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Conceptual interdisciplinary model of exposure to environmental changes to address indigenous health and well-being

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ABSTRACT

Objectives: Global environmental changes not only impact the physical environment but the health and well-being of people on earth. Emerging research demonstrates how indigenous peoples' physical and behavioural health is disproportionately affected by changes to their ecosystems in combination with pre-existing social and economic inequities. This article introduces a conceptual model to enhance our understanding of environmental change and its impact on indigenous behavioural health and well-being.

Study design: Using an indigenous theoretical lens, this article presents a review of existing theoretical frameworks applied to environmental changes and empirical studies with indigenous populations.

Methods: The conceptual model joins elements from the indigenist stress-coping model from the field of social work with the exposure pathway model from the field of public health.

Results: The interdisciplinary model joins elements from the indigenist stress-coping model with the exposure pathway model to highlight indigenous-specific sensitivities and cultural buffers that are particular to the impacts of environmental change among indigenous peoples.

Conclusions: Implications for public health and social work policy, practice and research with indigenous communities are discussed.

Background

Changes in the earth's environment are caused, in part, by anthropogenic activities that in turn affect the physical and behavioural health of humans.[1,2] The most common anthropogenic causes of environmental change are human population growth, material and resource consumption, energy and land use and pollution.[2–6] Research continues to show that some communities and populations are disproportionately

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more susceptible to changes in the environment than others owing to their social, economic and geographical factors.[2] For instance, emerging research demonstrates how indigenous peoples' health and well-being are eminently affected by changes in their ecosystems because of social and economic inequities.[7,8] Frameworks have been developed within public health and geography disciplines as an attempt to document the disparity of impacts of environmental change across varying populations (e.g. exposure pathway model), not as an effort to address social or economic disparities but to develop regional preparedness in response to these environmental changes.[9,10] On the other hand, frameworks in social work attempt to address social and economic disparities (e.g. indigenist stress-coping model) but have not incorporated the physical environment as a determinant of health. Given indigenous people's profound connection to the land and their disproportionate experience of environmental justice, there is a need for further theoretical exploration of environmental change and its relationship to the health and well-being of indigenous people across the globe.[11,12]

This article aims to integrate the indigenist stress-coping model[13] with the exposure pathway model to better understand how environmental change impacts indigenous health and well-being. Using existing literature, the article highlights indigenous-specific sensitivities (i.e. stressors) and cultural buffers (i.e. social support) that inform how environmental changes influence health and well-being. In addition, this article reviews three key concepts, such as resilience, vulnerability and adaptation within the environmental change literature, which includes describing their relation to each other and how these concepts can be integrated into public health and social work practice with indigenous communities. Understanding the conceptualisation and applications of vulnerability, adaptation and resilience within an indigenous context can increase preparedness for natural hazards and technological disasters and enhance responses to global environmental changes in indigenous communities. Finally, this article creates an important opportunity to diversify and enrich the conventional discourse on environmental change and contribute to improved policy, practice and research strategies that promote indigenous health and well-being.

Indigenous health

In this article, we use the World Health Organization (WHO) concept of health and well-being as, 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.[14] Much like an indigenous concept of health, the WHO definition is a more holistic understanding of health than Western biomedical paradigms that silos the mind, body and spirit into different entities.[14] For many indigenous peoples, health and well-being is a balance of relationships among individuals, communities and the ecosystem.[15,16]

Indigenous peoples have poorer health compared with their majority counterparts worldwide.[17–23] For instance, studies throughout America, Africa and Oceania highlight inequities in health between indigenous peoples and non-

indigenous groups[17,18,21,24] Mortality for US indigenous peoples compared with non-indigenous peoples is four times greater owing to alcohol-related diseases and two times greater owing to both diabetes and unintentional injuries.[25] Similarly, morbidity and mortality disparities are higher among indigenous populations in Latin American countries.[21] In Africa, consistent marginalisation and denial of 'indigenous' distinction have contributed to poorer health among indigenous Africans when compared with majority populations.[24] In Australia, mortality is five times greater for aboriginal people than in the general population for ages 35–54 years, and aboriginal life expectancy is 20 years shorter.[17] Among the Māori of New Zealand, life expectancy at birth is 77.1 years for women and 73.0 years for men, compared with 83.9 years for non-Māori women and 80.3 years for non-Māori men.[26]

