

Article

Transferrable Principles to Revolutionize Drinking Water Governance in First Nation Communities in Canada

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Abstract: There are analogous challenges when it comes to the management and provision of health services and drinking water in First Nations reserves in Canada; both represent human rights and both involve complex and multijurisdictional management. The purpose of this study is to translate the tenets of Jordan's Principle, a child-first principle regarding health service provision, within the broader context of First Nation drinking water governance in order to identify avenues for positive change. This project involved secondary analysis of data from 53 semi-structured, key informant (KI) interviews across eight First Nation communities in western Canada. Data were coded according to the three principles of: provision of culturally inclusive management, safeguarding health, and substantive equity. Failure to incorporate Traditional Knowledge, water worldviews, and holistic health as well as challenges to technical management were identified as areas currently restricting successful drinking water management. Recommendations include improved infrastructure, increased resources (both financial and non-financial), in-community capacity building, and relationship building. To redress the inequities currently experienced by First Nations when it comes to management of and access to safe drinking water, equitable governance structures developed from the ground up and embedded in genuine relationships between First Nations and Canadian federal government agencies are required.

Keywords: drinking water; First Nations; drinking water management; Jordan's Principle; equity; culturally appropriate services; human rights

1. Introduction

Jordan's Principle is a child-first principle that was created from the tragic story of Jordan River Anderson. He spent his entire life in a hospital due to jurisdictional funding disputes that led to inequitable access to government services [1]. The resulting inquiry led to the legislation behind Jordan's Principle. As a legal rule, the three pillars of Jordan's Principle are providing culturally appropriate services, safeguarding the best interests of the child, and substantive equality [2]. The intention of these three pillars is to offer a guiding framework that aims to ensure that the needs of the child are adequately considered and that there are no "denials, delays, or disruptions" in service provision due to jurisdictional disputes over funding [3]. The premise of Jordan's Principle is embedded in international obligations (UN Convention on the Rights of the Child) which are mirrored in domestic

legislation (Canadian Charter of Rights and Freedoms and the Canadian Human Rights Act) [4], with the overarching goal of achieving more equitable treatment for First Nations children [5].

The human right to equitable access to safe drinking water was first recognized back in 2010 by the UN General Assembly and the Human Rights Council and is seen as binding international law [6]. More recently, the UN's Sustainable Development Goal #6 targets "universal and equitable access to safe and affordable drinking water for all" by the year 2030 as part of a global agenda to which all nation states are signatories [7]. Further, the Canadian federal government has publicly declared some lofty water promises over the last 5 years, including a pledge to eradicate all drinking water advisories in First Nations communities by March 2021 [8] with investments in water infrastructure and sustainable water protection processes through partnerships with Indigenous groups [9].

Similar to health and child welfare services for First Nations children, water governance on First Nations land is complex and multijurisdictional. Municipal, provincial, and federal governments all hold some degree of decision-making power when it comes to drinking water quality. Separate federal agencies provide funding and policy and regulatory oversight (Indigenous Services Canada) [10]. The *Indian Act*, which governs non-self-governed bands [11], delegates authority to First Nations Chief and Council to manage day-to-day water systems on reserves, which includes water quality testing, issuing drinking water advisories, and planning and developing infrastructure [12]. This 'authority' is limited to First Nation reserves, excluding broader traditional territories which often have significantly larger geographical boundaries [13]. When it comes to drinking water management, First Nations succumb to what has been referred to as "the regulatory gap" [14]. This concept refers to the absence of legalized drinking water quality standards and lack of comprehensive powers for First Nations water management and clarity on specific governance structures [12], combined with the fact that provincial laws (including water protection laws) do not usually apply to reserves [14]. This removes the legal and institutional backbone that could ensure safe drinking water on First Nations reserves.

Systemic denials, delays in services, and underfunding are not uncommon when it comes to First Nations drinking water management and the availability of safe drinking water cannot be considered equitable [15]. As of February 2020, there were 61 long-term (longer than 1 year) drinking water advisories (DWAs) in First Nations across Canada and as of 19 October 2020, there were 18 short-term (12 months or less) DWAs on First Nations across Canada, 6 of which are on First Nations in Saskatchewan [16]. These numbers represent First Nation communities south of 60 excluding First Nations from British Columbia and the Saskatoon Tribal Council, and they reinforce the fact that First Nations suffer a disproportionate burden of poor drinking water quality [17,18], even when compared to communities with similar demographic populations and in similar rural locations and population sizes [19].

Historically, federal and provincial initiatives to tackle drinking water challenges in First Nations communities have not addressed the underlying concerns First Nations people hold, some of which include treaty rights, decision making and governance structures, as well as the jurisdictional authority and responsibilities held by First Nations to care for their water [13,20]. Cultural and spiritual protocols [20,21] as well as Traditional Knowledge [13] have also been cited as important perspectives that are imperative to First Nations drinking water governance but have yet to be adequately incorporated into governance models [13,20].

While Jordan's Principle evolved out of a terrible tragedy, that tragedy was the result of similar gaps in service delivery oversight that exist in drinking water services in First Nation communities. Therefore, it is proposed that the three fundamental principles have more wide-reaching application to the provision of jurisdictionally fragmented services. Specifically, this study uses the principles underpinning Jordan's Principle as a framework for analysis of reported drinking water challenges and opportunities in select First Nation communities in Canada. The purpose of this study is to demonstrate the utility of the Jordan's Principle framework within a broader context and to identify potential avenues to revolutionize First Nation drinking water governance. To note, the term revolutionize is not used lightly; in order to decolonize, or more accurately, undertake repatriation [22] of water governance, a fundamental and perhaps radical change of the current Western and capitalist systems is required.

