Food Sec. (2016) 8:815–826
DOI 10.1007/s12571-016-0594-6

ORIGINAL PAPER

Indigenous peoples' fisheries and food security: a case from northern Canada

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Received: 18 August 2015 / Accepted: 14 June 2016 / Published online: 11 July 2016
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Abstract Indigenous peoples in northern Canada (at least the off-reserve part of the population) experience food insecurity at a rate which is more than double that of all Canadian households. The Cree community of Norway House in northern Manitoba, which harvests and consumes a great deal of fish, may be an exception and may offer some lessons. The objective of the paper is to address food security through the lens of local fisheries, both commercial and subsistence, of a northern indigenous community, and to develop an integrated approach to analyze food security. The approach uses Sen's entitlement theory and the concept of food sovereignty. This mixed-methods research study employed questionnaire surveys among on–reserve commercial and subsistence fishing households, semi-structured interviews, focus group discussions and follow-up interviews for verification. During commercial fishing seasons (spring/summer and fall), fishers and their helpers share their fish harvest extensively through their families and communal networks, reaching almost half of the total population of the community. Such extensive sharing and the continuing community-based fishery have contributed to Norway House having more than 90 % food secure households, comparable to the Canadian average. Norway House may provide an example for other northern indigenous communities regarding food insecurity through use of fish and other traditional foods. The proposed integrated approach may be useful for analyzing food security in general.

Keywords Indigenous peoples · Sharing · Community-based fisheries · Entitlement theory · Food sovereignty, Manitoba

Introduction

Most of the world's undernourished and food insecure people live in low-income areas of developing countries; however, food insecurity is also an issue for Canada (Council of Canadian Academies 2014). More than 12 % of Canadian households experienced moderate to severe food insecurity in 2011 (Council of Canadian Academies 2014). This rate was higher among Indigenous communities but data are incomplete because on-reserve populations are not represented (Council of Canadian Academies 2014). According to data from the 2011 Canadian Community Health Survey, off-reserve aboriginal households across Canada experienced food insecurity at a rate more than double that of all Canadian households (i.e., 27 %) (Council of Canadian Academies 2014). Female-headed households with children consistently reported even higher rates of food insecurity. More women than men are affected (Beaumier and Ford 2010). Food insecurity rates were even higher among the poorer aboriginal households, that is, those on social assistance. In 2007–2008, 55 % of off-reserve aboriginal households living on social assistance were food insecure (Health Canada 2012).

Food insecurity is often associated with a nutrition transition from a high protein low carbohydrate diet to a high sugar and fat diet of processed foods (Kuhnlein et al. 2004, 2013). This changing dietary pattern is, in turn, linked to the decline of the indigenous way of life, less time being spent on the land, and the abandonment of traditional ways of obtaining food by fishing, hunting and trapping. For example, in the James Bay area, northern Quebec, there has been a sharp decline, from about 46 % in the 1976–81 period to 15 % in

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the 2004–08 period, in the proportion of Cree families going on the land for lengthy periods (Council of Canadian Academies 2014). Similarly, Usher (2002) found a sharp decline of fish and wildlife harvesting on a per capita basis from the1960–65 period to the 1988–97 period in the Northwest Territories.

The reasons for these declines and the failure of the development of a new economy and a nutritionally viable lifestyle to replace the old way of life in the Canadian North and specifically among Indigenous people are complex, and beyond the scope of this paper. As analyzed by the Council of Canadian Academies (2014), the reasons include the high cost of access to and purchase of healthy foods; problems of access to resources, caused by environmental change, and increasingly by climate change; environmental damage and pollution from large projects, such as dams and mines, with ensuing heavy metal problems; government's social policies, including those that have been characterized by some as cultural genocide; loss of skills and knowledge to obtain local foods; lack of nutrition education for store-bought foods; and changing food preferences, away from healthy local wild foods and toward store-bought processed foods, high in sugars and fats. Interestingly, nutrition-related problems among Canadian Indigenous peoples have a great deal in common with those elsewhere in the world (Kuhnlein et al. 2013).

