Water insecurity in Indigenous Canada: a community-based inter-disciplinary approach
Maura Hanrahan, Atanu Sarkar and Amy Hudson

ABSTRACT
Water insecurity in Northern Indigenous communities in Canada remains a pressing problem, with multiple dimensions and health impacts. We carried out a case study of long-term water insecurity in the Southern Inuit island community of Black Tickle, Labrador, where there is no piped water and people rely on an under-funded potable water dispensing unit (PWDU) and unmonitored water sources. Our community-based multi-disciplinary project involved qualitative and quantitative methods including key informant interviews, focus groups, a census, a literature review, water testing, and an engineering site visit. In Black Tickle, water security was chronically and severely compromised and was linked to poverty, food insecurity, men’s health, and mental health. We have taken a materialist approach; accordingly, later project phases involve research aimed at identifying appropriate solutions, and conducting pre-engineering and engineering work. This article reports on the first two phases of the project, through which we described the problem and identified its impacts.

Key words | Aboriginal, Indigenous, Labrador, Southern Inuit, water security

INTRODUCTION
Water security is defined as ‘ensuring freshwater, coastal, and related ecosystems are protected and improved; that sustainable development and political stability are promoted; that every person has access to adequate safe water at an affordable cost to lead a healthy and productive life; and that the vulnerable are protected from the risks of water-related hazards’ (World Water Council 2000). The World Health Organization has outlined a safe drinking water framework with the following key components: health-based targets, system assessment, operational monitoring, management plans and independent surveillance (World Health Organization 2008). Despite Canada’s status as a first world country, many of Canada’s Indigenous communities experience water insecurity on an extreme scale. Yet this topic is rarely the subject of academic research and there is no sense of urgency regarding the need for a water strategy to alleviate these problems. The multiple dimensions of water insecurity and their intersections were examined in the Southern Inuit community of Black Tickle on Island of Ponds, Labrador. The impacts of extreme water insecurity were also identified and recommendations were made regarding the urgent adoption of a long-term water security strategy.

METHODS
Goals
We investigated the multiple intersecting dimensions of water security in Black Tickle, where there is no piped water and a potable water dispensing unit (PWDU) that operates on an inconsistent basis. This multi-disciplinary project takes a materialist approach; rather than merely describe the problem, as has been the history of much social science, we want to play an active part in solving it.
For this reason and with the understanding that social science alone cannot solve this problem, we assembled a multi-disciplinary team and are continuing to work with the community. Our goal is to identify specific solutions that would reflect community priorities and go some way toward alleviating the community’s water insecurity. We chose to do a case study because of our awareness of the critical water insecurity issues in Black Tickle although our research process and results should have some value in terms of generalizability. This article reports on the first phase of the project which aimed to fully describe water insecurity in Black Tickle – taking information beyond anecdotes to a comprehensive picture of its dimensions and impacts – and gain a fuller understanding of the community. Previous solutions, such as the PWDU, did not involve the community, which is one factor in their ineffectiveness. To this end, we spent a week in Black Tickle in April 2013 (late winter/spring) and another week in October 2013 (fall).

Census

Working with a local assistant, in April, we carried out a community census that collected basic demographic data, such as household composition, age, gender, as well as preferred water sources, water consumption, and costs associated with drinking water. Nineteen households out of a potential 50 (population = 140) participated in the census for a response rate of 38%. We analysed census data using IBM SPSS 21 and Microsoft Excel 2007.

Qualitative research

Also in April, we conducted intensive open-ended interviews with key informants to better understand the dimensions and impacts of water insecurity; these involved the nurse-practitioner (n = 1), elders (n = 2), and community leaders (n = 2). We held a focus group with a parents’ association (n = 5, all women) and high school students (n = 9) and had a meeting with the Local Service District executive (n = 3). No form of health records was made available to us by the Labrador-Grenfell Regional Health Authority. Our interview with the nurse-practitioner was open-ended and focused on the extent of water-borne illnesses, and the health impacts of water insecurity. In our semi-structured discussions with community members, we asked for narratives about water, using prompts, such as ‘tell us how you collect water’, ‘what does water mean to you?’, and ‘how is water linked to health?’'. This method is consistent with Indigenous communication patterns and allowed us to receive residents’ perspectives. Thus, we were able to focus on the emerging themes of water use patterns, water quality, community health, and coping strategies. We met with all these groups again in October to identify community priorities for advancing water security.

