 2020; Ornelas et al., 2017; Ornelas et al., 2021; Sowerwine et al., 2019). Connecting to cultural knowledge and practices (e.g., planting culturally important foods, preparing and cooking cultural foods) were additionally highlighted as being important components for four of the interventions carried out (Bersamin et al., 2019; Brown et al., 2020; Cueva et al., 2020; Davis et al., 2003).

Another more general feature across the included articles was the dominance of *community-based interventions*. Ten of the interventions were denoted as being community-based interventions where direct community and stakeholder input was sought at the beginning of the development of the interventions. Community advisory boards and partnerships between researchers and the Tribal communities were formed before the interventions were developed and informed the foundation of the interventions. Stakeholders (e.g., Elders, farmers, educators, Tribal leadership) often informed community needs surrounding food access, health, and wellness. For example, Bersamin et al. (2019) ensured that local input and the Yup'ik worldview were integrated into intervention activities and evidence-based development strategies. The Food Resource Equity for Sustainable Health (FRESH) study by Taniguchi et al. (2022) additionally stated that commitment from the

Osage Nation was integral to the study's development and success.

Discussion

Our scoping review attempted to provide further insights into the existing literature surrounding food access interventions in AI/AN communities in the U.S. We specifically mapped the existing literature to the SEM to identify common SEM impact levels that AI/AN food access interventions are targeting. Below, we have further reflected on existing gaps in the literature on food access interventions in AI/AN communities.

All of the included interventions were conducted in rural areas with two of the interventions being conducted in both rural and urban locations (Davis et al., 2003; DeBruyn et al., 2020). The clear lack of interventions conducted exclusively in urban AI/AN communities surrounding food access is important as the majority of AI/AN populations live in urban areas (~70%) (NCUIH, 2022). There is limited research generally on food insecurity for urban AI/ANs; however, the limited evidence that does exist suggests that urban AI/AN individuals may experience higher food insecurity when compared to their rural counterparts (Dong et al., 2023). Various factors may contribute to food insecurity for urban AI/AN individuals, including high rates of poverty and limited access to culturally appropriate food access services and resources (Dong et al., 2023). Food insecurity may also contribute to other health outcomes. In a study carried out by Dong et al. (2023) they found that associations between food insecurity and cardiometabolic risks can impact urban AI/AN youth. Urban AI/ANs may also experience racial misclassification, which may further compromise the accuracy and usefulness of AI/AN health assessments (Yuan et al., 2014). Further research and support for food access programs involving urban AI/ANs are needed to better understand the potential similarities and differences across AI/AN populations to improve health outcomes.

Increasing access to Indigenous traditional foods as well as promoting gardening abilities were highlighted as important factors in many of the included studies. Traditional foods may promote food access for AI/AN communities and benefit overall health (Gutierrez et al., 2023). The Feast for the Future (FFF) program by Cueva et al. (2020) promoted traditional food access in three Tribal communities through the intergenerational Traditional Foodways Education Program and community farming initiatives. Youth participants were taught by local Elders about seasonal traditional cooking, gardening, and farming, and key food practices such as harvesting (Cueva et al., 2020). More importantly, traditional foods were brought into schools and enhanced organizational support toward these foods (Cueva et al., 2020). Overall, stakeholders expressed that the FFF intervention fostered Indigenous approaches to supporting healthy living and cultural identity through traditional foods (Cueva et al., 2020). The Traditional Foods Project (TFP) also supported the notion that traditional foods are interwoven with land, identity, food sovereignty, and food security (DeBruyn et al., 2020). Traditional foodways are critical to improving healthy food access, individual and collective relationships with food, and overall health outcomes (Cueva et al., 2020; DeBruyn et al., 2020; Gutierrez et al., 2023; Sowerwine et al., 2019). Multilevel traditional food interventions hold much promise in impacting AI/AN food systems and communities through culturally grounded and community driven approaches.