2. Materials and Methods

2.1. Author Positionality

All authors identify as non-Indigenous allied researchers. Further, all authors have extensive experience with First Nation community-engaged research within the topics of health and drinking water. Irvine is in the early stages of her academic career and has undertaken several research roles within First Nations community-based research projects in the areas of primary care and has recently started a PhD working on a First Nations community-led water-related health project. Schuster-Wallace has worked co-operatively with communities in Africa and Canada on issues of local water security and water-related health, supporting development of tools that use local knowledge to inform local decision making as a way to begin to reduce inequities and strengthen autonomies. Dickson-Anderson has worked collaboratively with Indigenous communities in Kenya and Ontario to conduct research supporting water security. Bharadwaj has engaged respectfully with Saskatchewan First Nations to cooperatively conduct research in the areas of water and health over the past 20 years. All authors preface that our positionality has been shaped by our collaborative partnerships with First Nations and Indigenous peoples, which has contributed to our understanding of different knowledge systems and decision-making processes. We understand how our innate perceptions may be different from those we work with and privileging community voices and lived experiences within the analysis framework is to highlight First Nation perspectives on where current drinking water governance processes are falling short. The intention of this article is to demonstrate how the contextually complex and community-specific challenges to First Nations drinking water need to address on-the-ground experiences with community members.

2.2. Study Location

In Canada, three groups of Aboriginal peoples—Indians (referred to as First Nations), Inuit and Métis—are recognized under its Constitution. These groups are three distinct peoples with unique histories, languages, cultural practices, and spiritual beliefs and are disparate from the general population of Canada. Approximately 1.67 million people in Canada identify themselves as Aboriginal [23], representing the fastest growing and youngest population in the country. More specifically, there are 977,230 First Nations people in Canada, the majority of which (57% or 403,369) live in First Nations communities also known as “reserves”. There are 634 First Nations communities in Canada, representing more than 50 Nations dispersed across the provinces and territories of the country. Based on the most recent Canadian census completed in 2016, Indigenous peoples in the province of Saskatchewan made up 16.3% of the population, which is significantly higher than the national average of 4.9% [24,25]. All First Nations across Canada have distinct cultural, linguistic, and spiritual values that shape local knowledge and decision-making processes. In the province of Saskatchewan, a western province of Canada where the research was undertaken, there are 70 First Nations, of which 61 are affiliated with one of nine Saskatchewan Tribal Councils. These councils serve member nations as a governmental body and are generally formed along ethnic, linguistic, or regional boundaries. The participating First Nations and peoples in this study represent Cree, Saulteaux, and one of four Lakota and Chippewa communities in the province. Participating communities are located within Treaties 4, 5, or 6.

The First Nation communities included in this study are all from central and south Saskatchewan, which is a prairie grassland region that has a relatively dry and cold climate, with an approximate 80 °C range in average daily temperatures throughout the year. Saskatchewan holds more than 40% of Canada’s total crop field acreage [26] and the North Saskatchewan, South Saskatchewan, and Saskatchewan rivers are relied upon by the province for municipal water supplies and wastewater treatment, agriculture use, hydroelectric dams, and reservoirs [27]. Droughts, sometimes lasting multiple years, are not uncommon throughout Saskatchewan [28], with pockets of severe drought recently observed in the southern part of the province [29].

2.3. Materials

Secondary analysis of 53 semi-structured, key informant (KI) interviews across eight First Nation communities from central Saskatchewan was undertaken. Primary data were from the Canadian Institutes of Health Research co-developed project entitled “Water Regulations: Impact on First Nations Health Equity and Promotion”. Original research questions were co-developed with community representatives and included (1) What are the challenges to achieving effective, culturally relevant, and ethical regulation of First Nations drinking water? (2) How do challenges associated with effective, culturally relevant, and ethical drinking water regulation impact the health of First Nations, as individuals, families, and as communities? (3) What are the differences or similarities of the challenges of water regulation among Saskatchewan First Nations communities? (4) What processes and capacity needs are required to change current and future conditions of water regulation for Saskatchewan First Nations specifically, and for Canada’s First Nations in general? Primary data collection was undertaken across multiple communities and varying community positions, and saturation was determined when there ceased to be emergence of new themes and comments within the study context [30].

In an effort to understand challenges and facilitators to First Nations water governance, entire interview transcripts were re-coded according to the three principles of: provision of culturally inclusive management, safeguarding health, and substantive equity (Figure 1).

Through the initial coding process, several subthemes emerged and were added to the code set. The transcripts were recoded according to the final code set (Figure 2). Data were managed and analyzed using NVivo 12[®] and Microsoft Excel[®] (2010 edition).

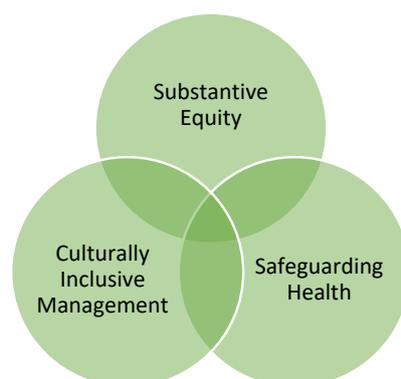


Figure 1. Analysis Framework.

