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The intersection of social and Indigenous determinants of health for health system strengthening: a scoping review

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ABSTRACT

The COVID-19 pandemic exposed long-standing gaps in health service systems and realities of environmental changes impacting Native nations and Indigenous communities in the US and circumpolar regions. Despite increased awareness and funding, there is limited research and few practical resources available for the work. This is a scoping review of the current literature on social determinants of health (SDOH) impacting Indigenous peoples, villages, and communities in the US and circumpolar region. The review used the York methodology to identify research questions, chart, and synthesize findings. Thirty-two articles were selected for full review and analysis. The articles were scoping reviews, evaluations, and studies. The methods used were 44% mixed (n = 14), 31% quantitative (n = 10) and 25% qualitative (n = 8). The synthesis identified four areas for discussion: 1) systemic and structural determinant study designs, 2) strengthening Indigenous health systems, 3) mapping the relationship of co-occurring health conditions and SDOH, and 4) emergent areas of inquiry. While the scoping review has limitations, it provides a snapshot of broad SDOH and shared Indigenous social determinants of health (ISDOH) to create tailored frameworks for use by tribal and urban Indigenous health organisations, with their partners, in public health and system strengthening.

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Introduction

Prior to the COVID-19 pandemic, Seven Directions, an Indigenous public health institute based at the University of Washington, embarked on a journey to map an Indigenous social determinants of health (ISDOH) framework for application in public health practice. This work was inspired by ongoing calls from Indigenous scholars and practitioners to re-examine the World Health Organization (WHO) social determinants of health (SDOH) frameworks for relevance and applicability to Indigenous peoples' worldviews, rights, and lived realities [1,2]. It accompanies recent reviews of the broader SDOH frameworks [3]. For example, in the circumpolar region, Indigenous communities are experiencing significant environmental changes due to human-caused climate shifts, which represent critical determinants of health specific to these communities, yet national public health discussions often fail to provide the important cultural and contextual factors that contribute to health outcomes in important ways [4–8]. Therefore, the exponential impact of COVID-19 within Native nations and Indigenous communities in the US, circumpolar region, and globally highlighted access to quality data, resources, and infrastructure within healing and health systems at all levels (i.e. tribal, state, and federal) [9,10,11]. These gaps, while not new, elevated the awareness and need to address systemic and structural determinants of health.

From 2019 to 2024, Seven Directions was funded by the National Network for Public Health Institutes through a US Centers for Disease Control and Promotion (CDC) cooperative agreement to develop an Indigenous social determinants of health (ISDOH) framework and training resource [12]. A recently released UN report on Indigenous determinants of health will contribute to global initiatives in this area [13]. These represent a growing effort to centre Indigenous communities and privilege Indigenous knowledge in health and health-related practices or wellness [14]. The purpose of this paper is to share a synthesis of the current literature on

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social determinants of health as it may apply to programs, services, systems, and policy development within Native nations and Indigenous communities.

Materials and methods

This review adapted the Arksey and O'Malley [15] "York methodology", design for topic specific, rapid literature reviews. The steps are 1) identify a research question(s) and consult with partners, 2) search for relevant studies, 3) select articles that align with the research question(s), 4) chart data and collate and 5) synthesise and report. We used an iterative process for research question refinement and synthesis. The author reports there are no competing interests to declare.

To provide context and support implementation of the scoping review methodology, the following six theoretical and conceptual frameworks and definitions are described below:

Social Determinants of Health – SDOH are the non-medical factors that contribute to the conditions in which people live, breathe, work, play, and pray. In the US Public health, SDOH domains are access to education, access to health care, economic stability, neighborhoods/built environment, and social-cultural context [16,17]. The World Health Organization (WHO) framework situates SDOH within the context of socio-economic and political forces and systems that contribute to health inequities and unfair and avoidable differences in health status [18].

Indigenous Determinants of Health – ISDOH reflect Indigenous knowledge and ways of being and doing that have kept communities' health well since inception [1]. Emergent domains are connection to lands and kinship, continuity of language and identity, exercising sovereignty and governance, and historic – contemporary systemic and structural determinants [1,12].

Typology of Determinants of Indigenous health – Figure 1 illustrates a typology for ISDOH that consists of overlapping circles. The three types are 1) broad SDOH, shared across populations; 2) shared ISDOH, held in common among Indigenous peoples; and 3) specific ISDOH, determined by Indigenous peoples' traditional, cultural, and place-based knowledge systems [1,12,19,20]. They represent an interplay of influences that create conditions for Indigenous community healing, health, and well-being. Please refer to both Carroll et al. [1] and Parker et al. [12] for detailed descriptions.

Socio-Ecological Model – The SEM describes concentric circles that represent multi-level areas of influence on individual and community health behaviour, conditions, and outcomes. The spheres are labelled individual, family, community or organisational, and societal [21]. They are sites of SDOH and ISDOH that contribute to conditions that influence health and wellness. These are also points to consider when designing multi-level interventions and systemic policy changes, for example. The SEM model is widely used in public health practice.

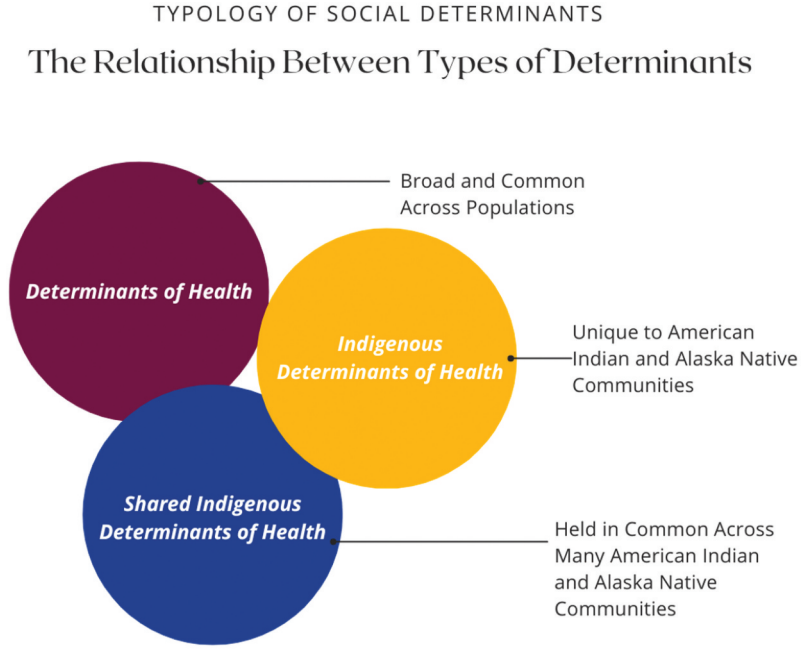

Figure 1. Typology of determinants of Indigenous health.
Source 12: p. 12, adapted 1 p.7.