Water testing

We tested water from three sources: the PWDU, a dug well, and a pond (others were buried by snow and inaccessible). Testing was conducted in April and October to cover cold and warmer weather and included the following water quality criteria: microbial parameters: bacteriological (Escherichia coli and total coliform) for which we used a public health laboratory in St. John’s; and chemical and physical parameters: physical and major ions, nutrients and metals, and disinfectant by-products. Because snowmobiles and all-terrain vehicles are used to retrieve water, we tested five water sources, including water from the PWDU, in April for hydrocarbons, i.e. benzene, toluene, ethylbenzene, xylene and other hydrocarbons (C6–C10, >C10–C16, >C16–C21, >C21–< 32). We trained two local people in water testing procedures, including sending samples to the appropriate laboratories. We collected water samples by following standard operating procedures laid down by Memorial University’s Core Research Equipment and Instrument Training Network (CREAIT) for all metals and minerals as well as those of the other laboratories. The containers were provided by the respective laboratories and we kept the containers in ice-lined insulated cold boxes. The water samples were delivered to the laboratories within 24 hours of collection.

Engineering site visit

Between the two visits, an engineering student carried out basic research that explored reliable, safe, economical and sustainable stand-alone water options for Black Tickle.
This paper laid the groundwork for an engineering site visit, which was carried out in October 2013.

Literature review

Meanwhile, we carried a literature search on water insecurity in Indigenous communities in Canada, including academic and gray literature.

We have also been committed to community-based participatory research, an approach to environmental and health research that is intended to increase the value of the actual research itself for both the researchers and the affected community (Viswanathan et al. 2004; Wallerstein & Duran 2010). Shared knowledge and experiences build bridges between researchers and community members and can lead to the identification of more effective improvements. Community-based participatory research is particularly useful with and attractive to marginalized populations, who may not have had significant influence over environmental and health initiatives and related decision-making processes (Viswanathan et al. 2004); this includes Indigenous people in Canada such as the Southern Inuit of Black Tickle. The caution is that community-based participatory research is labor-intensive and a slower research process than most because so many people are involved with many of them acting in a volunteer capacity. In addition, our research was cross-cultural, a characteristic that added to its labor-intensiveness.

The project required ethical clearances from the Health Research Ethics Authority, Memorial University, St. John’s, the Labrador-Grenfell Health Authority, Happy Valley-Goose Bay, Labrador, and NunatuKavut Community Council, Happy Valley-Goose Bay, Labrador.

RESULTS AND DISCUSSION

Indigenous people and water insecurity

Approximately 4.3% of Canada’s population identify as Indigenous – First Nations (status and non-status), Inuit or Metis (Statistics Canada 2014). The Indigenous population of Canada experiences lower health status than members of the dominant society, suffering a disproportionate burden of morbidity and mortality, with many social, economic and health indicators similar to those in middle income nations (O’Neil 1986; Adelson 2005). In 2013, Canada ranked eighth on the UN’s Human Development Index (United Nations 2014: 159). However, according to James Anaya, former United Nations Special Rapporteur on the rights of indigenous peoples, ‘Canada consistently ranks near the top among countries with respect to human development standards, and yet amidst this wealth and prosperity, aboriginal people live in conditions akin to those in countries that rank much lower and in which poverty abounds’ (Anaya 2013). These disparities result from the longstanding power imbalance between Indigenous governments and political organizations and the Governments of Canada and its provinces. Treaties were intended to facilitate the sovereignty of the Crown in Canada; that is, by recognizing a priori Indigenous rights, treaties allowed the British and allow the Canadian successor state to operate on what was, for millennia, Indigenous land. The Southern Inuit Treaty of 1765 between Hugh Palliser, Governor of Newfoundland, and the ancestors of Black Tickle Southern Inuit is in this category. Yet, despite the treaties, Indigenous communities have experienced massive losses over the past several centuries. These include loss of spirituality as Christian missionaries assumed positions of power and influence, loss of language as English and French became the official languages of Canada, and loss of parenting and family life as a result of the residential school system. Most salient here, however, is loss of land and land-use practices as settlers encroached on Indigenous land and Indigenous people were forced to abandon seasonal transhumance for year-round settlement on small parcels of land, many of them First Nations reserves governed by the Indian Act. A pattern of neglect of Indigenous communities followed with resulting ongoing health and infrastructure disparities. This can be categorized as environmental racism, which has usually been defined as the disproportionate proximity of non-white people to pollutants (Bullard & Wright 1993). In our view, concepts of environmental racism must also include government neglect of Indigenous people and the failure to provide basic services and infrastructure for health and life, such as drinking water.