The underlying causes of inequalities in health among indigenous peoples are attributed to historical trauma, separation from place and undervaluing of indigenous health practices. Foremost, historical events faced by indigenous groups inform health inequalities experienced by indigenous populations today.[11,12] Colonising events (e.g. forced relocation and removal, cultural separation through boarding or residential schools) continue to contribute to the higher prevalence of infectious and non-communicable diseases associated with poverty, low education, housing conditions and sedentary lifestyles.[11] Finally, health inequalities are attributed to the undervaluing of indigenous health practices.[17,19,20,23]

Indigenous health and the environment

Many indigenous peoples' relationship with the land is both cultural and spiritual.[27] For some indigenous communities, a relationship with the environment is how culture is expressed and passed onto the next generation and becomes part of their indigenous identity.[16,28–31] Indigenous communities have a strong relationship with their environment, or place, because they hold cultural meanings through their traditional practices.[16,32,33]

Removal from original lands disrupted, and in some cases continues to disrupt, subsistence living and cultural interactions with the environment.[23] Colonizers removed indigenous peoples from their original lands or confined them to portions of land that was either unproductive or continually destroyed and depleted through natural resource extraction. Currently, exploitation of indigenous lands for natural resources and waste landfills introduce exposure to hazardous and toxic chemicals to these communities.[19,23,34] Global environmental changes further disconnect indigenous people from the environment.[16]

To date, health and well-being impacts of environmental change among indigenous peoples are limited.[35] Indigenous peoples report health outcomes such as water- and vector-borne diseases,[16,36] malaria,[37] stomach disorders[38] such as diarrhoeal diseases,[36] malnutrition, respiratory diseases[38] and cardiovascular diseases.[16] Additionally, mental health concerns were related to negative feelings of place and maladaptive behaviours such as increased drug and alcohol usage

and suicidal ideation.[16,39] Studying the effects of environmental change on indigenous health is important for furthering not only indigenous knowledge but also society at large.[5]

Global environmental change literature

There are three main concepts within the global environmental change literature to describe human–environment interactions: resilience, vulnerability and adaptation. However, what is rarely mentioned in this body of work is how these concepts inform and interact with one another. In addition, multiple disciplines using resilience, vulnerability and adaptation in environmental change research invoke, or infer, different meanings using discipline-specific assumptions.[40] This section will review resilience, vulnerability and adaptation definitions and concepts within the context of the present model.

Resilience

In reviewing the global environmental change literature, resilience is defined by the United Nations as the 'the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions'.[41] Key concepts of resilience are drivers of change, adaptive capacity and transformation. Drivers of change are the social, economic, institutional, infrastructure, community and environmental factors that influence an individual or community's sensitivity to environmental change exposures.[10] Adaptive capacity is the ability to progress (or grow) in the presence of external threats or changes and increases the system's capability to adapt.[42–44] Transformation is the third element of resilience, which considers potential trajectories beyond the current state when the current conditions or pathways are undesirable or vulnerable. In some cases, returning to the pre-exposure state may not be possible; a transformation to the new state may become the new normal.[40]

Vulnerability

In the global environmental change literature, vulnerability is commonly defined as, 'the physical, economic, political or social susceptibility or predisposition of a community to damage in the case of a destabilising phenomenon of natural or anthropogenic origin'.[45] The variability of vulnerability stems from proximity to fragile ecosystems and the social and economic differences across communities.[9] The scientific community's understanding or conceptualisation of vulnerability has changed over the last century from a hazard-only approach, then to a human-centred focus and now to the integration of human and environmental interactions.[40] Recently, within social work literature, power differentials focus on an individual's, a community's or a country's ability to address inequalities.[46,47] From a public health perspective, vulnerability is integrated into epidemiological work studying environmental impacts on human health.[48] Vulnerability is presently understood as a multidimensional concept that includes physical, social, economic, environmental and institutional factors that creates the potential for exposure or harm.[40]