Public Health Practice – Public health practice is considered the science and art of ensuring the health, safety, and well-being of individuals, communities, and populations [22]. The three core functions of public health are assurance, assessment, programs, and policy development. Within these functions, 10 essential services guide practitioners in public health capacity, infrastructure, and systems strengthening [23,22].

Indigenous Public Health Practice – Indigenous healing, health and wellness systems are Indigenous public health. Describing it in response to standard public health definitions, it is community-centred and place-based, privileges Indigenous knowledge and systems, and is practiced from a rights holder's perspective ensuring tribal sovereignty and self-determination. Note that the term encompasses more than the standard public health definition guided by 3 core functions and 10 essential services. After decades of invisibility tribal health systems and urban Indigenous health organisations are engaged in national public health system improvement initiatives [24]. This is fitting and long overdue considering the federal government – government relationship and trust responsibility – must federally recognise Native nations [10].

These six theoretical and conceptual frameworks and definitions informed the articulation of the research questions, guided synthesis, and discussion of the selected articles.

Research questions

The intention of this rapid scoping review is to update the literature and consider broadening the audience for the six-module training from US to global Indigenous public health systems [12]. An initial search of the University of Washington Library and PubMed for the following terms "Indigenous social determinants of health", "American Indian" and "Alaska Native" from 2019 to 2024 gave no results for Native nations and Indigenous communities in the US. The few results referred to First Nations in Canada and Australia. This was expected as extensive scholarship to conceptualise and articulate Indigenous social determinants of health has come from Canada (Greenwald et al., 2019) [3]. Within the context of public health practice, it became evident that the terminology is not widely used in the US yet.

Therefore, we proposed the following central research question:

(1) What is the current state of literature, research, and evaluation, specific to SDOH and American Indian, Alaska Native, and Indigenous peoples in circumpolar region and US?

The focused follow-up questions were designed to consider the connection between social (SDOH) and Indigenous determinants of health (ISDOH) and their impact on public health practice [12]. They were:

(2) How are SDOH and ISDOH connected or represented in this literature?
(3) What are the implications of findings for public health practice?

Seven directions: Indigenous social determinants of the health project (2019–2024)

In March 2024, Seven Directions published a six-module ISDOH training on their website (www.indigenousphi.org). With respect to the diversity in Native nations' traditions, belief systems, Indigenous knowledge systems, history and relationships with government entities, we developed a public health training to facilitate public health practitioners in developing a relevant and meaningful ISDOH framework for use within their Indigenous public health/health systems. The approach that contributed to the final six-module training included a literature review; description of an emerging ISDOH framework, consisting of broad and shared constructs; story-sharing community workshops/meetings; and meetings with our advisory board. Seven Direction's approach to the development of resources, training, and technical assistance follows principles of continuous community engagement. We engage an advisory board for our projects and invite peer–peer sharing through Gathering Grounds, a community of practice, to share and receive feedback and guidance.

Search strategy and select relevant articles

This review is a rapid scoping review of peer-reviewed, open access and full text articles. Figure 2 Scoping Review Flow Diagram, below, contains the number of articles identified, screened, and selected for inclusion in this review. The databases used were University of Washington library search and PubMed. Two sets of key terms were used for the searches. The first set of key words was 'Social Determinants of Health', 'Alaska Native' and 'American Indian'. The second set of key words was 'Social Determinants of Health', 'Circumpolar' and 'Health'. Search terms were linked by the Boolean operator "AND" only. All results

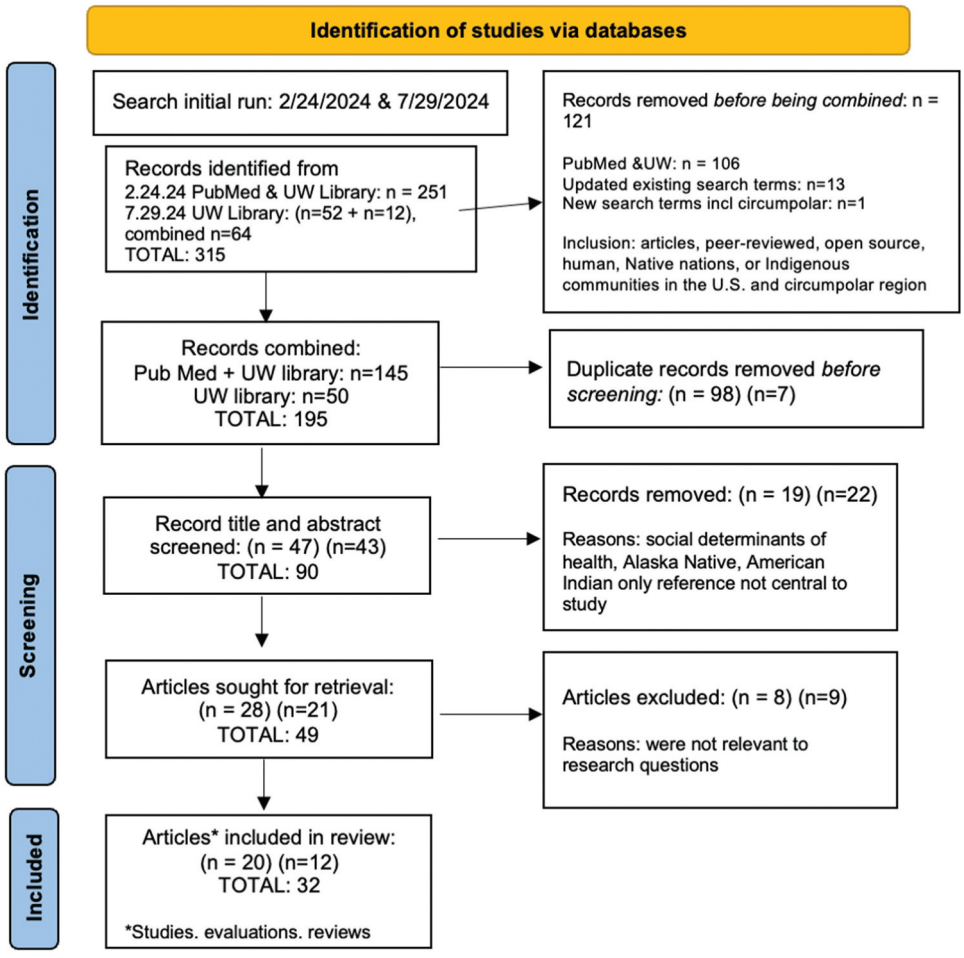

Figure 2. Scoping review flow diagram.

included at least one keyword term. The search engine date range was 2019–2024.

After initial identification, the articles identified in PubMed and UW library search were combined and the duplicates were removed. The titles and abstracts were then screened to identify articles relevant to the research questions. Articles that referenced social determinants only in the introduction and conclusion were excluded. Finally, secondary data set analysis with national surveys that aggregated and considered American Indian and/or Alaska Native populations as one of multiple minority groups were excluded.