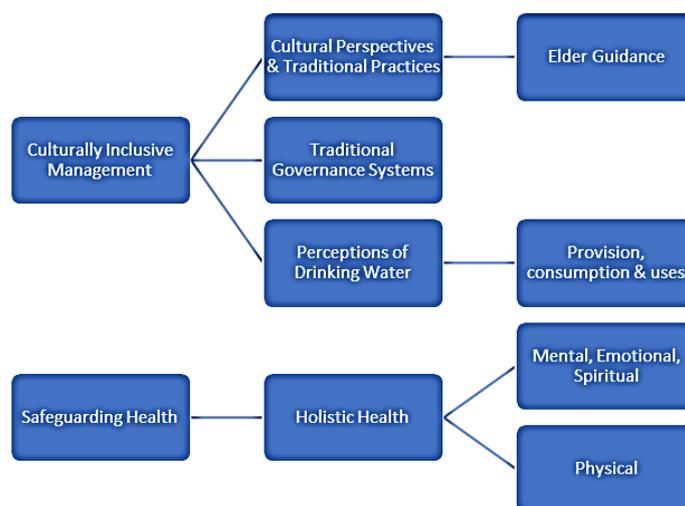


Figure 2. Cont.

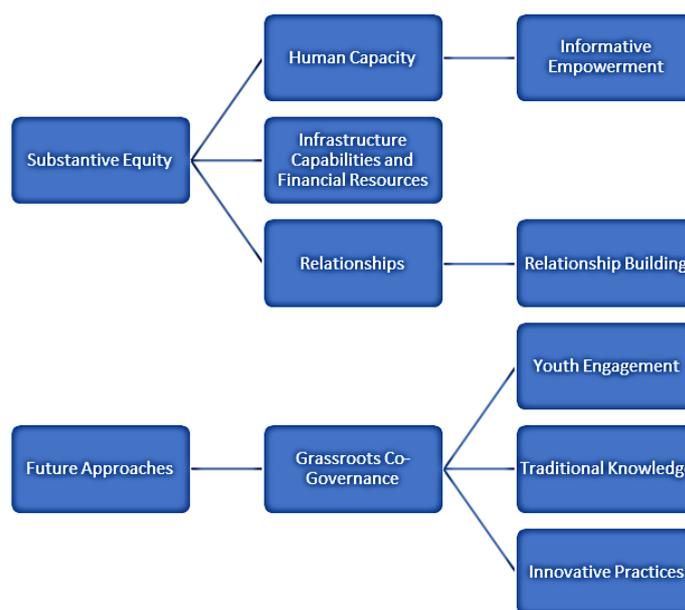


Figure 2. Final Code Set.

Ethical approval for primary research was provided by the University of Saskatchewan Research Ethics Board, Approval BEH-11-96.

3. Results

Of the 53 interviews, a maximum of 18 were from a single community and 18 were women participants (Table 1). KIs held a number of roles in the community, including community-based water treatment operators (3), water treatment officers (4), water treatment monitor (1), executive officer (1), Band Council member (1), documentation officer (1), community coordinator (1), public works supervisor/manager (2), community health worker (3) and community management team member (1). The largest proportion of perspectives were from community Elders (35). Results are presented within the overarching principles of culturally inclusive management, safeguarding health, and substantive equity.

Table 1. Genders and roles of respondents.

Location	Respondents		Role	Total Respondents
	Women	Men		
Community 1	0	3	Water treatment officer (1), public works supervisor (1), health services (1)	3
Community 2	1	2	Water treatment operator (1), health services (1), executive officer (1)	3
Community 3	2	15	Water treatment operator (1), Council member (1), Elder (15)	17
Community 4	12	6	Documentation officer (1), community coordinator (1), water treatment operator (1), water treatment officer (1), Elder (14)	18
Community 5	2	6	Management team (1), water treatment officer (1), public works manager (1), Elder (5)	8
Community 6	1	0	Water treatment monitor	1
Community 7	0	3	Health services (1), water treatment officer (1), Elder (1)	3
Total Participants (N)	18	35		53

3.1. Culturally Inclusive Framework for First Nations Water Management

First Nations people have a different way of viewing and knowing the world; differences in culture, knowledge systems, and beliefs exist between First Nations and the multiple levels of government agencies involved in managing drinking water on First Nations reserves. First Nations community members emphasized the importance of spiritual ($n = 11$) and cultural dimensions ($n = 46$) of water, as well as its sacredness and interconnectedness ($n = 30$) that leads to it being more than simply a commodity. It was made clear that there are multiple ways in which drinking water quality and culture are connected:

“I guess when you talk about water, when you lose that quality of water, you lose a quality of life, you know. And that’s what we’re losing. So our cul—when you say culture, it’s, um, it’s a struggle you make. Maybe the way the water is struggling, maybe that’s how we’re struggling. That’s part of our culture.” SL2

Elders and community members stated the importance of understanding the sacredness of water and embedding it in management and governance going forward. Pre-colonization relationships and traditional governance processes are seen to be key to informing the future:

“They always told you one thing: Don’t play with water. And the other thing is um, don’t use it if you’re going to . . . or don’t use it if you’re going to make something good of it. Don’t throw it away if someone else can use it . . . Because once we get back to that Indigenous piece of sacredness of water, of spirit of water, of inherent right to water, who gave us this water, that’s all a part of this. And how can our next generation not be better because of it? And I’m not just talking First Nations people, I’m talking the Medicine Wheel and all races. So, we’re trying.” M1

“The use of the water, it’s not the same. So there’s definitely a shift from the traditional aspect of it to more modern and it’s because we’re not utilizing the . . . The social issue of it is it’s an erosion of who we are as Indian people. And ah now, no other, I always say, no other people in this world has changed or adapted from hunter/gatherer to state of the art technology within the span of 100 years. So that way of life is altered forever. It’s gone.” B2

These sentiments on the loss of culture can be tied back to the literature, specifically in relation to loss of cultural practices [14,31] and the need for, and importance of, guidance from Traditional Knowledge [13,32] in the realm of water governance.