Thus, water insecurity is one of many serious issues for Indigenous communities in Canada. It is, however, difficult
to quantify in that there is no comprehensive national survey of water systems in Indigenous – First Nations, Inuit and Metis – communities. Much of the information that is available is First Nations-specific, omitting Inuit and Metis communities. According to Statistics Canada’s National Assessment of First Nations Water and Wastewater Systems 2009–2011, 341 reserve water systems were deemed high risk (Statistics Canada 2012). To get some sense of the scale of the problem, we note that there are 617 First Nations in Canada, although not all have reserves (Aboriginal Affairs and Northern Development Canada 2014). This number echoes previous reports: in 2011, the Auditor General of Canada said that more than half of water systems on the lands reserved for Indigenous people posed a medium or high risk (Auditor General 2011). As of August 2012, almost one out of five First Nations communities in Canada was under boil water advisories (Auditor General 2011). Indigenous households are 90 times more likely to be without piped water (Auditor General 2011). In fact, 28% of houses on First Nations reserves lack piped water with 13.5% using truck delivery (Statistics Canada 2012). Approximately 30% of First Nations community water systems are in the high risk category; in addition, these communities have 26 times the national average rate of water-borne infections (Eggerton 2008; Patrick 2011). This figure echoes one from an Alberta study which found that half the First Nations water supply systems tested were high risk (Smith et al. 2006: S1). The authors of the Walker-ton Enquiry report opined that First Nations drinking water was ‘among the poorest quality water in the province (of Ontario)’ (Mascarenhas 2007: 571).

The water security problems in Indigenous communities, including but not limited to First Nations reserves, extend beyond drinking water quality to accessibility and wastewater and sewage management. According to the Assembly of First Nations (AFN), ‘…75% of the 740 water treatment systems and 70% of the 462 wastewater treatment systems on reserves posed a medium-to-high risk to drinking water and wastewater quality’ (White et al. 2012: 6, citing AFN 2005: 4–5). Only 54% of the on-reserves homes are piped for wastewater with 8% on truck haul; 2% of the households have no service at all (Statistics Canada 2012). Thus, water insecurity is widespread in Indigenous Canada with no obvious commitment on the part of federal, provincial or territorial governments to Water Safety Plans as recommended by the World Health Organization in order to protect public health (Davison et al. 2005).

The situation in Indigenous Canada is not unique; Indigenous peoples in other developed countries experience water insecurity similar to those in Canada. Approximately one-quarter of Alaskan Native households lacks complete plumbing facilities (Gasteyer & Vaswani 2004). Although Canada and the United States have 100% access to improved water and sanitation, both countries have failed to provide such services for all their Indigenous populations (World Health Organization 2009). In both countries, this points to environmental racism. We note that the human right to water was formally affirmed by the United Nations Human Rights Council in 2010, making it equal to all other human rights and legally binding and enforceable in existing human rights treaties (Gerlak & Wilder 2012). In Canada the enforceable right to water is ‘based on the right to life, liberty and security of the person under section 7 of the Canadian Charter of Rights and Freedoms and governments’ obligation to provide ‘essential public services of reasonable quality to all Canadians’ under section 36 of the Constitution Act, 1982’ (Boyd 2011: 81). In addition, the a priori Aboriginal rights of First Nations, Inuit and Metis are affirmed in section 35 of the Constitution Act, 1982. This surely includes the treaty right to health, especially when section 7, as alluded to above, is factored in. In fact, Canada is bound by the honour of the Crown to interpret these rights with generosity rather than sharp dealing. In Haida Nation v. British Columbia (Minister of Forests 2004: 522–523), 3 SCR 511, 2004 SCC 73, the decision read: ‘In all its dealings with Aboriginal peoples, from the assertion of sovereignty to the resolution of claims and the implementation of treaties, the Crown must act honourably. Nothing less is required if we are to achieve the reconciliation of the pre-existence of aboriginal societies with the sovereignty of the Crown.’