Chart and collate

For charting and collation, citations ($n = 49$) from selected articles were uploaded into an Excel spreadsheet and the full text saved as an Adobe pdf. To complete charting, the following identifiers populated eight columns: authors, participants, type, methodology, topic area, SDOH, ISDOH, and applied to public health. As the authors reviewed the full text, they populated each cell with data from the selected articles. Filtering of the spreadsheet provided quantity of articles within each identifier/qualifier. After charting, the final articles ($n = 32$) were selected for inclusion in this review. The descriptions for all selected articles are based on the charting data. The final 32 articles were charted and collated in response to the research questions (i.e. types, SDOH-ISDOH connections, and application). The collation and synthesis were completed referencing the CDC domains, socio-ecological model, and Indigenous social determinants of health, including their typology [1,12,17,21].

Quality assurances

The initial key term searches were conducted by the first author. After initial screening of titles, selected citations were downloaded for screening of abstracts and review for inclusion of the full articles. Two co-authors populated the Excel spreadsheets, which were then audited by a different co-author to check for error input or comment on any discrepancies. Any

points for clarification or disagreement were noted and resolved following shared decision-making. For Table 1, one co-author populated and a second one reviewed for completion and agreement. The first author provided the final review and decisions, as needed.

The following section provides a description and synthesis of the 32 selected articles for the representation of current public health research and practice on SDOH within Native nation and Indigenous communities.

Results

Synthesis and report

The final 32 articles selected for this review were research studies, 47% using primary and secondary data sources ($n = 15$); 40% reviews ($n = 13$); and 13% evaluations, using primary and secondary data sources ($n = 4$). Most articles referenced mixed methods 47% ($n = 15$) or were specifically 31% quantitative ($n = 10$), and 22% qualitative, ($n = 7$). Regarding authors of selected articles, approximately 88% of authors were Indigenous, either first author or part of the team ($n = 28$). The reviewers subjectively identified the authors as either recognised Indigenous scholars or through self-identification on faculty pages. It is important to identify senior and emerging Indigenous scholars, and their areas are interest to continue identifying Indigenous social determinants of health.

The focal age or life stage for the selected articles was all ages ($n = 14$), elders ($n = 3$), adults ($n = 9$), adults and adolescents ($n = 2$), and youth, adolescents, and children, specifically ($n = 4$). Topics include dementia, pandemic, oral health, sexual health, chronic disease/conditions (e.g. type 2 diabetes, cancer, and obesity), food insecurity, mental health, addiction, housing, holistic health, traditional foods, and culture. All 32 articles included the five US CDC domains, with consideration for influences of the broader determinants identified in the WHO SDOH framework. The selected articles primarily studied or conducted evaluations to consider Indigenous shared and specific cultural and contextual factors associated with the identified health/public health concern. Economic instability or food insecurity, access to housing, discrimination and racism centred the structural and systemic determinants. These articles identified shared and specific Indigenous social determinants without specifying this label. They included culture, ways of living, and traditional foods.

Discussion

Four areas of research and practice

In response to the central research question of this scoping review, the current literature on social determinants of health in American Indian, Alaska Native, and Indigenous peoples in the circumpolar region contributes to four areas. They are 1) call for systemic and structural determinant study designs that consider the impact of SDOH across life courses and intergenerationally, 2) contribution to strengthening Native nations and Indigenous community systems of healing, health, and well-being, 3) mapping complex and interconnected relationship of co-occurring health conditions and SDOH, and 4) identification of emerging topics or areas of inquiry. The selected articles by theme and descriptors are found in Table 1 below.

Within these four areas synthesised below are responses to the two follow-up research questions that asked about SDOH-ISDOH connections and implications of findings for public health practice.

Structural and systemic determinants of health: across life course and inter-generational study design

The first set of articles are studies and reviews of multilevel impact of SDOH, health behaviour and health outcomes specific to elder health, food sovereignty, chronic health conditions (e.g. cancer, diabetes and cardiovascular disease), sexual health and discrimination/racism. They are grouped under structural and systemic determinants because their findings and recommendations suggest an increased use of life course, inter-generational, and multi-level study design.

Elders. Two selected articles were studies on elders' health and SDOH [25,28,38. These were cross-sectional, qualitative studies of broad SDOH (e.g. insurance and resourced health facilities) and shared ISDOH (e.g. traditional medicine, balancing worldviews, historic and inter-generational trauma, and fulfilment of trust responsibilities). They contribute to future directions in research with elders that emphasise community level healing and practice that addresses barriers to access and use of services from a multilevel perspective.

The Baron et al. [25] article titled, "The social determinants of healthy ageing in the Canadian Artic", calls for multi-level, dimensional program and service development research (i.e. interventions) that serve Inuit elders. This was a research study using secondary quantitative data from the 2006 Aboriginal Peoples Survey ($n = 850$ Inuit, age 50 yrs. and older) to identify SDOH associated with healthy ageing. Study findings using

Table 1. Summary of selected articles by theme, $n = 32$.