A critical underpinning common to Indigenous ideologies is that everything is interrelated [20]; the world is connected by water and all life processes require water to survive. It is important to understand this connectivity when thinking about the health of First Nations communities as well as reciprocal relationships with the environment:

“And it was meant for the purpose that you can’t live without it. Everybody has to have it. Animals, the whole world. Even ah, even the earth needed water to grow things.” CH3

“So when we talk about water, it’s interrelated to everything that we were back in the day . . . so you’re looking at how bugs are, how the frogs are, how the fliers are, how the four-legged are, and the two-legged and everything’s interconnected. And then you take away water out of that equation. What would live? Everything that doesn’t need water would still be okay.” M1

Commodification is one of the fundamental differences that shape value systems when it comes to water governance. Commodification of water is a main driver of decision making when it comes to the management of natural resources in Canada, including water [13,33]. Specifically, water as a

resource that can be bought and sold is embedded in the dominant capitalist and Western worldview and does not address the idea of collective responsibility to protect drinking water resources for all. Conversely, First Nations peoples do not see water as a commodity or as a resource that can be owned ($n = 8$), but more as a living entity that people have a responsibility to protect for future generations, and certainly not rights over its exploitation [13,19,21]:

“Well, nobody owns water” B18

“Water . . . can’t be owned. It is ah, gifted to all things by the Creator and to try and own it is um, is wrong. To keep it away from another human being is wrong. To spoil it for another human being is wrong, but to spoil it for nature as well is wrong. Plants, animals, bugs, whatever uses it. If we spoil it, then we’re doing wrong.” M1

Traditional water governance parallels First Nations cultural survival [34]. Traditional ceremonies, foods, language, and cultural practices are the pathways through which First Nations maintain their spiritual relationships with, and responsibility for, water. Community members felt as though there was a loss of cultural practices and spiritual ceremonies ($n = 38$) within the modern context of water relations:

“The use of the water, it’s not the same. So there’s definitely a shift from the traditional aspect of it to more modern and it’s because we’re not utilizing the . . . The social issue of it is it’s an erosion of who we are as Indian people. And ah now, no other, I always say, no other people in this world has changed or adapted from hunter/gatherer to state of the art technology within the span of 100 years. So that way of life is altered forever. It’s gone.” B2

“And, uh, and then after that, when the water started not to get so—those ceremonies died down. I don’t know, for so long they didn’t have any ceremonies that much. And then they kind of revived and now they’re building again. So, yeah. Um, the language, too, where you don’t have your language, you don’t really have a culture. Now we’re using this Indian-English language, so that culture is kind of struggling. But this, in time, history, this area was a very popular place. A very clean and very pure place. Ceremonial ways. But now, today, it’s, uh, it’s a struggle. It’s a struggle.” SL2

“Because once we get back to that indigenous piece of sacredness of water, of spirit of water, of inherent right to water, who gave us this water, that’s all a part of this. And how can our next generation not be better because of it? And I’m not just talking First Nations people, I’m talking the Medicine Wheel and all races. So, we’re trying.” M1

“Well, my parents—well, my mum grew up, like—the—our parents grew up the traditional lifestyle. But even today, she doesn’t eat as much as the traditional foods’ cause she says there’s a funny taste to them now. That’s why they don’t really eat them. They think that they’re not good because of the water, the pollutants and all that.” CH2

First Nations governance models are traditionally guided by reciprocal relationships [18] whereby relationships between living and non-living things structure protocols and practices. These relationships form a basis for First Nations systems of governance and law [20]. Water remains a central connection to First Nations and their ability to maintain respectful relationships with all non-living entities [18]. Furthermore, water is seen as a living entity and has been referred to as “the life blood of Mother Earth” that deserves respect and protection [13,35]; in most regards, water is considered life. In this respect, Indigenous water governance models oppose dominant Western approaches that see water as a commodity that can be exploited [36]. From this, sustainability is embedded within First Nation health, taking an ecocentric worldview, whereby humans identify as an equal within the larger environmental systems and the abiotic world [37]. Colonization stripped away highly sophisticated governance

models and continues to restrict First Nations rights to self-determination through colonial policies and regulations. The Chief and Band Council electoral system was imposed on First Nations by the *Indian Act*, which has been described as a way to “undermine traditional governance and augment assimilation” [38]. The majority of First Nations still operate under this electoral system, which restricts First Nation decision-making power and has many internal restraints on long-term community development initiatives undertaken by Chief and Council. This has left many First Nations people disenfranchised from their traditional water governance models, which includes, interacting with water in traditional ways. However, it is important to recognize that Indigenous governance systems in Canada have been ongoing since time immemorial [21] and First Nations are re-asserting their rights in water decision-making processes [39,40].

The communities included in this study are predominantly Cree. Universal principles for modern good governance developed by the Cree National Working Group centre on *Taapwaayaayihtimuwini*, which means spiritual value [40]. Further, these governance structures take a holistic and balanced perspective. As such, water governance incorporates health (mental, physical, emotional, and spiritual), ecosystem services, and spiritual and ceremonial needs [40] as well as drinking water [21]. While we believe that water should be looked at within this comprehensive and interconnected framing, given that Jordan’s Principle is centered on service provision for acute health issues and is the framework of analysis being used, the scope of this paper remains within the bounds of drinking water management, and direct impacts on health. The Safe Drinking Water for First Nations Act provides an example of re-enforced perpetual challenges to the management of safe drinking water that is misaligned with First Nations goals and needs. This Act represents a drinking water governance structure that was developed without meaningful consultation with First Nations and is now being rethought, with written commitment by the Canadian federal government to support a First Nations-led approach, through the Assembly of First Nations.