Resilience related to vulnerability

Placing vulnerability and resilience at either end of a continuum ignores the nuanced complexity of both constructs. For example, one unit (at any level) could have vulnerabilities to environmental change yet have higher adaptive capacity and cultural buffers that enable successful adaptation or transformation, which demonstrates resilience. Miller et al.[47] explain the debate between resilience and vulnerability as a lack of clarity because these concepts developed on parallel tracks and differ on spatial and time scales of analysis. Vulnerability is empirically tested at the actor level, and resilience has more exploration at the socioecological/systems level. One possible way to see this relationship in social work is to study resilience at an individual or community level. For example, impacts of environmental changes vary on the levels of vulnerability among indigenous peoples. Their ability to adapt to change while maintaining their basic structure or functions is dependent on their adaptive capacity and cultural buffers.

Adaptation

Within geography and earth sciences, adaptation is defined as 'the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities, and human intervention may facilitate adjustment to expected climate and its effects'.[49] Adaptation is warranted when environmental changes have the potential to significantly harm the society.[50] International frameworks, as well as national, state, regional, and tribal policies, guide adaptation strategies. To understand the range and limits of one's ability to adapt, system adaptive capacity is analysed. Adaptive capacity refers to 'the ability or potential of a system to respond successfully to climate variability and change and includes adjustments in both behaviour and in resources and technologies'.[51] The level of adaptive capacity informs the resilience of a system exposed to changes in the environment.

Adaptation related to resilience and vulnerability

Adaptation is the set of policy and programmes designed to reduce vulnerability and increase adaptive capacity to global environmental changes. Adaptation is used as a framework for environmental change research in relation to vulnerability and resilience.[52] Where environmental change is the perturbation disrupting the system, vulnerability is a source of negative feedbacks, and if successfully able to adapt to these disturbances, then the system demonstrates resilience at that time to that disturbance.[52] Power dynamics of macrolevel social, political and economic processes influence coping abilities through access to resources and shape the individual and community adaptive capacity.[53] Wisner et al.[53,54] argue that these macroprocesses create conditions that enable or prohibit the access to financial and informational

opportunities necessary for successful adaptation. Thus, the impact felt to environmental changes is dependent on conditions developed at the macrolevel.[54] In this sense, adaptive capacity is the level of vulnerability to environmental changes and adaptation activities that focus on areas with low adaptive capacity.[53] Determinants of adaptive capacity include available technological options for adaptation; availability of financial resources; institutional design; human and social capital; access to risk-spreading tools, processes and mechanisms; information availability and access and awareness and understanding.[53,55,56]

Conceptual framework for indigenous health and environmental change

Although indigenous peoples around the world contribute the least to changes in the environment, they are disproportionately impacted by these changes owing to at least three main reasons: (1) indigenous peoples' location to vulnerable ecosystems (exposure), (2) cultural and traditional lifestyles which are deeply reliant on natural resources for subsistence and practices (sensitivity) and (3) indigenous peoples as a group are disproportionately among the poorest of their societies and have the greatest health disparities (adaptive capacity). A strict interpretation of vulnerability without considering resilience factors of cultural buffers and adaptive capacity would conclude that eradication of indigenous peoples by global environmental changes is imminent. However, we know that not to be the case, as globally, indigenous people have survived centuries of colonisation and attempts of genocide and cultural destruction, still, we (indigenous people) remain. Furthermore, contemporary indigenous identity and culture is evidence of the resiliencies of indigenous peoples today.[57]