Theme	1st author et al. (year)	Indigenous Scholars/ Organisations	Age Group	Type/Data Source/ Methodology	Informs Indigenous Public Health Practice by
SSD	[25]	Unconfirmed/ Unknown	Elders	Research Secondary/ Quantitative	Tailor interventions to address different health profiles for Inuit ageing in Inuit Nunangat, with attention to socio-cultural factors that contribute to elders who fall in the "Good Health" profile. Enhancing social-familial connections and participation activities is important for overall well-being in Inuit communities, alongside continued improvement to economic and material conditions.
SIHS	[26]	Native/Indigenous	Adults and adolescents	Research Secondary/ Quantitative	This article emphasises centring identifying Indigenous indicators of holistic health for assessment rather than using individualist western ideas in public health. Cultural protective factors are essential for health rather than individualist and biomedical focus.
MCR	[27]	Unconfirmed/ Unknown	Adults and adolescents	Research Primary/ Quantitative	Identifies disparities and gives baseline data to identify trends in health throughout Indigenous communities in Greenland. Can help determine where to allocate resources and services.
SSD	[28]	Indigenous/Native	Elders	Research Primary/ Qualitative	Community engagement and CPBR to engage trust and effectiveness in Alzheimer's disease and related dementia (ADRD) interventions that align with AI/AN values
SSD	[29]	Indigenous/Native	All ages	Evaluation Primary/Mixed	Culturally tailored programs are essential to the effectiveness of health and wellbeing intervention programs
SIHS	[30]	Indigenous/Native	Adults	Research Secondary/ Quantitative	Understanding ISDOH helps identify policies and programs that are most culturally relevant. Include Indigenous perspectives in pandemic response plans to reduce healthcare avoidance.
SIHS	[31]	Indigenous/native	All ages	Review/Qualitative	Offers the First Nations Mental Wellness Continuum (FNMWC) model framework for enhancing and planning mental health services to better meet Indigenous needs and emphasises improved collaboration among stakeholders.
MCR	[32]	Indigenous/Native	Children	Evaluation Primary/ Qualitative	Recognizing SDOH play in health to support health-promoting decisions and education in caregivers
SSD	[33]	Unconfirmed/ Unknown	All ages	Research Secondary/ Quantitative	Addressing discrimination in AI/AN communities is essential in equalising access to healthcare and improving health overall
MCR	[34]	Indigenous/Native	Children	Research Secondary/ Quantitative	Addressing economic disparities that impact the prevalence of overweight/obesity status in AI/AN children. Examples include access to nutritional foods or assistance programs. Recognising systematic determinants (e.g. research, clinical practice, and policy decisions) contributes to addressing the inequalities.
SIHS	[35]	Indigenous/Native	Adults	Evaluation Primary/Mixed	Evaluation of a curriculum to increase workforce cultural awareness and ability to provide safe environment and serve American Indian and Alaska Native communities in urban cities in the US.
EA	[36]	Indigenous/Native	Adults	Review/Mixed	Risk factors for metabolic syndrome aetiology of disease, calls to address structural and systemic determinants
MCR	[37]	Indigenous/Native	Adults	Research Secondary/ Quantitative	Indigenous PH to consider SDOHs and emphasise community-based interventions to combat obesity and improve health outcomes
SSD	[38]	Indigenous/Native	Elders	Research Primary/ Qualitative	Structural barriers and inequities account for AI/AN Elder health must be addressed through intervention and policy initiatives for elder well-being.
MCR	[39]	Indigenous/Native	Adolescents	Research Secondary/ Quantitative	Communities in which one lives and relating SDOHs should be heavily considered when looking at health risks in AI/AN communities
EM	[40]	Indigenous/Native	All ages	Research Secondary/ Qualitative	Viewing housing as an ISDOH. Developing methods and networks that reframed housing rather than trying to fix or repair current ill-suited housing or infrastructure, specifically for social justice, including the community Dene having control over their built environment
EA	[41]	Indigenous/Native	All ages	Review/Mixed	Interventions that address all aspects of SDOHs will be the most effective in STI response. These efforts should also target building a culturally appropriate framework.
SSD	[42]	Indigenous/Native	Adults	Review/Mixed	SDOHs are interconnected with themselves and with cultural and traditional factors that must be considered for potential intervention.

(*Continued*)

Table 1. (Continued).

Theme	1st author et al. (year)	Indigenous Scholars/ Organisations	Age Group	Type/Data Source/ Methodology	Informs Indigenous Public Health Practice by
EA	[43]	Indigenous/native	All ages	Research Primary/ Quantitative	Highlights use of reliable tools for measuring cultural factors that impact health in Indigenous communities. Importance of using Indigenous epistemology and approaches to health.
SSD	[44]	Unconfirmed/ Unknown	All ages	Review/Mixed	Identifies gaps in research often centring historical/cultural context, community-level factors, and overall equity-focused frameworks for cancer risk.
SIHS	[45]	Indigenous/Native	Adults	Research Primary/ Quantitative	This cross-sectional survey quantified food insecurity and found it did not negatively impact COVID-19 infection or vaccine uptake within urban Indigenous communities. Findings support cultural norms of mutual aid and community-led efforts coming from within tribal health care clinics, drawing on ISDOH and addressing shared SDOH.
SSD	[46]	Indigenous/Native	All ages	Review/Mixed	Approaches towards food security in AI/AN communities should incorporate better representation and consideration of cultural contexts in community approaches.
SIHS	[47]	Indigenous/Native	All ages	Review/Mixed	Culturally tailored approaches, partnerships, data sovereignty, and community engagement in PH sectors allow tribes to control their interventions to fit their community best.
SIHS	[48]	Indigenous/Native	Adults	Research Primary/Mixed	Development of more relevant and equitable health policies, measurement strategies, and programs that address maternal child health in Circumpolar regions. Emphasizes enhanced responsiveness to these populations to improve care delivery and health outcomes through the consideration of a social and structural
SIHS	[49]	Indigenous/Native	Adults	Research Primary/ Qualitative	Emphasizes public health systems that can maintain continuity of care for AI/AN communities in need during emergencies. Must emphasise standard healthcare and sustain traditional healthcare services that are culturally responsive to substance use treatment prevention and treatment strategies.
SIHS	[50]	Indigenous/Native	All ages	Review/Mixed	Dissemination and implementation strategies targeting Indigenous communities may find benefits in CBPR. Trust must be essential for successful D&I within communities.
SSD	[51]	Indigenous/Native	Adults	Review/Mixed	This review puts emphasis on the structural and systemic determinants' impact cardiovascular disease and stroke on women and specific attention to American Indian and Alaska Native women. This statement calls attention to designing studies and engaging in policy that addresses structural and system determinants inside and outside health systems.
SSD	[52]	Indigenous/Native	All ages	Review/Mixed	Multi-level health prevention and treatment intervention may serve well for health in Indigenous communities.
EA	[53]	Indigenous/Native	All ages	Review/Mixed	Addressing gender and health/wellness that centres Indigenous knowledge helps deconstruct colonialist ways of treatment and viewing gender. Ensures treatment, programs, and policies are culturally sensitive and centre community.
SIHS	[54]	Indigenous/Native	All ages	Review/Mixed	Integration of SDOH and EHR may provide benefits but must be sensitive to cultural and community needs.
SIHS	[55]	Indigenous/Native	All ages	Evaluation Qualitative	Using holistic approaches of SDOH can ensure EHR are kept for ethical and helpful reasons that advance health systems for these communities and help close gaps in care.
SSI	[56]	Indigenous/Native	Youth	Review/Mixed	Sharing of the three well regarded suicide prevention program with attention to addressing structural racism as a risk factor among Alaska Native and American Indian youth. This is a call to add to crisis-response services by addressing community-level structural determinants and testing programs that are ground in community and cultural ISDOH.

Theme code descriptors: SSD = Call for Structural & Systemic Study Design, SIPHS = Strengthening Indigenous PH Systems, MEE = Mapping Aetiology, Ethnography, Prevalence, EA = Emerging Areas of Inquiry.

multi-dimensional holistic indicators indicated that "good health" elder profiles were more associated with socio-cultural, activities and family connections than "intermediate health", which was primarily associated with economic and material conditions. These findings represent shared SDOH and tailored, socio-cultural ISDOH to include in framework for study design.

The Jaramillo et al. (2023) article, titled 'The Community as the Unit of Healing: Conceptualizing Social Determinants of Health and Well-Being for Older American Indian Adults', was a timely well-designed mixed-methods study (i.e. interview and survey). A total of 96 American Indian elders, 55 years and older, and 47 delivery of care professionals in Southwest, US, participated between 2016 and 2017. Analysis was completed with an American Indian elder's advisory board. Study findings identified access to services associated with underfunding, complexity of navigating and obtaining services and coverage by insurance. Recommendations shared are for health policy initiatives that support community level intervention that focus on the structural and systemic determinants that impeded elders' access to culturally appropriate grounded care (Jaramillo et al. 2023).