The community of Black Tickle

The transient nature of settlement patterns makes population measurement in Black Tickle challenging; many residents move back and forth between Black Tickle and Happy Valley-Goose Bay, Labrador’s Service Centre, for seasonal
work and to visit family. According to our spring 2013 census, 126 people live in Black Tickle while 12 live in nearby Domino. The province of Newfoundland and Labrador has a new voluntary community resettlement program for remote communities with limited financial incentives; when a vote was held in Black Tickle in 2014, 60 people voted to stay while 40 voted to resettle. Resettlement is not an option under this provincial government program, because, according to program criteria, 90% of residents have to vote to leave (Canadian Broadcasting Corporation 2013). Commitment to Black Tickle is strong, however, as reflected by patterns of transience and the resettlement vote.

The ancestors of the people of Black Tickle have frequented Island of Ponds for hundreds of years. The descendants of Inuit women and British men, there was no consistent name for the people of NunatuKavut, the part of Southern Labrador where Black Tickle is located, or for their ancestors; they were variously called Eskimos, half-castes, breeds, half-breeds, Metis, Eskimo Indians, and natives (De Boilieu [1861] 1869; Goudie 1973; Wallace 1985 [1905]; Kennedy 1995; Curwen 1996) with all of these terms reflecting their Indigenous ancestry and their status as ‘other’ or culturally different from the dominant settler society. Thus, they have been marginalized since Europeans have been established in Labrador in the 1700s.

Black Tickle is a former summer fishing station that was settled year-round in the 1960s as part of a push of Indigenous people into year-round settlements. Prior to the 1960s, people practiced Indigenous seasonal transhumance. They spent summers fishing out of Black Tickle, renowned for its cod fishing grounds, and they travelled to Porcupine Bay or Reed’s Pond for the winter. In these locales, they could access water, wood for heat, and fur-bearing animals which they trapped and hunted. They sold the furs or made clothes and sleeping bags from it while the meat was consumed. Seasonal transhumance allowed for maximum resource use in a sub-Arctic environment which demanded that populations were small and dispersed (Hanrahan et al. 2015). The move to Black Tickle as a year-round settlement was part of the Government of Newfoundland’s original resettlement program in the 1950s and 1960s and the federal policy thrust towards the assimilation of Indigenous people. According to people in the community, the Roman Catholic priest at the time communicated with government bureaucrats who between them determined that Black Tickle would be the permanent location of the community; the people had little say. Elsewhere in NunatuKavut, Spotted Island and Batteau were evacuated with their former seasonal residents moving to Cartwright, a larger Southern Inuit town, year-round. The receiving sites for resettled people were not always well chosen; Island of Ponds, where Black Tickle sits, was a poor choice; it consists of igneous rock and tundra and has no potable water, no running water, and no wood. Further, the winter climate is challenging as the completely unsheltered island juts out into the windy Labrador Sea.

Yet, half a century later, residents are very attached to Black Tickle and frequently speak of their close relationship to the land and sea and the feeling of freedom this relationship facilitates. There are more multiple family households in Black Tickle than in the general Canadian population, fewer one person households, and more five person-plus households (our census and Statistics Canada 2011). Black Tickle also has a lower median age (38) than Newfoundland’s (44) and Canada’s (40.6) (our census and Statistics Canada 2011). The mean age of females was 32.83 while the mean age of males was 32.84. The demographics of Black Tickle reflect Indigenous rather than general Canadian patterns. There is a slightly higher number of females than males in the community, according to our census, but the difference was not significant. Local unemployment is widespread since the 2012 closure of the fish plant so there is a high reliance on government transfer payments, which is a source of financial and mental stress. There is also increased movement between Happy Valley-Goose Bay, Cartwright, and Charlottetown, and Black Tickle as residents seek seasonal work.

Community location

Island of Ponds is a small once glaciated island off Labrador’s South Coast; it is made up almost entirely of igneous rock with insufficient sediment cover to support trees. None of the 366 shallow ponds on the island contain potable water and there are no rivers or flowing water. All the ponds freeze over in winter.