Food security issues are complex and interdisciplinary in nature, and they need to be addressed from a holistic perspective, focusing on the interconnectedness of various sectors of the food system, the ecological, economic/business, and the social. The ecological dimension includes the biological management of the resource (Ayles et al. 2011) and the overlap of commercial and subsistence fisheries (Islam and Berkes 2016). Moreover, food security studies for Indigenous people would be incomplete without the social dimension, including the consideration of their perspectives and cultural values (Power 2008) and attributes of traditional foods (Lambden et al. 2007). In the present paper, we approach this problem through the lens of local fisheries, both commercial and subsistence, in one northern Indigenous community in Canada. There is evidence that fishing livelihoods play an important role in household food security both in mid-northern Canada (Morrison 2011; Rudolph and McLachlan 2013; Thompson et al. 2014) and internationally (Hanazaki et al. 2013; Fiorella et al. 2014; Kawarazuka and Béné 2010). However, the role of fisheries in food security has been understudied in the literature (Grafton et al. 2015; Kittinger et al. 2015). Fish are an important source of protein and different types of essential nutrients, such as vitamin A, calcium, iron and zinc. Fisheries need more attention in addressing food security (Pilling et al. 2015; Béné et al. 2015; Población 2013; Kawarazuka and Béné 2010).

Among Indigenous communities in the Canadian north, including the northern parts of the Province of Manitoba, fishing is considered as a part of culture. Many aboriginal communities regard fish as a staple resource because of its relatively reliable nature and abundance. In large parts of northern Canada, of the various groups of wild foods (big game such as moose, small game, migratory waterfowl such as ducks and geese, and plant foods such as berries), fish have the highest potential for helping meet local food needs (Berkes 1990, 2012). In different parts of northern Canada, estimates of the annual harvestable fish supply greatly exceed the actual levels of harvest (Friesen and Nelson 1978; McCart and Den Beste 1979). There has also been a major decline in the number of small-scale Indigenous commercial fisheries that once dotted the mid-northern Canadian landscape, indicating a presently unused fishery potential.

Despite reduced productivity due to environmental problems, fish and other wild resources are abundant enough in many areas to help with food security. Berkes et al. (1994) conducted a harvest study in Hudson and James Bay Lowlands, Ontario, and their findings indicated that if wild food harvests were distributed equitably and fully utilized, they could provide the protein needs of the entire regional population. Traditionally, fish were a major part of local food resources almost everywhere in Canada, and the significance of fish to Indigenous peoples is illustrated by their selection of summer meeting places (and later, reserves) adjacent to good fishing areas (Tough 1996). Fishing plays an important role in bringing people together socially and culturally, including the celebration of Indigenous traditions, such as the First Salmon ceremony in the Pacific Northwest (Berkes 2012).

To deal with the complexities of food security issues, we use two concepts to analyze our case. The first is Sen's (1981) idea of entitlements, which addresses the relationship between food consumption and distribution. The second is the concept of food sovereignty, which addresses the relationship between production and distribution.

In the 1980s Nobel laureate Amartya Sen brought a paradigm shift in the literature by turning the focus of food security from "availability" to "entitlement". Sen (1981) theorized food security as "entitlement to food" and analyzed its relevance in famine situations (Devereux 1993; Maxwell 1996). Theory of entitlement became a major part of food security analysis, and food security was defined as being a "problem of food supply with reference to the importance of access and entitlement" (Maxwell 1996, p.156). Sen (1981, p. 45) pointed out that "A person starves either because he does not have the ability to command enough food, or because he does not use his ability to avoid starvation; a person is reduced to starvation if some change occurs either in his endowment (e.g., alienation of land, loss of labor power, ill health) or in his exchange entitlement (e.g., fall in wages, rise in food prices, loss of employment, drop in price of foods he produces)". Therefore, the failure to obtain food may be characterized as

an "entitlement failure" (Sen and Drèze 1989). The concept of entitlement holds that food insecurity and persistent hunger are indicators of low livelihood resilience of the poor, who lack capacity either to produce sufficient food for themselves or lack financial ability to purchase food through a regular food system (Sen 1981, 1984). Typically, people who depend on irregular income from daily wage labor (for example barbers, weavers, shoemakers) and lack productive assets fall into this category (Sen 1981). Severe food insecurity and acute malnutrition may occur when the entitlement of a person or community is disturbed by various socio-economic and environmental factors. The entitlement framework is beneficial for analyzing causes of food insecurity as it helps to disaggregate the reasons why a person or group may become vulnerable to becoming unable to access food (Chisholm and Tyers 1982).