The Crouch et al. [28] article titled, 'Dementia, Substance Misuse, and Social Determinants of Health: American Indian and Alaska Native Peoples' Prevention, Service, and Care', was a qualitative sub-analysis of a larger study. 12 Alaska Native elders, aged 62–89, who were not diagnosed with Alzheimer's disease and related dementias (ADRD) but had family members with this diagnosis participated in interviews and completed the Orthogonal Cultural Identification Scale-Adult (OCIS-A). The findings identified six themes of disease ethology, barriers to treatment and SDOH. The findings described two shared ISDOH for holistic health that are 1) balancing two worldviews and 2) incorporating Alaska Native worldview and approaches in treatment. Returning to caregiving, ageing in place with care from all family members, was described as an example of a point where balancing the worldview and engaging in decolonising practices can have an impact. The study implies higher risk for ADRD and substance misuse associated with the impact of systemic and structural determinants (e.g. discrimination and inter-generational trauma) along the lifespan. These are balanced by an emphasis on context and culture in research and practice. Recommendations imply the use of life course, cultural-, and inter-generational-rooted frameworks for research, which represents decolonising and Indigenizing public health practice.

Food sovereignty. Two articles were placed together under food sovereignty as they study the impact of traditional foods and food insecurity at the community level [29,46]. Both were reviews and considered shared ISDOH that represent legacy of colonisation and subsequent policies and laws that contribute to systemic and structural determinants that impact access to traditional foods and food insecurity. An additional article included is from Stotz et al. [52], which is a review that includes access to healthy foods. These articles contribute to a larger, nationally recognised food sovereignty movement that is positively impacting public health practice in the U.S [57].

DeBruyn et al. [29] evaluated the CDC-funded Traditional Foods Project (TFP) and provide a synthesis in their article titled, 'Integrating Culture and History to Promote Health and Help Prevent Type 2 Diabetes in American Indian/Alaska Native Communities: Traditional Foods Have Become a Way to Talk About Health'. The project implemented community defined strategies to address type 2 diabetes through traditional foods, physical activity, and social support. The interventions were implemented from 2008 to 2014 with 17 partners. Seven main themes were identified in the qualitative data: traditional knowledge and grassroots efforts, connection to health, power of stories and storytelling, community engagement, knowledge sharing and gratitude, flexibility, and program sustainability. Their recommendations support increased integration of culture, specifically accessing and using traditional foods, as a determinant of health and wellness in research and practice [29].

The review titled, 'Food Insecurity among American Indian and Alaska Native People: A Scoping Review to Inform Future Research and Policy Needs', by Nikolaus et al. [46] synthesised 34 publications of 30 studies on food insecurity experienced by American Indian and Alaska Native individuals and communities. Most studies were cross-sectional, qualitative, and focused on rural communities. Findings identified a range of food insecurity estimates from 80% to 16% and higher prevalence in rural settings. The high prevalence of food insecurity led to recommendations of improving the quality and culture rigour of studies, respecting Indigenous data sovereignty, acknowledging the values of traditional foods, and addressing contributing structural and systemic determinants of health (e.g. policies, initiatives, and interventions) that support conditions contributing to food insecurity and support food sovereignty.

The Stotz et al. [52] review titled, 'Multi-level Diabetes Prevention and Treatment Interventions for Native People in the USA and Canada: A Scoping

Review', is an important contribution to food sovereignty research and practice. There were few multilevel diabetes prevention and management interventions that included broad SDOH such as access to healthful food and places for physical activity. 10 interventions identified used individual-, school-, and community-based design. Three of the interventions included environmental or policy-level components. These findings recommend addressing challenges of time and resources and highlights the importance of having high levels of trust at the organisational level for impactful multi-level interventions.

Chronic conditions and infectious disease. Three of the articles selected study pathways of broad SDOH (e.g. access to education, health care and financial stability) and shared IDOH (e.g. discrimination and historic and inter-generational trauma) associated with chronic health conditions: cancer, cardiovascular disease and sexual health [41,42,44,51].

Melkonian et al. [44] shared their review in the article titled, 'Social Determinants of Cancer Risk Among American Indian and Alaska Native Populations: An Evidence Review and Map'. The 297 studies included in their review were observational and cross-sectional (94%). For their data extraction, the authors identified the categories from PROGRESS-Plus, a health equity list of areas that include place, occupation, social capital and discrimination. The identified if the articles indicated historic and/or current trauma and receipt of IRB and/or tribal research and review approval for the studies. The findings highlighted that most registries did not include cancer risk factors other than age, sex, or race. There may be no other reviews for American Indian and Alaska Native individual and communities on SDOH and cancer. Broad SDOH and shared ISDOH identified in this review were race, place, social economic status, access to care, discrimination, historic and/or contemporary trauma and a need for specificity of data on community-level social determinants of health. Recommendations for improved data include the use of composite indices, improved data systems and linkage methodologies, and collaboration with community partners at every phase of the study. The review provides a call for identifying the systemic and structural SDOH from policies to practice that contribute to cancer risk.

Two articles included in this review support continued and increased study of systemic and structural determinates of health that impact the risk of cardiovascular disease within Native nations and Indigenous communities [42,51]. Leung et al.'s [42] article titled, "Social determinants of incidence, outcomes, and interventions of cardiovascular disease risk factors in American Indians and Alaska Natives" is a review of the literature, like Melkonian et al. [44], that studies the pathways of broad SDOH and shared ISDOH to risk and protective factors for cardiovascular disease (CVD). The risk factor themes that have a multifactorial effect were income-related obstacles, healthcare access, structural racism, socioeconomic disadvantage, and unequal access to financial stability and educational attainment. This article provided useful information for future research. Recommendations include a new SDOH approach that considers the diversity of American Indian and Alaska Native individuals and communities, tailoring assessments, developing cultural and traditional knowledge-rooted resources, and work within a multidisciplinary, upstream approach.

Authors included the article by Sharma et al. [51] titled, 'Status of Maternal Cardiovascular Health in American Indian and Alaska Native Individuals', to complement the review shared by Leung et al. [42]. This is an official statement on the topic by the American Heart Association. It summarises the impact of mental health, lifestyle, cardiovascular disease risk factors, and the cumulative impact of institutional and structural racism and historic trauma that impact SDOH experienced by American Indian and Alaska Native individuals and communities. This statement draws attention to determinants associated with improving data systems, both access and quality. The statement concludes with a call for improved workforce training in research and health care settings.