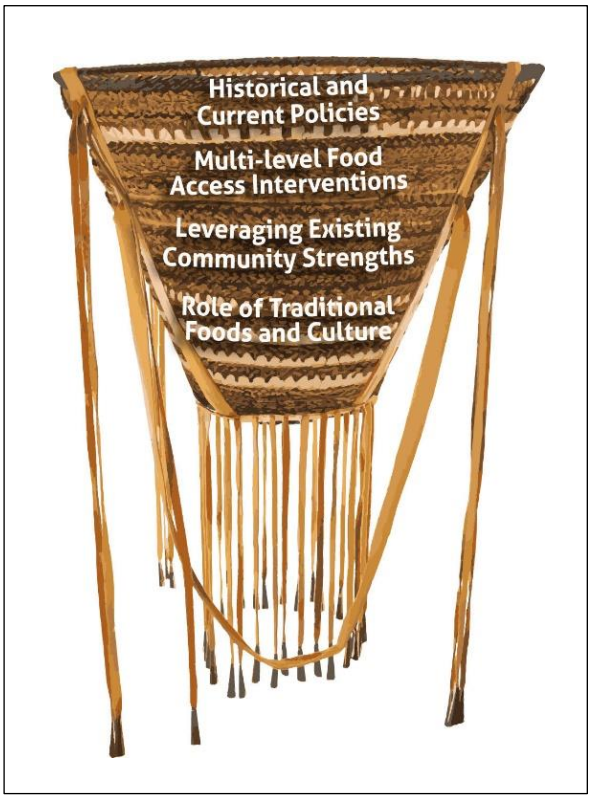
All the included studies targeted multiple levels of the SEM, which points to research projects in Tribal communities potentially being attuned to the importance of being inclusive of multiple levels of the community experience regarding food access. This multilevel approach to addressing food access is notable as the targeting of many impact levels is known in other contexts to potentially influence individual and collective food access (Stluka et al., 2018). For example, rural multilevel food access interventions have been carried out in other communities in the U.S. Stluka et al. (2018) discusses a multistate longitudinal multilevel intervention that aimed to improve food security through food policy councils and food pantries. The team found the community and strengths-based approach to be effective. However, there were also challenges with the study including timelines, participant retention, and fidelity (Stluka et al., 2018). Multilevel interventions, especially those in rural areas, have the

potential to improve food access and foster positive changes in rural food systems. Prominent public health funding agencies (e.g., Centers for Disease Control and Prevention, United States Department of Agriculture [USDA], and Food and Nutrition Services) also recommend multilevel interventions that can foster a policy, systems, and environmental change (PSE) approach (Randall et al., 2023). In a study by Randall et al. (2023) in the rural Southern U.S, qualitative findings indicated that community-based interventions and cultural influences were found to be key components to a PSE approach. Further research that assesses multilevel impacts in rural communities, including with AI/AN communities, may improve the understanding of multilevel approaches in varied contexts.

It became apparent throughout the review that interventions tended to target the institutional and public policy impact levels the least, whereas they targeted the intrapersonal (individual) and community SEM levels the most. Where policy levels were incorporated, they were mainly at the Tribal level with sparse interaction at state or federal policy levels. This despite federal policy resulting in programs such as the Food Distribution Program on Indian Reservations (FDPIR) (which introduced processed foods to AI/AN communities) continuing to influence food choices for those that utilize their services (Budd Nugent et al., 2022). Institutional and public policy level targets have the potential to have profound impacts on food access in AI/AN communities. Institutions that may exist in AI/AN communities include worksites, schools, universities and colleges, hospitals, parks and museums, and faith-based organizations (Harris et al., 2012). The complexities of what food is allowed and available in these institutional settings in AI/AN communities may derive from many multilevel and interacting policies at local, state, Tribal, and federal levels. Additionally, navigating the various policies impacting food access in Tribal communities can be unclear due to the potential for policy overlap. Local policy interventions at the Tribal level are of course needed. However, there is also need for more food access interventions that target policies that regulate state and federal programs directly within Tribal settings (i.e., federal hospitals, public schools). There is also a need for further capacity building and infrastructure that enables Tribal stakeholders to be able to advocate at Tribal, state, and federal levels.