In the 1990s, another major paradigm shift occurred in the literature of food security, "food sovereignty", which is conceived as a genuine precondition of food security (Patel 2009). Food sovereignty is a term that was coined by the members of Via Campesina, a peasant movement, in 1996 (Nyéléni 2007). "Food sovereignty is broadly defined as the right of nations and peoples to control their own food systems, including their own markets, production modes, food cultures and environments" (Desmarais et al. 2011, p.20). Food sovereignty refers to a policy framework advocating the rights of peasants, farmers, women, Indigenous peoples, and minorities to define their own food and agriculture system and not to become victims of international markets (Windfuhr and Jonsén 2005; Rosset 2008; Wittman 2009). The conventional definition of food security does not cover the social aspect of the food system (Haugen 2009; Patel 2009; Morrison 2011). The food sovereignty approach tries to address this gap. For example, inmates of a prison can be food secure; or a northern Indigenous community can be made food secure by flying in low cost nutritious food (as has been suggested by some scholars), but this does not provide food sovereignty. A rights-based approach is the hallmark of food sovereignty in addressing the interplay between production and distribution, while Sen's theory uses entitlement thinking to analyze why food insecurity occurs in the first place. Both theories have contributed to the food security literature by shifting the paradigm from availability to entitlement to a rights-based approach.

Our objective in this paper is to address food security as related to fish and local fisheries of an Indigenous community, and to develop an integrated approach to analyze the role of these fisheries. The results are presented under four headings: (1) background findings and the community context, (2) frequency of fish consumption, (3) sharing fish and other wild foods, and (4) significance of fisheries in household food security, followed by the Discussion in which we develop an integrated model to analyze food security applicable to Indigenous communities. The findings of this study help the understanding of food security by viewing it through the lens of fisheries, an approach which may be useful for similar Indigenous communities elsewhere.

Regarding terminology, "subsistence fishing" is referred to in the literature also as "food fishing", "domestic fishing", and "native harvesting" (Berkes 1988). In this paper we use the term subsistence fishing and food fishing interchangeably, and define food fisheries as "local, non-commercial fisheries, oriented not primarily for recreation but for the procurement of fish for consumption of the fishers, their families and community" (Berkes 1988, p. 319). Commercial fisheries are often defined as those conducted by licenced fishers for sale of fish. The term "Indigenous people" may be used interchangeably with "aboriginal people", in preference to "native people". The term "Indian" is no longer used in Canada, except in a legal sense. Indigenous peoples in Canada are referred to as First Nations, and also include Inuit and Métis.

Study area and methods of data collection

Norway House Cree Nation is located 450 km north of Winnipeg on the convergence of Lake Winnipeg and the Nelson River in northern Manitoba, Canada. Norway House is accessible by an all-season road and by air. The resident population is 4758 (Statistics Canada 2013). The majority of community members are Cree, one of the largest Indigenous groups in Canada that extends across the boreal and subarctic regions from Labrador to British Columbia. There are few job opportunities available considering the relatively large population of the community. The majority of the community members support themselves with limited social assistance from the government. The band council, schools, hospital and fisherman's co-op are the largest employers in the community.

Fishing is an important part of livelihood in Norway House, similar to many other Indigenous communities elsewhere in Canada. Community members engage themselves both in commercial and subsistence fishing. Norway House Fisherman's Co-op was established in 1962. The Co-op owns and controls all commercial fishing licences. There are 50 active (and two inactive) commercial fishing licences. If a commercial fisher is not actively fishing for two consecutive years then his commercial fishing licence becomes inactive. All commercial fishers have to be a member of the Fisherman's Co-op. Commercial fishing in Manitoba is regulated and fishers have to sell their catches to the Freshwater Fish Marketing Corporation located in Winnipeg. Norway House fishers sell their catch through the Co-op. There are two commercial fishing seasons spring/summer and fall. Most of the fishers have fishing cabins on the lake. During fishing seasons, some fishers take their families with them to live in fishing cabins. The majority of the commercial fishing takes place in Lake

Winnipeg (the tenth largest lake in the world), Playgreen Lake and Kiskittogisu Lake.

Historically fishing was considered as a family activity and this tradition still continues. Community members of all ages go food fishing throughout the year. People mostly use angling, or gillnets and boats and go to nearby rivers for subsistence fishing. Residents also participate in other traditional activities, hunting, trapping and berry picking. Schools at Norway House encourage students to participate in traditional means of living by offering outdoor courses and providing them with hands-on training in fishing and hunting. People share traditional foods (fish, moose meat and small game) with their families, neighbors and friends. The Chief and Band council play an important role in keeping cultural activities alive by organizing traditional feasts around the year, when the whole community gets together to celebrate and enjoy traditional food and activities.