Leston et al. [41] conducted a literature review titled, 'Creating a path forward: understanding the context of sexual health and sexually transmitted infections in American Indian/Alaska Native populations – a review'. The authors reviewed 138 articles, from 2005 to 2021, on sexually transmitted disease within American Indian and Alaska Native (AIAN) communities or populations. The connection and relevance of epidemiology, social and behavioural, clinical service, and health research and intervention studies to sexual health were presented. Within the context of ISDOH, the framework was divided into four quadrants: individual, clinical services, public health research and programs, and surveillance and epidemiology. Broad SDOH were presented along with both shared and unique ISDOH (e.g. history and culture) in the framework. The authors recommended using the framework to design AIAN context specific, multilevel, and intersectoral interventions and programs.

Marginalization/Discrimination/Racism. Discrimination was also identified as broad systemic SDOH for future study designs in articles by Crouch

et al. [28], Melkonian et al. [44], and Godfrey et al. [36]. In Findling et al. [33] articles titled, 'Discrimination in the United States: Experiences of Native Americans', data from a secondary analysis of a national survey quantifies the degree of discrimination and harassment in the population sample of American Indian and Alaska Native peoples. Respondents reported discrimination in clinical settings (23%) and avoidance of seeking health care for themselves or family members due to their experience (15%). The recommendations were to include measures of discrimination and other systemic determinants of health in future studies.

Wexler et al.'s [56] review titled, 'Centering Community Strengths and Resisting Structural Racism to Prevent Youth Suicide: Learning from American Indian and Alaska Native Communities', is an invaluable contribution to the literature and future research. It is a review of three American Indian and Alaska Native strength-based suicide prevention efforts that span decades. The review shared the approaches to participatory research with respect to tribal sovereignty and self-determination and emphasis on Indigenous intellectual traditional to co-develop health pathways for American Indian and Alaska Native youth. The authors are respected Indigenous and non-Indigenous scholars in the field. The three efforts are *Gungasvik*, a cultural resistance to marginalisation of *Yuuyaraq* (the Yup'ik way of being); *PC Care* (promoting community conversations about research to end suicide with rural Inupaiq and Yup'ik communities; and *New Hope,* a joint White Mountain Apache and John Hopkins University. This review focuses on highlighting social determinants at the structural level, shared SDOH, of racism as a risk factor and shared/specific ISDOH at the community level that contribute to mitigation and prevention.

Strengthening Indigenous health systems: taking action

The second set of articles represent a shift towards research and practice to strengthening systems through quality improvement, assurance, and implementation science [26,27,30,31,35,45,47–50,54,55]. System strengthening addresses both broad SDOH and shared ISDOH associated with access and use of health and health related care (i.e. both systemic and structural determinants of health).

Community-led, culturally grounded programming and services. CONCERTS Collaborative Madesclaire Odile Henderson Austin Quandelacey Talia, Nelson et al.'s [45] article titled, 'Food insecurity in urban American Indian and Alaska Native populations during COVID-19 pandemic', was a cross-sectional survey to study the association between COVID-19 infection, vaccination status, and food insecurity among American Indian and Alaska Native adults at five urban Indigenous health clinics. According to the study, 38% of the survey participants ($n = 730$) experienced food insecurity during the pandemic. Findings suggest that cultural and community norms of mutual aid and mobilisation within tribal health care facilitates may have contributed to reducing infection and increasing vaccination uptake. This study quantifies a broad SDOH, food insecurity, and at the same time identifies shared ISDOH of mutual aid and community-led efforts for Indigenous public health practices.

Quality improvement. Increasingly, research is directly contributing to strengthening health systems serving Indigenous peoples in the US and circumpolar region [48]. Performance indicators in the article titled, 'Selecting contextually appropriate performance indicators in a circumpolar context: a modified Delphi approach', were studied. This was a research yet falls under evaluation tools when evidence is put into practice. The study found, after applying the Delphi consensus process with 14 participants, that there were gaps in performance measures that were culturally congruent for the circumpolar region, specifically for maternal-child health.

The Richardson et al.'s [49] team considered quality improvement within the health system for providing treatment for additions by interviewing providers. Their article titled, 'Provider perspectives on the impact of COVID-19 on treatment of substance use and opioid use disorders among American Indian and Alaska Native adults', found broad and shared SDOH impacting access. Particularly impactful for systems improvement was the power of language and use of "client-relative" to initiate that shift to more culturally responsive prevention and treatment.

Dresse et al. [30] article titled, 'Prevalence and factors associated with healthcare avoidance during the COVID-19 pandemic among Sámi in Sweden: the SámiHET study', addressed broad social determinants of health for accessing health care services. This was a population-based cross-sectional study, and 3658 participants' data were analysed. The association between health care avoidance and sociodemographic, structural, and cultural factors was modelled. The findings provide evidence to support improved public health emergency response planning in the future.

The articles by Wark et al. [54,55] included in this review are titled, 'Engaging stakeholders in integrating social determinants of health into electronic health

records: a scoping review' and 'Engaging Stakeholders in Social Determinants of Health Quality Improvement Efforts'. The review identified 20 articles that exampled how SDOH may be integrated into electronic health records (EHR). Specifically, considerations were for which SDOH domains, engagement with stakeholders, cultural adaption of SDOH, implementation barriers and strategies to mitigate them. 20 articles were selected, 18 were individual level, and 10 used the National Academy of Medicine (NAM) domains and measures for EHR, including community level indicators. One tracked data sharing between health care and social services and the second built profiles of the built environment and uploaded geo codes into the EHR. Most health systems focused on community deficits and individual barrier-broad SDOH (e.g. low income). This review found no literature on integrations of SDOH into EHR for Indigenous peoples and few included protective factors. The review identified components that would make the integration of SDOH acceptable to providers, clinical leadership, and need for patient engagement. The recommended areas for future research included studying the SDOH that are protective and serve as indication of resilience for integration and application within health systems.

The subsequent Wark et al.'s [55] study was specifically a quality improvement project to engage stakeholders in identifying shared ISDOH of relevance in a health system and consider how to integrate the data into EHRs. This was a case study evaluation from 2017 to 2020 with the steering committee from the Southcentral Foundation, a tribally owned and operated health care organisation. Focus groups and workgroups were engaged throughout the project period. Findings share updates to the broad SDOH domains specific to Alaska native individuals and communities, shared ISDOH. While it is challenging to integrate the SDOH data into clinical practice, doing so can potentially provide needed access and use of services. Additionally, this project highlighted the importance of collaboration with multiple stakeholder groups for necessary cultural grounding. They conclude with advocacy for ensuring privacy, collecting relevant SDOH data, meaningful analysis, and useful visualisation within large health care systems.

Tribal epidemiology centers. Reece et al. [47] drafted a commentary titled, 'Building a Roadmap to Health Equity: Strengthening Public health Infrastructure in Indian Country'. The commentary describes the Tribal Epidemiology Center Public Health Infrastructure (TECPHI) initiative, funded by the Centers for Disease Control (CDC) from 2017 to 2022 to build the tribal data system capacity. The article provides a description of the participatory, culturally responsive approach used to develop the TECPHI model and its flexibility for application for COVID-19 response. Evaluation of performance measures and qualitative components aligns with the TECPHI strategies and 5 Public Health 3.0 recommendations: workforce development, data information system development, partnership and collaboration, funding and sustainability, and foundational infrastructure. The TECPHI model supports addressing social determinants of health through culturally responsive, community drive public health infrastructure efforts. This article advocates for continued collaborative partnerships and alignment across tribal, state, and federal initiatives to address social determinants through strengthening the public health capacity and infrastructure.