“For instance, for me and what I’m learning in leadership and governance through my Elders is we had what was a family system . . . So if we had an issue in the community, I would get together with all my Bear Clan people and say “Here’s the issue and here’s our solution” and then the Buffalo Clan and the Raven Clan and the Beaver Clan and so on, would get together and they would say “Here’s our solution to our issue.” Then they would come together and say . . . the head men or the head people would get together and say “Here’s our solution to this issue.” SL1

Additionally, the matriarchal system is a key example of traditional stewardship processes that have been institutionally erased, particularly with respect to the suppression of women’s traditional water governance roles. Historically, it was First Nations women who were predominantly known as ‘water-keepers’ or ‘care takers’ of water [21,35]; women held water stewardship roles and responsibility to respect, honour, and provide gratitude to water spirit through community ceremonies and protocols [21,32]. Through these processes, women gained a cultural responsibility for community water protection and management, a position that has been temporarily lost under current water governance models but is being reclaimed at the grassroots level:

“We had our people and they told us what to do. We had our societies and we go to the Elder society, we would go to the Women’s society and we would ask these questions. What should we do? We had spiritual people that helped us as well and if we didn’t have a physical answer for it, a physical plain answer for it, we actually went to ceremony to ask Creator. “Give us some guidance, give us some support . . . There are some people out there that won’t believe that everything has a spirit. Who won’t believe that fire has a spirit and water has a spirit and those types of things. We’re talking about Indigenous knowledge as well and we’re talking about things we don’t understand anymore.” M1

3.2. Safeguarding Health

In many First Nations reserves across Canada, drinking water does not meet the Canadian Drinking Water Quality guidelines set out by the federal government. This is in part due to the variability of guidelines across provincial and territorial boundaries as well as the lack of legally binding standards [41] and insufficient financial resources to support their achievement. Collectively, these have implications for health outcomes on First Nations reserves [42]. Further, standards and regulations that focus on protecting physical health outcomes often do not acknowledge First Nations worldviews of holistic health and well-being which commonly have physical, mental, spiritual, and emotional dimensions [43]. Without these dimensions of health reflected in drinking water regulation and policy, it is impossible to provide the appropriate supports required to safeguard First Nation health:

“When the water declines, and then so do people” SL1

Respondents across all eight First Nations communities claimed challenges to physical ($n = 16$), emotional ($n = 3$), mental ($n = 4$) and/or spiritual health ($n = 7$) resulting from poor drinking water. From a physical health perspective, poor-quality drinking water was often blamed on water hardness and elevated levels of chlorine ($n = 11$). Particularly, community members noted dryness and general skin irritation ($n = 4$) as well as stomach aches ($n = 3$):

“I know my grandchildren, they go back home and their skin breaks out in a rash. We’ve said that many times but they insist it’s the operators putting in too much chlorine.” YQ2

“Yeah, we, most of us were getting, you know, our stomachs kept getting sick. You want to throw up and throw up, yeah. But we didn’t know it was from the water, cause I thought it was a flu going around, til they tested our water.” B16

One community member voiced concern over the unknown health risks of consuming unsafe drinking water over time and another mentioned health implications from adaptive behaviours to adverse drinking water, specifically consuming large quantities of bottled pop and juice:

“They’re tested and they are finding small percentages but it’s accumulations over time and depending on whether they consume more of it or bath in it. The amount that they’re using is, it varies.” B2

“Well, they think that the juice is healthy, but it’s not. It’s just a—because they don’t have—like, ‘cause they can’t drink that water. So of course a lot of them just buy pop.” CH2

When drinking water is not properly treated, consumers are at greater risk of chronic exposure to disinfection by-products, such as trihalomethanes (THMs) and halo-acetic acids (HAAs) that result from the treatment process itself [44]. One water treatment operator (SL1) explicitly stated that their community had ongoing issues with THMs, which are formed through chemical reactions between high concentrations of organic matter in source water and chlorine-based disinfectants in the treatment process. Certain disinfection by-products (DBP) are known to present a threat to human health [45]. However, there are multiple factors that influence the formation of DBPs, their concentrations in drinking water, and risk they pose to health. The International Agency for Research on Cancer classifies THMs into 2B as a “possible human carcinogen” and 3 “not classifiable as to its carcinogenicity to humans” [46].

Further, health workers and Elder community members ($n = 8$) made observations on the increase in prevalence of chronic diseases over the years as drinking water quality has worsened. Similar links have been made in the literature between certain contaminants in drinking water and chronic disease [47]. For example, increased nitrates in drinking water were found to produce adverse pregnancy outcomes and increased prevalence of colorectal cancer [48] as well as higher risk of developing thyroid cancer specifically in post-menopausal women [49]. *Helicobacter pylori*, a bacteria

associated with contaminated drinking water [50], has been found to increase risk of developing both gastric ulcer disease and gastric cancer [51]. However, given the small populations of the communities involved in this study, and of First Nations communities in general, there is a lack of epidemiological links in the literature that specifically correlate consumption of contaminated drinking water to the chronic diseases experienced by community members and many confounding factors may be at play.