In considering some of the key gaps and knowledge mobilized on food access interventions within Tribal communities from this review, there are several considerations for developing, operationalizing, and amplifying food access programs. We have framed these considerations within a traditional food storage basket as depicted in Figure 2. Baskets are significant to many AI/AN communities. The basket is culturally important and is connected to food as it is used to carry food and plants in ceremonies and was used when traveling long distances within some Tribal Nations. Food access considerations may include: (1) the historical and current policies impacting food access in Tribal communities; (2) the importance of the development and delivery of multilevel food access interventions; (3) the importance of leveraging existing

Figure 2. Traditional Food Storage Basket with Key Considerations for American Indian/Alaska Native (AI/AN) Food Access Interventions



strengths in AI/AN communities to enhance food access through community-based programs; and (4) the importance of traditional foods and culturally aligned programs and their role in food access. These four considerations are reviewed below.

Historical and current policies continue to impact AI/AN communities' access to food. A better understanding of the policy-based approaches to increasing AI/AN food access is greatly needed. More specifically, there is a critical need for more research that assesses the viability and impact of policy interventions that aim to increase food access in AI/AN communities. Additionally, research that examines the long-term effects of policy approaches to increasing food access in AI/AN communities could further inform intervention development. Despite the food access interventions reviewed having some targets at the Tribal policy level, there is a paucity of research that assesses the impact of Tribally driven policies and their effectiveness in promoting food system change and increasing overall food access. In spite of this paucity of research, there is continued potential to improve the local Tribal policy environment surrounding food and agriculture through mechanisms such as Tribal Food Codes (Indigenous Food and Agriculture Initiative [IFAI], 2024). There is a need for more research that can provide examples of effectively improving local Tribal policy environments such as the American Indian Healthy Eating Project (AIHEP). AIHEP was carried out with seven North Carolina AI Tribes in which they used an ecological framework to improve access to healthy, affordable foods (Fleischhacker et al., 2012). The AIHEP resulted in the Tools for Healthy Tribes toolkit and engagement with Tribal policymakers to increase access to healthy foods (Fleischhacker et al., 2012).

Multilevel food access interventions typically intervene on two or more levels of the SEM (Charns et al., 2012) and may have the greatest impact in improving health (Trickett, 2009). However, multilevel interventions are rare in AI communities despite their potential to positively impact health (Blue Bird Jernigan et al., 2020). With all the food access intervention studies included in this review being multilevel, further investigation could determine why the food access space is leading in multilevel interventions in AI communities compared to other research areas, and what lessons may be learned from those approaches. Additionally, challenges to intervention science within AI communities often lacks the consideration of cultural and sociological contexts existing in these settings (Blue Bird Jernigan et al., 2020). With this, better understanding of the culturally important measures and the role of environmental and social influences on food access is needed in the context of multilevel interventions.

Food access interventions within AI/AN settings requires a *community-based* approach that prioritizes local knowledge and input. The Sowerwine et al. (2019) intervention included in this review provided a detailed narrative of the process and partnerships needed to develop a multilevel intervention to enhance food access within the Klamath, Karuk, and Yurok Tribes. Through a community-based participatory research (CBPR) approach, the intervention promoted food security through teachings around accessing and preparing traditional foods, leveraged local community strengths, and created sustainable food system changes (Sowerwine et al., 2019). The project was effective in integrating cultural values through the partnership between Tribal partners and university-extension staff, while also fostering Tribally led research, education, and workforce development (Sowerwine et al., 2019). Through partnerships and a CBPR approach, the project exemplifies how local Indigenous community strengths and knowledge can transform food systems and enhance infrastructure to sustain longer-term project outcomes (Sowerwine et al., 2019).

Successful interventions conducted within AI/AN communities have been found to be grounded in culturally based approaches in which local values, worldviews, and ethics are integrated (Walters et al., 2020). *Traditional foods and culturally aligned programs* have therefore been highlighted in many of the articles included in this review. Traditional foods themselves are culturally important foods that have provided nourishment and sustained for AI/AN Peoples for millennia. Many Indigenous Peoples, including American Indians, are reclaiming their food systems through Indigenous food sovereignty (Gutierrez et al., 2023).