Approaches/Frameworks/Models. Elman et al. [31] provided a synthesis of findings in their scoping review titled, 'Mental health services in the Northwest Territories: a scoping review'. This review shared details on the First Nations Mental Wellness Continuum (FNMWC) model for a continuum of essential services. They included 68 mental health services from 23 resources. The synthesis is intended to accompany the model. Indigenous social determinants of health are named and specifically included in the model they represented, shared ISDOH, and overlap with broad SDOH that impact Indigenous peoples in the region. This is an important resource for Indigenous public health practice.

Analysis. Bertheussen et al.'s [26] article titled, 'Using latent class analysis to operationalize a wholistic assessment of Inuit health and well-being', is an example of these efforts to directly address Indigenous health systems strengthening. This paper shared the operationalising of a wholistic indictor of health for Inuit health. This was a secondary analysis of the 2017 Nunavik Health Survey ($n = 1196$). The authors identified wholistic health profiles using latent class analysis and identified three health profiles, excellent, good, and fair. Like the Baron et al.'s [25] study ISDOH, such as kinship, through community cohesion, family relationships and emotional support were associated with a higher rate of health.

Bjerregaard et al.'s [27] study titled, 'The Greenland population health survey 2018' also contributes to developing culturally congruent and contextually appropriate surveys that can appropriately assess the health of Indigenous peoples in the circumpolar region. National level strategies to survey Indigenous people

health and social determinants are important for Indigenous public health practice. These efforts need to include Indigenous peoples in the design and implementation, preferably led.

Assurance & capacity. Along with tribal data system, strengthening is the assurance of a trained workforce in broad SDOH and shared ISDOH in practice [35]. Garcia et al. [35] shared evaluation findings from an SDOH training they developed for providers in their article titled, 'Social and Structural Determinants of Urban American Indian and Alaska Native Health: A Case Study in Los Angeles'. The team developed a 90-minute interactive workshop for increasing medical school faculty's and trainees' understanding of the social and structural determinants that impact urban American Indian and Alaska Native individuals and communities in urban settings. Their evaluation was conducted with 35 participants. The curricula discuss determinants of health alongside storytelling, intersectionality, and inter-generational approaches. Findings indicate an increase in understanding, ($p < .05$) from pre- to post test. The article shared PowerPoint, facilitator guide, evaluation form, and videos in the appendices. It is designed for non-American Indian and Alaska Native facilitation as needed. There are few curricula available and this fills a gap in capacity building, providing assurance to patients or clients that their providers have awareness and potentially approach them with cultural humility.

Implementation science. The final article included under health system strengthening was a review completed by Sacca et al. [50] titled, 'Barriers, frameworks, and mitigating strategies influencing the dissemination and implementation of health promotion interventions in Indigenous communities: a scoping review'. The purpose of this scoping review was to identify the common barriers and mitigating dissemination and implementation (D&I) processes within Indigenous communities in the US, Pacific Islands, and Canada. 23 studies from 2004 to 2020 were included. The most frequently cited barrier was social determinants of health in community or community-societal policy level barriers. The most common D&I strategy was community-based participatory research (CBPR), followed by the SISTER (School Implementation Strategies, Translating ERIC Resources) strategy for building partnerships. The review identified a need for D&I strategies at all levels to address barriers to implementation, specifically addressing broad SDOH at the community level and community collaboration or engagement at each point in the process. As Native nations and Indigenous communities strengthen their health systems, a shared ISDOH of access and quality, culturally ensuring relevance and community responsiveness of D&I strategies, will play an increasing role.

Mapping complex relationships of SDOH, health, and well-being

The third set of articles were cross-sectional studies designed to quantify and qualify associations between co-existing health conditions and SDOH. They were grouped together because their results can be used for intervention and policy development. They represent shared ISDOH related to the health condition being studied, which are childhood caries and obesity [32,34,37,39].

The Elwell et al.'s [32] article titled, 'A Formative Assessment of Social Determinants of Health Related to Early Childhood Caries in Two American Indian Communities', was a qualitative formative assessment conducted to develop an intervention with two similar American Indian communities located in different regions: Southwest and Plains [32]. 57 caregivers, oral health care providers, and social service providers were interviewed. The study used the WHO social determinants of health framework for content analysis. The three major themes identified were oral health knowledge and values, barriers and supports for children's oral health. Specific community and structural barriers were transportation, access to health promoting foods and access to speciality oral health care. This study contributes to understanding of the pathways of social, behavioural, environmental, and broad social determinants that contribute to early childhood caries. As a result, shared strategies support pregnant women, new mothers, and caregivers with oral health materials. While this study is important for understanding shared ISDOH systemic and structural determinants at the community level, there were no recommendations.

Three studies that are related through topic area and identification of shared ISDOH that contribute to obesity among American Indian and Alaska Native peoples were included in this review [34,37,39]. They were designed to characterise factors associated with obesity across multiple life stages: elders, youth, and children. Goins et al.'s [37] article titled, 'Social determinants of obesity in American Indian and Alaska Native peoples aged ≥50 years' shared findings from a secondary analysis of Indian Health Service data to fit a multivariable linear model of factors, specifically broad SDOH, for obesity experienced by adults aged 50 years and over. Of note, this is the first large, geographically diverse study of social determinants of obesity. The results suggest future studies that consider stress and adverse

childhood events, specifically shared ISDOH of historic trauma, boarding school, and food access. They also suggest community level measures such as collective efficacy for future studies. Final recommendations are for longitudinal studies using the life course framework on shared ISDOH of older American Indian and Alaska Native individuals and communities.

Johnson-Jennings et al.'s [39] study titled, 'American Indian Alaska Native (AIAN) adolescents and obesity: the influence of social determinants of health, mental health, and substance use', conducted a secondary analysis of data from the Indian Health Services, Improving Health Care Delivery Data Project with a sample of 26,226 AIAN youth, 12–19 years of age. The multivariable linear regression model identified association between behavioural health (e.g. mental health and substance use disorders), risk factors for obesity and broad SDOH. For example, AIAN adolescents living in counties with less access to grocery stores had lower odds of obesity (OR = 0.83, $p < 0.01$) than those living in countries with more access to grocery stores. The findings that show decreased odds of obesity among AIAN adolescents in counties with higher concentration of AIAN may indicate shared ISDOH indicators associated with the ability to practice cultural values and be in social relations (e.g. practice culture and social cohesion). Additional shared ISDOH were identified in neighborhood/built environment indicators with lower vehicle access and higher rates of incomplete kitchens were not associated with obesity. This study represents a shift in paradigm towards examining the relationship among SDOH and behavioural health with obesity, including its prevalence These are important findings as they represent the geographic and cultural diversity of AIAN adolescents in the US and insight into SDOH and behavioural health factors related to obesity.