We conducted the study over a period of 14 months from September 2013 to November 2014, asking about household harvests in the previous year, that is, 2012–2013. The study included commercial fishers and subsistence fishers as research participants. We also interviewed the president, secretary and members of Norway House Fisherman's Co-op. This mixed-methods research study employed semi-structured interviews with key informants and focus group discussions. This was followed by household questionnaire surveys and follow up interviews. The questionnaires included two questions on food security based on Health Canada (2012) (for details see "Results" sections regarding Figs. 4 and 5).

Interviews and survey questions were designed to follow community norms for acceptable language and respect. The questions were pretested with selected fishers and co-op members and modifications were made based on their feedback. We employed two community researchers and trained them to conduct questionnaire surveys. The follow up interviews and focus group discussions were conducted by the principal investigator, with the help of community researchers.

We conducted a total of 23 follow up interviews. For these interviews, we sampled by dividing fishers into four subgroups (1) commercial fishers ($N = 8$) (2) subsistence fishers ($N = 8$) (3) retired elder commercial fishers ($N = 3$), and (4) elder subsistence fishers ($N = 4$). We interviewed these seven elders to gain some historic insights into commercial and subsistence fisheries. Some of these senior fishers could only communicate in the Cree language, requiring a translator. All commercial fishers and the majority of the subsistence fishers were male. In the past, females used to participate in subsistence fishing; however, that happens rarely at present. Additionally, we interviewed two female elders who had been active in subsistence fishing.

We conducted two sets of questionnaire surveys among commercial and food fishing households. Among 50 commercial fishing households, the study covered 35 households (i.e., 70 % of the total). We used snowball sampling for the commercial fishing household survey.

For subsistence fishing households, we had 100 completed surveys or about 10 % to 15 % of the total number of households in the community (assuming 6 persons per household). We used stratified sampling because harvesting tends to be highly skewed, with a few households contributing a disproportionate share of the harvest (see Berkes et al. 1994). To choose the sample, we asked household heads to identify themselves as "intensive" or "active" or "occasional" harvesters or non-harvesters. "Intensive harvesters" were defined as harvesters bringing home "a lot" of traditional food. "Active harvesters" were those bringing home "some but not a lot" of traditional food. "Occasional harvesters" were those bringing traditional food only occasionally. We included some commercial fishing households in the sample of subsistence fishing households because the majority of the commercial fishers did participate in food fishing outside of the commercial fishing seasons (only 11 weeks of the year). We also included "poor" households (those living only on social assistance), non-harvesting households, old-age homes, and female-headed households to cover the vulnerable segments of the community. Thus, "subsistence fishing households" in the results sections include some households that are in fact non-harvesters.

The data gathered from the questionnaire survey were verified by follow-up interviews and focus group discussions. The follow-up interviews were used to verify specific household questionnaire results and to expand on some of the points raised. For verifying general, community-wide findings, we arranged two separate focus group discussions involving five commercial fishers and five subsistence fishers. For data verification, we prepared visual displays (posters, graphs and charts), to present to the Chief and Band Council, the Fisherman's Co-op, and key informants. All data of household surveys were anonymous. We used Excel spreadsheets to process the data from household questionnaire surveys and to create tables and figures.

Results

Background findings and the community context

Community members participate in various activities that produce food such as fishing, hunting, and berry picking. Some kinds of tourism also produce game and fish, caught by tourists for pleasure and given away to local households for consumption. We were interested to find out which activities produced food for domestic purposes. Participants in commercial and subsistence fishing households were asked to describe activities that produced food for household consumption. The major food producing activities were fishing, hunting and trapping, followed by berry picking, tourism and other (Fig. 1). Commercial fishers would fish for commercial purposes during the fishing season, and many would be involved actively in food fishing as well when the commerial fishing season was over. Most of the

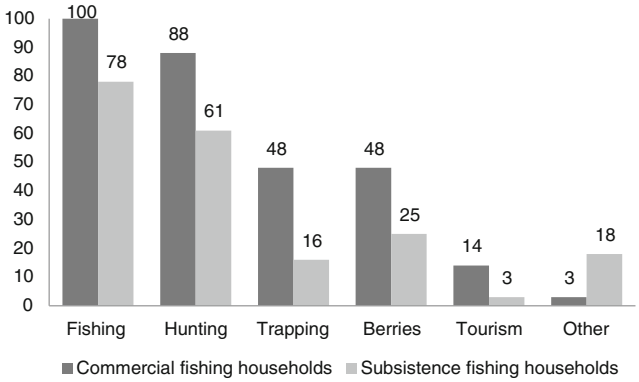


Fig. 1 The activities that produced food for household consumption in 2012–13

commercial fishers we interviewed also hunted and trapped in the off season. In both commerical and food fishing households, fishing was the number one traditional activity in producing food for household consumption.