To understand how environmental changes impact indigenous peoples at the mezzolevel or microlevel, we draw from the concepts of vulnerability and resilience from the indigenist stress-coping model[13] within the field of social work and the climate change and mental health framework within the public health field as an exposure pathway. Walters and Simoni[13] posit that cultural buffers of ethnic identity and social support at the individual level can moderate the relationship between stressors of indigenous life events, such as discrimination, historical trauma and health outcomes. Berry and et al.[58] argue that environmental changes are within the local cultural, economic and social contexts that impacts individual and community health. Fig. 1 demonstrates how vulnerability, resilience and health outcomes are in the context of local culture, economic, social, developmental and environmental human and earth systems.[59] Vulnerability is the proximity to exposure of environmental changes, and sensitivity is the range of impact of exposure[60] determined by stressful events such as disruption of land and its resources, historical trauma, discrimination and traumatic life events.[13] Sensitivity can directly impact health outcomes or can be mediated or moderated through adaptive capacity.[60] Adaptive capacity can be assessed through levels of human and social capital as well as information availability.[53,55,56] Similarly, exposure can directly impact maladaptation (poor health and increased substance use) or can be mediated or moderated by drivers of change.[60] Resilience is the presence or absence of adaptive capacity and drivers of change such as cultural buffers and institutions and their influence on adaptation or transformation.[42,60]

The framework provides a big picture of the interaction between environmental concepts, social work theories and public health frameworks to understand how environmental change exposure and indigenous-specific factors affect the health of indigenous peoples.
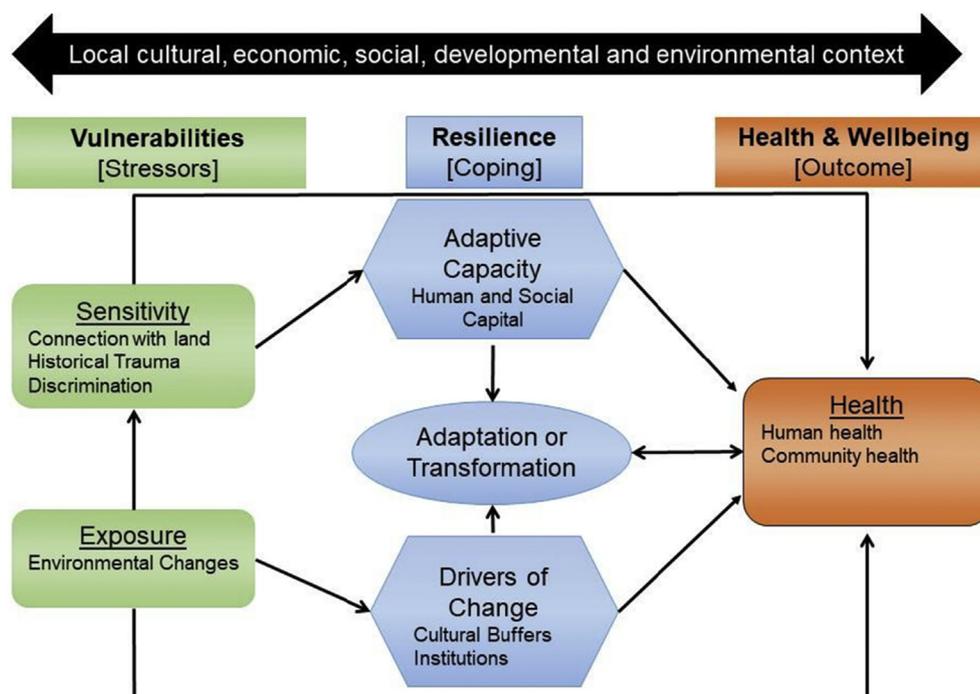

Fig. 1 − Indigenous vulnerability, resilience, health and well-being framework.