In common with most Northern Indigenous communities, there are limited options for transportation. There is
no fixed link to the island; nor are there commercial flights. The Labrador-Grenfell Health Authority operates a small plane that visits the island on an as needed basis. The seasonal ferry service operates between five and six months of the year, depending on ice conditions. Like other Labrador Coastal communities, Black Tickle is not connected to the province’s electrical grid and relies on expensive diesel. Firewood retrieval necessitates a journey to the former winter stations of Reed’s Pond and Porcupine Bay, 20 and 25 km distance respectively.

Water sources, access and quality in Black Tickle

There was no piped water system or water truck in the community. Since 2004, residents have used a PWDU that is irregularly funded by the provincial government. Residents formed the Concerned Citizens Committee and lobbied hard for some form of water security. The PWDU was the result, although it was constructed in Domino, over a mile from the majority of the households on the island. The location of the PWDU was the choice of the provincial government, which funded and installed it; residents told us they were not consulted and some suspect its location was chosen to benefit the now defunct fish plant, not family homes.

In April 2013, during a short-lived attempt at cost recovery, residents paid $2 CDN per liter of drinking water, making cost an access issue. Bottled water is irregularly available at the two stores but its cost is also prohibitive. In April 2013 the PWDU had just received an operating grant after a long time of being unfunded, a pattern that exemplified longstanding government neglect. For water, residents relied on several unmonitored shared shallow wells within the community as well as brooks, and ponds, such as Herring Cove Pond (see Figure 1). Distrust of the PWDU was high due to longstanding attachments to a favoured brook at Porcupine Bay, 25 km away, the cost of purchasing PWDU water, and the frequent breakdowns and closure periods due to lack of funding. Distrust was compounded by animal activity (especially muskrat and beaver) in and around the PWDU’s source water, Martin’s Pond, although water is treated when it leaves Martin’s Pond.

Water retrieval is a gendered male activity in Black Tickle. Because of the distance and the physical effort required to load, move and unload water, water retrieval was labor-intensive. Wells are communally shared and use is free, a consideration when poverty is a factor, as it is here. The location of the PWDU, over a mile from most houses, meant that travel by snowmobiles and all-terrain vehicles (ATVs) and the associated costs of gas and maintenance were also significant obstacles to water access. Hostile winter weather further constrained access. Therefore, the location of the PWDU emerged as the factor of most concern for residents in that the location restricted water access. Because of this, shared shallow water pits, called ‘wells’, emerged as the most reliable water sources, though some wells became buried under snow and were thus inaccessible. In addition, the wells were vulnerable to contamination by wild animals’ feces and urine. E. coli and total coliforms were present in three water sources, Bern’s Brook, Kelly’s Brook and Herring Cove Pond in April, and in another, a dug well, in October. Exact measures were not provided by the provincial government laboratory. In April and October, PWDU drinking water test results were satisfactory. In April, water samples from the PWDU’s general use tap (which produces water intended for uses other than drinking) contained high levels of disinfection by-products (DBPs), such as trihalomethanes (THMs), and haloacetic acids. According to the provincial government, ‘The health risks from disinfection by-products, including THMs, are much less than the risks from consuming water that has not been appropriately disinfected’ (October 2014). We identified iron as a significant aesthetic problem that discolored PWDU water and discouraged its consumption. We note that DBPs and iron were removed from drinking water produced by the PWDU, but it...
is possible that people sometimes consume general use water from the unit. We have flagged this issue for community leaders and, in fact, all results were forwarded to the Local Service District and discussed with them. No hydrocarbons were detected in the water samples from the five sources tested in April (see Tables 1–3).

Water usage was low. Black Tickle residents use much less water than the Canadian average of 274 L of water per person per day (Environment Canada 2014). We found that the average household in Black Tickle used 392 L daily (note that average household size in the community is 2.84 people.) Daily water usage is not uniform as so many factors are involved. The number of men in a household was positively correlated to the amount of water consumed in the household. The same relationship was not found between the number of women in a household and water consumption. This result reflects the reliance on men to retrieve water and it implies that female-headed households are especially vulnerable to water insecurity. Particularly for some households, water access is a worrying problem. When WHO standards are applied, the necessity to travel more than 100 m to access water means that the health risk of community members is between high and very high (World Health Organization 2008).