Fyfe-Johnson et al. [34] studied using secondary data from the Indian Health Services American Indian and Alaska Native children, aged 1–22 years. The multivariate linear mixed models indicated a very high prevalence of overweight to severe obesity status. The findings did support addressing food insecurity as those children living in counties with free or reduced provided lunches have 15% lower odds of transitioning from normal to overweight/obese status.

Emerging areas

The final set of articles are reviews of literature in emerging areas for SDOH research: metabolic syndrome, gender, and cultural connectedness [36,40,43,53].

Godfrey et al. [36] conducted a literature review titled, 'Metabolic Syndrome Among American Indian and Alaska Native Populations: Implications for Cardiovascular Health'. This article described the aetiology of metabolic syndrome and risk factors associated with structural racism and social determinants of health. Metabolic syndrome is a strong predictor of diabetes, which in turn is the leading cause of heart disease among American Indian and Alaska Native peoples or populations. For example, the prevalence of metabolic syndrome was 55% American Indians compared to 35% non-Hispanic adults in the 1990's Strong Heart Study. The article described broad SDOH (e.g. air pollution, toxic metals, financial instability, and education) and shared ISDOH (e.g. air pollution, toxic metals, trauma, discrimination, food insecurity, and underfunded health care system). Suggested health promotion strategies were to develop family and community-level programs that included traditional foods and multifaceted culturally tailored activities. Their primary recommendation was to design studies that were innovative, inclusive, and responsive to diversity within American Indian and Alaska Native nations, villages, and communities.

The Masotti et al. [43] article titled, 'The Culture is Prevention Project: Measuring Culture as a Social Determinant of Mental Health for Native/Indigenous Peoples', identified structural and systemic inequities and advocated for community level interventions, specifically culture as a determinant of health. The mixed methods study was completed in two phases with 361 urban Native Americans in California from 2018 to 2021. Results found that culture was significantly associated with mental health and wellbeing ($p < .001$) and decreased risk for depression ($p < .001$) and substance abuse ($p < .07$). Recommendations were to use culture as a determinant of health for interventions and as a health outcome measures.

Larcombe et al. [40] article titled, 'Sekuwe (My House): building health equity through Dene First Nations housing designs', is an important contribution to supporting community and Indigenous public health practitioners mapping Indigenous social determinants of health frameworks for their communities. It represents both broad, shared, and unique determinants of health that we associate with social (e.g. built environment) and Indigenous (e.g. traditional and resurgence of ancestral knowledge and teachings). University student and Dene senior high school students created a Dene healthy housing design to propose for future funding. It addresses the interconnection between the Dene way of living and being with the built environment.

Tremblay et al.'s [53] study titled, 'Indigenous gender and wellness: a scoping review of Canadian research', is an important contribution as an emerging area of consideration as we apply SDOH and ISDOH in Indigenous public health practice. This is a review of gender-related research among Canadian Indigenous peoples.

Critical consideration for Indigenous public health in the circumpolar region and U.S

This literature review was conducted to supplement the existing literature and potentially expand the indigenous communities that may apply the Indigenous social determinants of health training to their own communities and health systems. Circumpolar communities offer a critical example of the importance of applying an Indigenous SDOH approach to understanding public health issues across and within Indigenous communities. In particular, the Inuit experience unique Indigenous-specific SDOH through practice of traditional activities, such as hunting, fishing and gathering practices. These cultural practices take place within a rapidly warming environment that has dramatically changed over the past 50 years from human-caused climate change. Because these traditional practices take place on the ice, the warming Arctic has heightened risks for Indigenous communities through slippery ice that often is weakened through warmer temperatures and no longer supports the weight of humans, animals and modes of transportation, such as snowmobiles. For example, among Inuit communities, drownings are about 6 times higher compared to non-Indigenous Canadians, and Inuit communities face a risk of snowmobile related drownings that are 8 times the rate of non-Indigenous Canadians [8].

By applying the Indigenous SDOH approach to understand these health disparities, it is possible to improve our understanding of the public health risks, problems and issues confronting Indigenous communities from a more nuanced, complex position. This enables public health practitioners, Indigenous communities, and other decisionmakers to address these risks using a holistic understanding of the key determinants at play and take action to preserve and sustain Indigenous cultures, knowledge systems and relationships. The effects of colonisation have placed Indigenous cultures at the risk of epistemic-cide, yet many Indigenous ways of knowing can still be retained if community members, researchers, and public health practitioners can respectfully document and maintain these knowledge systems.

Conclusion

In summary, the purpose of this scoping review was to identify current research and practice focused on SDOH within Native nations and Indigenous communities. The increased interest in Indigenous social determinants of health, health systems strengthening, and limited public health resources available were the impetus for the review. 20 articles were selected and synthesised using SDOH, ISDOH, and socio-ecological concepts. Additionally, the articles were synthesised by the type of determinant of Indigenous health and application to public health practice. Current literature falls into four areas: 1) life course and intergenerational approaches to systemic and structural determinants; 2) strengthening Native nations and Indigenous community healing, health, and well-being systems; 3) mapping the complex and interconnected relationship of co-occurring health conditions and SDOH; and 4) emerging topics or areas of inquiry. Community- and societal-level systemic and structural determinants were recommended for future research and interventions. These studies also advocated for multilevel, intersectional studies that adhere to the principles of community-based participatory research.

All four areas are connected by an awareness and engagement in studies that address systemic and structural determinants, broad SDOH and shared ISDOH. Most of the studies reviewed applied broad SDOH and shared ISDOH, although they did not use the ISDOH terminology. Shared ISDOH identified in studies were often strength-based determinants associated with community, culture, and connection to place. Additional shared ISDOH identified were often associated with the legacy of assimilation policies and impact of federal government not fulfilling their trust responsibilities to Native nation and Indigenous communities. Structural and systemic determinants that negatively impact communities represent an area of overlap between shared ISDOH and broad SDOH, as shown in Figure 1. Systemic racism and discrimination are shared by the broader population, as is underfunded health care systems. Yet, within the context of tribal sovereignty and trust responsibility, these can be specific to a Native Nation and Indigenous community.

Identifying the distinction and relationship among SDOH and ISDOH that impact Alaska Native and American Indian, and Indigenous peoples in the circumpolar region (e.g. individuals and communities) is important for public health practice. They serve to support the development of community and tribally specific determinants of health frameworks that identify both barriers and promoters of Indigenous community healing, health, and well-being [12]. The ISDOH specific frameworks are then applied to study designs, program planning, and provision of services. Those efforts constitute a commitment to strengthening systems for healing, health, and wellness serving Native nations and Indigenous communities.

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