Implications for research, policy and practice

The World Bank predicts that by 2050, climate change will be the global challenge.[61] This will mean that environmental changes will permeate every aspect of the physical and social environment. Environmental change has serious implications for population health and well-being, but what determines the impact of environmental change are the human systems and infrastructure available.[62] The Intergovernmental Panel on Climate Change[4] has high confidence that the 'severity of the impacts of climate extremes depends strongly on the level of the exposure and vulnerability to these extremes' (p.8.). The potential impact of environmental change on global health necessitates the concern for the physical environment because exploitation of natural resources inevitably results in exploitation of people.[63] Consequently, professions focussed on improving the overall health and well-being of society should, by extension, be concerned with the physical environment and the general well-being of the earth.[63]

Contemporary public health practice requires transdisciplinary collaborations between public health workers and other professionals, including social workers, to address the 'wicked problems' of environmental change.[64] As professions both committed to fostering the health and well-being of individuals, communities and populations—including those disproportionately affected by environmental change—public health and social work practitioners can have a significant role in the campaign for environmental justice. Practitioners can aid in the prevention of adverse consequences of environmental change and advocate for those most impacted by climate change through community organising, education, policy change and interdisciplinary/ transdisciplinary research.

Practitioners and researchers are encouraged to promote indigenous communities' traditional environmental methods and tools when developing adaptation strategies. This will allow for indigenous communities to continue to build resilience and avoid further subjugation of 'vulnerable' labels using pan-Indian research and practice approaches of the past.[57] For example, the Confederated Salish and Kootenai Tribes of the Flathead Reservation prioritise their traditional ecological knowledge in scientific research on how to preserve their environment, culture and people who are exposed to climate change rather than a one-size-fits-all notion of indigenous ecological knowledge.[57,65,66]

There are many ways for practitioners to be involved in addressing issues of environmental change among indigenous peoples. At the international and national levels, practitioners can address the causes of environmental change through governmental or multinational organisations, such as national climate change legislation and addressing wealth disparities and situations of poverty. At a national level, practitioners can develop mechanisms or policies to enforce corporate accountability for their contributions to the greenhouse gases.[67] Community organisers can lead environmental movements and build coalitions or work with communities to develop environmentally conscious or sustainable communities. Practitioners can also concentrate their efforts among those in rural versus urban geographic locations by conducting vulnerability assessments.[68] Specifically for indigenous peoples, practitioners can be advocates for the inclusion of their governments within the international organising bodies that govern the emission standards, energy extraction ethics and indigenous rights.

Public health social workers[69] can build on attachment theory that is used in early childhood and adolescence and as a guideline for working with clients who experience loss or disruption to their environment and trauma and crisis interventions.[70−74] Medical social workers can follow examples from Australia, New Zealand, Canada and Peru to develop culturally appropriate health services that integrate Western practices with indigenous medical practices.[23] Additionally, there is a need for the professions to develop a culturally relevant notion of 'environment' similar to that of aboriginal Inuit—where personhood is rooted in identity as one's relationship with the land and where well-being includes human health and spiritual and cosmos.[75] As professions committed to addressing health and social inequities, public health in partnership with social work can continue to carve out their role in addressing challenges of environmental change in what will be the global challenge of the century.[76]

Conclusion

Global environmental change is an ongoing and complex process that will continue to permeate all spheres of life on earth.[2] Given their attachment to and dependence on the land for spiritual, cultural and subsistence practices, indigenous people are disproportionately vulnerable to environmental change.[77] The conceptual model presented in this article illustrates how theories used in multiple disciplines can merge to advance our understanding of the long-term impacts of global environmental changes on indigenous peoples that can pave the way for transdisciplinary work. The model may also be applicable to other cultural groups and impoverished peoples facing overpowering environmental changes (i.e. climate change events, repeated disasters, pollution and contamination) in their local communities such as the small farm crop production, hurricanes in the Gulf Coast, Flint water crisis, Louisiana's cancer alley, pollution in urban environments (e.g. South Bronx, Delray in Detroit).

Author statements

Ethical approval

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Competing interests

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