We asked residents to indicate their preferences for drinking water, including sources of water. Overall, there was a preference for the PWDU and natural sources, such as Porcupine Bay, and shallow community wells at about the same rate. Bottled water was less preferred. These preferences did not vary seasonally. This finding was interesting as it suggests that weather does not affect preferences in terms of sources of water. Community members were asked to state reasons for their preferences; they were able to indicate multiple reasons. The majority cited purity and cleanliness and the lack of taste, meaning that tasteless water is favored. There is a longstanding belief in the community that natural water sources, particularly Porcupine Bay, are contaminant-free and safe to drink as the water is clear and colorless, an issue we have discussed with community leaders. Natural water sources are unmonitored and untreated; thus, the training we delivered included the testing of these sources and discussions of the importance of testing these sources.

We also asked residents to identify their preferences for general use water. The PWDU is less preferred than the wells for general use water. This is believed to reflect the location of the PWDU compared to wells, which are closer to most households in the community. As one resident commented, ‘A closer PWDU would cut water costs enormously.’

### The PWDU: costs and operations

The PWDU requires annual operating funds of approximately $38,000 CDN to cover labor, electricity, filters, chlorine, pump parts, soda ash, etc. Given the high rate of unemployment and poverty, the PWDU is unsustainable even with the high user fee of $2 L, which was set during an

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**Table 1 | Water sample results (microbial parameters), Black Tickle, Labrador, April 2013**

<table>
<thead>
<tr>
<th>Source code</th>
<th>Total coliform</th>
<th>E. coli</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
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<td>Unsatisfactory</td>
</tr>
<tr>
<td>#2</td>
<td>Present</td>
<td>Absent</td>
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</tr>
<tr>
<td>#3</td>
<td>Present</td>
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<td>Unsatisfactory</td>
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<tr>
<td>#4</td>
<td>Absent</td>
<td>Absent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>#5 (PWDU)</td>
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<td>Absent</td>
<td>Satisfactory</td>
</tr>
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**Table 2 | Water sample results (hydrocarbons), Black Tickle, Labrador, April 2013**

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<tr>
<th>Source code</th>
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<th>Toluene</th>
<th>Benzene</th>
<th>Iron</th>
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<tr>
<td>#4</td>
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<tr>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>H</td>
</tr>
</tbody>
</table>

N = normal; H = high.

**Table 3 | Water sample results (microbial parameters), Black Tickle, Labrador, October 2013**

<table>
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<th>Source code</th>
<th>Total coliform</th>
<th>E. coli</th>
<th>Conclusion</th>
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<td>#8</td>
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attempt at cost recovery. When they are available through the provincial government, funds are granted on an annual basis with the fiscal year ending March 31. Thus, the approach of April is a stressful time in the community and there have been years in which no funding has been secured. This contrasts to communities in which piped water is the norm, as is the case with the vast majority of municipalities and local service districts in Newfoundland and Labrador.

In May 2014 the Local Service District’s funding request to the provincial government was met with the offer of a one-time special assistance grant to be cost-shared 70/30 between the province and the community, as follows:

‘…requests for funding of an operational nature are not generally approved under any of our departmental funding programs. Exceptions have been made, in extraordinary and emergency circumstances; but they are rare. Communities are expected to plan for and ensure adequate local revenue is generated to deal with these expenses. Recognizing your current circumstances and in the spirit of assisting you while you prepare a plan to self-sustain the operations of your system, I am prepared to approve a Special Assistance Grant in the amount of $30,000 on a 70/30 Provincial/Municipal cost-shared basis… This is one-time transitional funding to support your operational requirements while you establish to independently fund the operations and maintenance of your water system’ (Kent 2014).

So the province would provide a maximum of $20,070.79 with an expected community contribution of $8601.77. According to the Local Service District, residents would have to pay $10 L to raise the $8601.77, which was clearly impossible. The province seems not to recognize water security as a right but appears to view it as something to be earned and provided at the local level. In this case, there is no provision for the contextualization of specific situations. There is no notion of long-term planning, no concern for the health issues raised by the extreme level of water insecurity in Black Tickle, and no concept of water safety plans as promoted by the World Health Organization. During this time, the PWDU was again unfunded and the people of Black Tickle are once again turned to unmonitored shallow wells for their drinking water (Canadian Broadcasting Corporation 2014). The presence of E. coli was detected in two out of these seven wells.