Food sovereignty initiatives support Indigenous communities' ability to increase access to traditional and healthy foods while also reducing dependence on processed foods (Blue Bird Jernigan et al., 2021). For example, traditional foods are vital to Alaska Native diets where they are an important nutrient source and contribute to overall food security (Walch et al., 2018). Interventions that support AI/AN Peoples in rebuilding food sovereignty in their communities have the potential to create sustainable changes and impacts (Gutierrez et al., 2023). Indigenous food sovereignty also supports access to traditional foods and can help foster collaboration between historically "siloed segments of communities (e.g., agriculture, land use, commerce, health departments)" to create more food equitable environments (Blue Bird Jernigan et al., 2021, p. 7). Interventions that enhance Indigenous food sovereignty may also promote approaches that restore relationships between Indigenous Peoples and their homelands and strengthen their ecological knowledges (Coté, 2016). With this, there is need for more research that better supports an understanding of how Indigenous food sovereignty can be used as an applied public health approach to improve traditional food access within AI/AN communities.

Limitations

Most of the articles included in this scoping review had a participant base that was AI with a clear lack of AN representation. Therefore, our findings may not be representative of the AN population due to their lack of representation in this review. Additionally, food access interventions that are carried out in AI/AN communities may not always be published in peer-reviewed academic journals. As this review included only peer reviewed studies, relevant community-based food access work happening on the ground in AI/AN communities may therefore not be fully represented. Regardless, as policy and funding structures are often informed by academic orientated publications, we felt it was important to get an idea on the breadth of the literature on this topic area within the literature that may be used for informing food access dialogues and programmatic work. Future work should be directed toward examining non-academic sources of Tribal food access programs to create a more comprehensive understanding of targets for change to inform future food access intervention development.

Conclusion

Our scoping review provided further evidence that food access is a tantamount public health issue and priority for AI/AN populations in varied settings. We reviewed the literature on interventions aiming to address food access in AI/AN communities. Included articles were mapped across the SEM, which highlighted clear gaps at the institutional and public policy impact levels, with a more specific policy gap at the state and federal policy levels of intervention. Nonetheless, our review highlighted that there is valuable research that has been conducted on AI/AN food access interventions with many interventions targeting multiple levels of the SEM. Further collaboration between AI/AN communities and researchers may lead to the development of more informed multilevel interventions that integrates Indigenous methodological approaches and culturally based approaches to improving food access. AI/AN food systems were once robust, diverse, and fully supported the health and well-being of AI/AN Peoples (Sarkar et al., 2020). By honoring the strengths, knowledges, and experiences of AI/AN communities it is possible to contribute to the rebuilding of AI/AN food systems while ensuring the right to food for current and future generations.

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(continued)

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Appendix

Table A1. Example PubMed Search Strategy

Search Terms
("Native American"[Title] OR "American Indian"[Title] OR "Alaska Native"[Title] OR "American Indian/Alaska Native"[Title] OR "Indians, North American"[Mesh]) AND (("access to food"[Title] OR "healthy food access*"[Title] OR "food bank"[Title] OR "food pantr*"[Title] OR "food assistance"[Title] OR "food security"[Title] OR "food shelf"[Title] OR "fruit and vegetable prescription*"[Title] OR "obesity prevention"[Title] OR "Healthy Food Availabilit*"[Title] OR "Availability of Healthy Food*"[Title] OR "Healthy Foods Availabilit*"[Title] OR "Access to Health Food"[Title] OR "Food Deserts"[MeSH] OR "Food Insecurity"[MeSH] OR "Food Security"[MeSH] OR "Food Assistance"[Mesh]) OR (("health promotion"[Title] OR intervention[Title] OR program*[Title] OR protocol*[Title] OR project*[Title] OR initiative*[Title] OR validation*[Title] OR evaluation*[Title] OR development*[Title] OR assessment*[Title] OR pilot[Title] OR strateg*[Title] OR "Health Services, Indigenous"[MeSH] OR "Health Promotion"[Mesh] OR "Program Development"[Mesh] OR "Program Evaluation"[Mesh] OR "Preventive Health Services"[Mesh]) AND ("food sovereignty" [Title] OR "traditional food*"[Title] OR foodway*[Title] OR "food security"[Title] OR "food system*"[Title] OR "cultural food"[Title] OR nutrition[Title] OR agriculture[Title] OR farm*[Title] OR garden*[Title] OR permaculture[Title] OR cook*[Title] OR vegetable*[Title] OR fruit*[Title] OR seed*[Title] OR forage*[Title] OR "food is medicine" OR "food as medicine" OR harvest*[Title] OR recipe*[Title] OR diet*[Title] OR "Diet, Healthy"[MeSH])))