“Culturally, my elders tell us what you put in the water is getting you sick. That’s where all the cancer, arthritis, whatever, kidney problems, that’s what’s causing it. All the chemicals that you’re putting in the water.” SL1

Beyond physical health effects, many community members reported mistrust ($n = 13$) in their drinking water, including not drinking the water that came out of their taps because they do not understand the treatment process. They also felt that poor drinking water quality has resulted in the decrease, and relocation, of cultural practices. In both cases, attributions to mental and spiritual health-related issues were made:

“Like, uh, at home I don’t drink out of the tap. I don’t drink that. And I don’t trust it, you know. I don’t trust that water. I’d rather go get, uh, bottled water in town than drink that water.” SL2

“I think that’s the mentality we’re talking about. Um, the people have this mentality where they think the water is contaminated. They don’t trust it. And that affects everything: your health, your personal health, your emotions, your mental health and the spiritual side, there are a lot spiritualists here. Traditional spiritualists here who use water and they pray.” B2

“I feel that with this water, it’s been polluted and the true spirituality, sincerity, it’s been altered, affected. Like I said, it’s contaminated, polluted. There’s uneasiness. There’s no calm, there’s not purity. That’s the thing. And I can tell, based upon my own spirituality, I have a heavy, heavy heart. No matter what I do, no matter how hard I work, no matter how much I love my family, there’s this unsettling, uneasiness. It’s gnawing inside of me. I can’t do enough. I have to do more and more. There’s not enough.” B3

These holistic health findings are consistent with ones found in a similar Saskatchewan-based study [52] as well as a 2016 scoping review that looked at health outcomes and drinking water quality in Indigenous communities across Canada [42]. Emotional health burdens related to adverse drinking water are under-explored, including the broader implications to health. However, in a newly published study with an Ontario First Nation, emotional responses to adverse water included worry, unhappiness and anger, as well as fear, stress and confusion [53].

3.3. Substantive Equity

“Substantive equality is a legal principle that refers to the achievement of true equality in outcomes” [2]. This includes focus on equal access, opportunity, and provision of services and benefits that consider unique needs, such as cultural and economic requirements. Substantive equality can be applied as a process and set as an end goal [3]. While in academia there is a clear differentiation between equality and equity, with the former simplistically referring to equal treatment [54], the legal meaning of substantive equality is more aligned with the authors’ academic definition of equity, i.e., seeking to overcome barriers that contribute to inequalities and providing individuals and groups with what they need to contribute and benefit equally. However, substantive equity does not just refer to governance approaches or outcomes but can also fit within an environmental justice framework [55]. In order to achieve equity, the processes through which the inequities have been developed and the structures that perpetuate them must be assessed and removed. Substantive equity and the recommendations

provided below that evolved from this analysis also point to the significance of recognitional justice; understanding the different perspectives, needs and positions of First Nations peoples and the colonial governance structures that disempowerment them [55]. Therefore, this paper also presents a step towards procedural justice through the recognition of the need for First Nation voices and transparency in drinking water management and regulation as a necessary step for self-determination.

There are a range of challenges faced by First Nations across Canada with respect to equitable provision of safe drinking water. This can, in part, be contributed to the disenfranchisement of First Nations historical ways of governing environment and water and the suppression of women's voices in governance and water governance in particular. Examples exist where First Nation women are taking steps to reclaim their roles in water stewardship, such as the North American Water Walk [56], the establishment of the Ontario Indigenous Women's Water Commission [21], and M'kmaq anti-fracking protests [57].

There is no one size fits all model to water governance, which can be reflected in the current status of inequitable governance models and prevalence of drinking water advisories in First Nations across Canada. While the principles of culturally inclusive management and safeguarding health lay the foundation for changes in perspectives, understandings, and approaches to First Nation drinking water governance models, themes emerging in relation to the principle of substantive equity identify tangible areas where governance models can, and arguably must, be revolutionized to repatriate water governance in order to improve equitable health outcomes in First Nations communities. Broadly, these areas are capacity, infrastructure, resources, and relationships.

Community members throughout all interviews discussed how on-the-ground management by water treatment operators as well as financial and infrastructure resources are not sufficient to provide equitable and sustainably safe drinking water. The skills and abilities (including greater access to education, training, and experience) of community water treatment officers were identified by community members as ways to improve the community's access to safe drinking water. Water treatment operators ($n = 3$) expressed feelings of burnout from being overworked and underpaid, which contributed to the high level of employee turnover as well as gaps in water testing and cleaning frequency:

"Just like our wages. They've been saying the last three years they're going to—they're going to go up because they're getting fed up of losing, um, operators from reserves. Reserves train the operators and the operators leave for the mines or everywhere else." CH1

Significant variation of certification levels of water treatment operators between First Nations, the need for more training, competitive wages and back-up operators have been expressed by water treatment operators in other provinces across Canada [58].