Almost simultaneously, a water insecurity problem developed in Pigeon Cove and St. Barbe, small non-Indigenous communities on the island of Newfoundland’s Great Northern Peninsula with respective populations of 80 and 180 (Nordic Economic Development Corporation 2011). Pigeon Cove has piped water but cold weather conditions and freezing pipes meant that water had ceased to run. In these cases, the ministry was quick to respond:

‘Municipal Affairs Minister Steve Kent expects the people of Pigeon Cove and St. Barbe will have running water within a couple of days … The two towns have been without water since last Wednesday … ‘The plan involves the installation of an overland piping system to the nearest available water supply,’ said Kent. The pipes will be run to a pond about 1.5 km from the current source…. ‘I didn’t want to wait several days longer. That’s a more expensive add-on, but it provides water to residents in the quickest possible way.’ In all, Kent said, restoring water to Pigeon Cove and St. Barbe would cost more than $100,000’ (Crocker 2014).

Water insecurity in Pigeon Cove and St. Barbe was, thankfully, temporary and there was never any question in public discourse that it would be otherwise. Water security in Black Tickle has a long and ongoing history and is further complicated by other issues indicative of the community’s marginalization as an Indigenous community, such as its settlement history and the lack of transportation options. The contrast in responses to the two situations could not be greater. While Pigeon Cove and St. Barbe enjoyed a swift response to their problems, as was their right, Black Tickle had to mount a lobbying effort to get the PWDU funded for 2014–2015. They enlisted the help of NunatuKavut Community Council, representatives of which met with the minister and his staff in St. John’s, the province’s capital city. In the end, NunatuKavut Community Council was able to contribute towards the community contribution expected by the provincial government; the Local District raised some money and the Special Assistance Grant was secured. There were sufficient funds to operate the PWDU until July 2015, excepting parts replacement. In March 2015 the Local Service District again applied for one-time special funding for...
PWDU operations. Community leaders are optimistic that this application will be successful, noting that this will be ‘one of many times we’re after getting one-time funding’. Yet a crisis occurred in April 2015 when the filters were damaged with the result that the Red Cross flew in water at a limit of 2 L per day per person (CBC 2015).

THE IMPACTS OF WATER INSECURITY

Health risks

Most conversations about water in Black Tickle turn to food security. The local water has a brown case due to its high iron content and/or natural organic matter, which make it visually unappealing. For this reason parents sometimes add Kool-Aid™ to water to encourage children to drink it. Alternatively they offer pop (Pepsi™/Coke™), which is slightly cheaper than bottled water and is more consistently available. Even a price difference of 15 cents factors into spending decisions because of household finances. It was clear in our focus groups that residents understood the health compromises they were making but felt forced to make these compromises.

Although no statistics for the local level were available, the nurse confirmed a high rate of diabetes in Black Tickle, in common with many Indigenous populations that have made the epidemiologic transition (Hanrahan 2008) and other NunatuKavut communities (Martin et al. 2012). One local family has eight adult siblings out of ten with diabetes. Several residents with diabetes and other chronic illnesses regretfully restricted water intake; one female diabetic drank only one glass of water a day.

Women taking part in a focus group placed the obesity rate at 80%, which was confirmed by the nurse. The links between water insecurity, food insecurity, poverty and health were well understood. ‘A lot of the obesity has to do with the fact that there’s not enough water, there’s an access problem to water,’ said one resident, referring to the high intake of sugary drinks.

Gastro-intestinal infections were common and there was an outbreak through the fall of 2012, with every household and demographic affected. One elderly resident said, ‘I’ve been stomach sick my whole life.’ Contamination is a concern throughout the water retrieval process. Buckets to hold water may not be sanitized. Because of the lack of a piped sewer system, waste is carried on the same komatiks (Inuit sleds) that are used for water retrieval and then dumped in the harbor or the designated landfill site.