Water treatment operators from this study were not involved in the financial management of the water systems, so they are unaware of the financial restrictions and costs, which some community members believe fosters a wasteful approach to water use:

"We don't know how much money's going out, where that money's going. We have a lot of land outside the reserve we had bought. Where that money's going, I don't know. Never anything done on this reserve." B10

"Uh, I think it all comes down to budget, you know. Like we—like, we'd like to be more integrated into the budget. Because we—that's one thing that comes up with INAC when we do our annual inspections every—that was one of the questions, are you directly involved with the budget? And we always say no. So we have no idea what our—What our budget is, what our limits are" CH1

Respondents also felt that staff, as well as Chief and Council, need to be better informed of the federal government's policies, procedures, and funding arrangements regarding drinking water

treatment. This includes the federal government providing easily accessible data on upstream and neighboring practices:

“I believe the government has to be proactive in having better data and research for what’s being released upstream from us. To ensure that, of course, through drinking water, and umm...having like, regulations for underground water, surface water, and stuff like that, cuz I don’t know if underground water is safer or surface water, but we need regulations on both of them. It comes from somewhere and sooner or later it’s been tampered with by humans.” CH3

“So that’s kind of what I see happening is ah . . . the educating that has to keep taking place in order for us to maintain the water quality that’s there.” YQ18

One community member called for education for the entire community:

“You’d have to . . . Every department would have to be included in it because you can’t enforce all these mechanisms without also educating your own people. Cause why spend money protecting and putting all these things in place when our people don’t know what it means.” B1

One of the areas over which the federal government holds authority is in the provision of maintenance services and parts for water treatment systems. The majority of water treatment operators commented that the federal government tenders the lowest bidder when it comes to developing drinking water treatment infrastructure in First Nation communities. This leads to water treatment systems that are retrofitted with outdated parts and have minimal lifecycles. One of the main factors contributing to a community being on a boil water advisory is the breakdown of outdated water treatment parts [17]. Further, water treatment operators often have no indication of when a part will stop working and therefore cannot order it ahead of time. Further, when a part does need to be replaced, it takes significant time and money due to the difficulty of sourcing outdated parts, resulting in avoidable delays for communities to have access to safe drinking water:

“Well, INAC—INAC contracts people—they put out a bid. Okay, I need a water treatment plant built, and then whoever can build it the cheapest, that’s who they give the contract to. And we’ve found, actually, there’s lots of—I usually get into this with the water treatment officer, but they, um—a lot of places, to make it cheap, will just use older parts from here and there, and they mix and match, and then when it’s time to actually find replacement parts, they can’t [laughs]. And it takes six months to ship something from somewhere in the States that—yeah, like, there’s a lot of—it’s outdated. Outdated parts, I guess, but in general, I suppose the treatment plants are just getting older.” CH2

“The majority of the parts I have are obsolete now. After maybe three or four years, they’re all obsolete.” SL3

Additional concerns were raised over environmental changes in water sources, indicating that relationships between climate events and ecosystem responses must be understood in order to develop adaptive sustainable community responses. More specifically, algal bloom, drought [59], drought-related wildfires, and heavy rainfalls and flooding [60] are known to increase difficulties for water treatment and therefore influence capacity and treatment technology needs:

“And also, you know, how long is the plant going to last? How long are, you know, with new technology that’s coming on board, we need to stay on top of that and we need to find out what costs are and ah, also the quality of the water itself. Like how is industry going to impact the underground water that we’re getting from? We don’t know that. When the contracts came in to build the plant, their main concern was to build the thing and move on. Didn’t look at the impacts of what would happen in case something did, or if it dried up or something.” YQ2

In a few communities, cisterns are the main source of drinking water storage and continue to be a source of contamination from improperly placed septic tanks, groundwater and rainwater seepage, the deposit of trash, and invasion of animals, all of which pose a risk to human health:

“Frogs and mice, you know, and that’s the reason why we don’t want to drink the water, yeah. Cause they never clean the cisterns. They say they do, but still I wouldn’t, I don’t drink it anymore.” B7

It was mentioned that contamination can also occur during the transport of the water from the treatment plant to the cistern via the water truck. This issue has been explored further in one of the participating communities and it was found truck-to-cistern systems had several sources of risk for drinking water [61]. Instead of replacing or repairing cisterns so community members can rely on them for a source of safe drinking water, they are told to use alternative water sources. From the interviews, it was unclear where the responsibility for cleaning cisterns lay, which speaks to the fragmented governance structure and demonstrates how gaps in services lead to reduced access to clean drinking water:

“Our Environmental Health Officer advised that we don’t drink from our cisterns cause they’re not clean or disinfected, and they’re supposed to be at least once a year. But some of us have gone quite a few years without it being cleaned, so we’re advised not to drink from it.” P1

Another, perhaps contentious, issue that emerged from community members was in regard to the transparency of information on budgets and financial decision making both within the First Nation and between the government agencies; an issue that was identified years ago at a national scale [14]. Several questions arose from community members in regard to the contractual financial contribution that the federal government allocates towards the community’s operating budget for water treatment and distribution costs:

“I don’t know, but umm . . . whatever happens with funding and all that, like it’s under wraps . . . there’s no transparency, or nothing happening, so, we don’t know what is for what, and what’s going to where . . . but that’s a different” LR2

One community member mentioned that outdated population data are used to determine financial contribution amounts, resulting in the community being significantly underfunded:

“Look at us here. You—I—I know you were taken around to see how big our reserve is, I’m sure. Well, Health Canada still uses 1970s numbers for here. No kidding. 1970s population numbers is what they use. They’ve never updated. Like, right now we have over a thousand that live here. You know how many we had in the seventies? Less than a hundred. So that’s—those are the numbers they’re using, still in the seventies. ‘Cause you can imagine how far back we are. We fight to try and get the numbers, like, brought up. But yeah, they’re—they’re still using numbers.” CH2

Further, contributions often do not include increases in operating costs or unexpected expenses, which means that water management involves constantly responding to drinking water-related crises:

“It’s, we have the same problem here cuz, I, when I was a council member, I was the portfolio holder for Water and Sewer and you are exactly right when you say that. We had to dip into other pools of funds to get this part in because we didn’t, don’t have enough funding to offset a lot of these expenses. And in regards to parts, yeah, we encountered that problem. We had to, one occasion that I remember we had to get parts from Ontario. Yep. And we keep telling INAC people that they help us upgrade our water system here, but it’s not working.” CH3