Because of the sexual division of labor that has men responsible for water retrieval, virtually every man in the community was in chronic pain due to back and shoulder injuries. Some men required surgery, but they indefinitely postponed it because their families needed them to retrieve water (and wood to heat their homes).

Mental stress was strongly associated with water insecurity. Water was ‘always on people’s minds’, especially when winter storms were forecast and in summer when wells tended to dry up. The mercifully short spring and fall were times of particularly high stress due to transportation problems associated with these seasons. In spring there is insufficient snow cover for snowmobiles to travel and retrieve water. The ground is too muddy for the easy use of ATVs, as is the case in the fall. In addition, throughout the year people knowingly consume untreated water and unhealthy high sugar drinks; they also worried about men’s health.

Coping mechanisms

Water conservation practices were pervasive in Black Tickle with weather factored in. Stacks of salt-beef buckets filled with distilled water were in almost every house. One woman said she drank only one cup of coffee per day and one glass of water, having ‘no other choice’. Another said, ‘No one is drinking enough water in the community,’ with all other focus group participants agreeing. Bath water was shared and re-used to wash walls.

There was a great deal of culturally-reinforced sharing: of water retrieval duties, of food, water, and vehicles. Such sharing occurs throughout Inuit society with the sharing of Inuit country food being particularly important (Ford & Beaumier 2011). It meant that lone parents and elderly people were protected to some degree from extreme water insecurity, although our survey demonstrates that female-headed households seem to be more vulnerable to water insecurity than male-headed households.

Residents adopted short-term strategies such as water conservation and long-term strategies such as advocacy.
They demonstrated remarkable resilience in that their volunteer efforts have led to few successes but they continued to lobby for improved water security. They see every small victory, such as last year’s partial special assistance grant, as an important step forward.

Possible solutions

Community-based participatory research allowed us to understand the many aspects of water insecurity in our case study community. Continuing to work with the community, especially the Local Service District, we now focus on engineering research to identify and provide solutions. The community identified access to potable water as its top priority. This was a result of the labor-intensity involved in accessing water from the PWDU and other sources. ‘Bring the (PWDU) water closer to the community’ was the phrase we most often heard. There is no expectation of piped water, given the difficulties in getting a fully-functioning PWDU, the high costs of water infrastructure (Dawe 2015), and the community’s lack of political clout. Water access for drinking and for general use emerged as the most pressing issue with water quality identified as something that can be dealt with through boil order advisories, continued monitoring and testing, and avoidance of certain water sources.

This article focuses on the initial phase of our research, which is ongoing with later phases to be reported at a later date. The next phases – pre-engineering and engineering – are aimed at improving physical access to water, which is the clear priority of the community.

CONCLUSIONS

Our study has identified and explored the multiple dimensions of water insecurity in Black Tickle-Domino and related adverse health outcomes. Contrary to the WHO’s Water Safety Plans, there are no health-based targets, monitoring plans, or independent surveillance and there is inadequate operational monitoring and very little system assessment. Further, the scale of water deprivation in this and other Indigenous communities in Canada amounts to a serious violation of human rights. We strongly urge government authorities to take bold and forward-looking decisions that would recognize community contexts and lead to water security using the multi-barrier approach. We recognize the complexities and challenges involved in identifying and implementing solutions. In fact, we have begun working with engineers to find sustainable ways to end the decades-old water problems faced by the community, involving assessments of the system, energy requirements, and the identification of possible options. The scenario in Black Tickle-Domino is not unique in Canada, with many remote Indigenous communities in Canada facing similar levels of water insecurity; this smacks of environmental racism and certainly constitutes environmental injustice. Given its widespread nature, water insecurity in Indigenous Canada also requires further attention from academic researchers committed to multi-disciplinary and materialist approaches.

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REFERENCES


Dawe, E. 2015 Water and Energy Recommendations for the Community of Black Tickle. Industrial Outreach, Faculty of Engineering and Applied Science, Memorial University, St. John’s, Newfoundland.


Patrick, R. J. 2011 Uneven access to safe drinking water for First Nations in Canada: Connecting health and place through source water protection. Health Place 17 (1), 386–389.


Wallerstein, N. & Duran, B. 2010 Community-based participatory research contributions to intervention research: the intersection of science and practice to improve healthy equity. Am. J. Public Health 100 (Suppl. 1), S40–S46.


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