In part, on-the-ground water management challenges were tied to a reported paternalistic or entire lack of relationship between First Nation community and government agency representatives, which led to feelings of disempowerment and mistrust in both water governance practices as well as drinking water in the community. These feelings are compounded by the historical and current effects of colonialism that have created power imbalances that impact First Nations' ability to govern their drinking water effectively. Relationships and communication between Chief and Council and water operators was also an area identified as needing improvement for more sustainable management ($n = 5$). Having government agencies and representatives willing to go to First Nations communities and listen to community concerns to understand First Nation perspectives were mentioned as important relationship-building measures that need to happen:

“As keepers of the land and the sacredness that we hold to it. Land and water and whatnot, for them to understand, to have that philosophy. Ones that we hold dearly, but it's not going to happen. They'll still come there with ... Everything that they propose, there's always a plan already in place that doesn't give us much room to ... they'll offer maybe a couple of instances where you, you know, have a voice but the big picture that's, you know, it always happens. When something new comes down the pipe from Ottawa, we know there's something in there already that's not going to conform to what we want and that. It's already set in stone. “Here, we'll give you a chance to speak” but it's very little that we have input in it. And I know our leaders are fighting, always for it and a lot of it does take money unfortunately. So yeah, everything that does come down, it's already set in stone and we have to fight for whatever we want.” YQ2

4. Recommendations

By exploring responses to drinking water using a Jordan's Principle-based framework, several opportunities for change emerged:

Recommendation 1: Build equitable community-specific relationships to guide co-governance models for drinking water management in First Nation communities (culturally inclusive management, safeguarding health and substantive equity).

Starting from bottom-up community engagement, federal agencies need to improve their local representation and the relationships that they form with First Nations. This includes developing mechanisms whereby First Nations concern's and opinions have the power to influence decision making over local drinking water management. This may consist of communities electing their representatives to build congruences between First Nation and Western worldviews for rights-based and responsibilities-based water management regulations. Further, institutional space for the re-vitalization of Traditional Knowledge systems and values will be required to form common ground to collectively move forward. Engaging youth in relationship-building processes and drinking water governance development is encouraged by communities as community youth are the future stewards of the land and water as well as leaders of the community; the sooner they become involved and informed, the better.

Recommendation 2: Improve transparency and accessibility of information for First Nations education and empowerment (substantive equity).

Providing accessible and transparent information on financial allocation, budgeting, and upstream watershed practices are all identified ways to support First Nations to make informed and empowered drinking water decisions. Specifically, there is a need for improved transparency from the federal government to ensure accountability on provision of financial resources. This information should be made easily available from federal agencies to Chief and Council as well as to the water treatment operators. Greater transparency from within the First Nation is also a way in which water treatment operators can gain a more comprehensive understanding for sustainable practice as well as emergency preparedness. Understanding upstream practices and effects of climate change that may contribute to degradation of First Nations drinking water sources will support water treatment operators in evaluating appropriate treatment and monitoring processes.

Recommendation 3: Authority and equitable support for First Nations to update their water treatment systems (culturally inclusive management, safeguarding health and substantive equity).

Updated water treatment systems in First Nations will lead to more sustainable management strategies and improve continuous access to safe drinking water for communities. This includes reassessing the financial contribution from the federal government to reflect current populations, providing updated technical and scientific information on water treatment systems, and allowing First Nation control over decision making on system upgrades. First Nation decision making should also involve the provision of research funding for communities to engage in assessing alternative water treatment upgrade options that best meet their needs alongside technical capacity provided by external experts; a process that will create community ownership and research capacity building. With increased financial resources and autonomy over its allocation, First Nations will be better supported to develop sustainable infrastructure. Lastly, creating accessible emergency and contingency funding to remove jurisdictional funding delays will allow for more consistent provision of safe drinking water.

Recommendation 4: Improve on-the-ground capacity for drinking water management (safeguarding health and substantive equity).

Water treatment plant operators are essential when it comes to the provision of safe drinking water to First Nations communities; therefore, they deserve competitive wages as well as safeguards for their health and well-being. More specifically, wages of water treatment operators working on-reserve should be competitive with water treatment operators working off-reserve. Increased education and funding to train more operators and back-up operators will improve work–life balance and decrease turnover rate of current operators. These changes will improve capacity for drinking water system maintenance, testing and cleaning. Encouraging the participation of females and youth in these training programs will further facilitate intergenerational sustainability and incorporation of women’s roles in water stewardship.

5. Conclusions

While Jordan’s Principle evolved out of a terrible tragedy, the principles of providing culturally appropriate services, safeguarding the best interests of the child, and substantive equality apply far more widely than health system services delivery. In many cases, current approaches and guidelines to First Nations water governance are insufficient for providing equitable and sustainable drinking water in culturally responsive ways. Both First Nations peoples and Canadian federal government agencies have different decision-making processes and must therefore work together in an equitable manner to understand and address the barriers to effective water governance identified throughout this and other papers. To redress the inequities currently experienced by First Nations when it comes to management and access to safe drinking water, equitable governance structures developed from the ground up and embedded in First Nation principles fostered by genuine relationships are required. Findings from this analysis identify specific challenge areas as well as policy and practice recommendations to begin the radical, fundamental changes to First Nations drinking water management in Canada that will serve to protect health, promote culture, and move towards equitable governance structures and sustainable practices.

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