Commercial fishing in Norway House takes place for 11 weeks spread over spring/summer and fall seasons. Food fishing does not have such restrictions, and can occur anytime during the year, including winter under the ice. Some 77 % of households reported that they participated in food fishing (including angling) activities. Of those households reporting fishing, the majority took part in spring/summer fishing (90 %) and fall fishing (80 %); fewer reported winter fishing (35 %). Table 1 shows the number of participants and their level of activity in each season for subsistence fishing activities.

Both subsistence and commercial fishers at Norway House target similar fish species (Islam and Berkes 2016). The harvests of commercially profitable fish species are controlled and regulated by fishing quotas. Walleye *Sander vitreus* (locally called pickerel), lake whitefish *Coregonus clupeaformis* and sauger *Sander canadensis* are quota fish; the other species are not. Walleye was the top species harvested in all seasons; seasonally important species included lake whitefish and northern pike, *Esox lucius*, locally called jackfish (Islam and Berkes 2016). Burbot *Lota lota* (locally called mariah, with high vitamin D in liver) was the only fish that was not sold commercially but considered a local delicacy in winter. Seniors in the community appreciate this fish; however, younger generations do not like it as much.

Table 1 Number of participants reporting their seasonal fishing effort (1–5 days… over 45 days) for subsistence fishing during the year 2012–13 ($N = 100$)

	1–5 days	5–15 days	15–45 days	Over 45 days
Fall	21	31	4	7
Winter	13	10	3	2
Spring/Summer	25	31	8	5

Frequency of fish consumption

> "My mother once told me as a little kid we used to have fish and potatoes mixed together as baby food. She fed us with boiled whitefish. She would pour some of the fish juice and mix it with potato to make it soft and that was our baby food."-Food fisher B (active harvester), in his 70s, March 2014

We wanted to find out the frequency of eating fish in both commercial and subsistence fishing households. The majority of the households reported eating fish once a week during the year as a whole (Fig. 2). Judging by the results of open-ended questions and follow-up interviews, commercial fishing households ate fish every day, or nearly so, during the fishing season. Again, availability of fish is seasonal (since fish runs are seasonal) also in the subsistence fishery. So it was important to find out household strategies when there was "no fish coming in".

Commercial fishing households mostly used fish from their own freezers (77 %), and subsistence fishing households mostly received fish from others (70 %) as well as using fish from their own freezers (61 %) (Table 2). The only traditional fish preservation technique still used is smoking. According to an elder fisher woman in her 80s, in the past, people in Norway House also used underground storage (the area has, or had, discontinuous permafrost) and made fish pemmican (dried fish pounded with berries and fat). Households reported preparing fish using different cooking methods: frying (99 %), boiling (21 %), smoking (9 %) and baking (1 %). It was interesting to note that people were more inclined to frying fish than using the traditional methods of preparing fish (boiling and smoking).

Commercial (6 %) and subsistence (4 %) fishing households rarely bought fish from local stores, but bought substitute foods instead. Some community members believe that fish collected from the adjacent river are not safe for consumption and they also think that fish from lakes are not as tasty as river fish. This motivates them to buy other foods from the

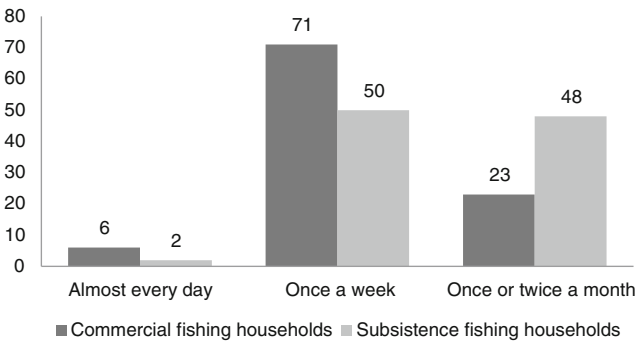


Fig. 2 How frequently did your family eat fish in the year 2012–13?

Table 2 When there is no fish coming in, what do your family eat instead?

	Commercial fishing households (%)	Subsistence fishing households (%)
Someone shares fish with us	26	70
We use fish from our own freezer	77	61
We buy fish from the store	6	4
We buy other food from the store	69	37

local grocery store, passing up the option to catch fresh fish from the river.

In the household survey, when we asked household heads if children were eating fish, 100 % of the respondents replied "yes". However, during follow-up interviews, many household heads commented that children were, in fact, not eager to eat fish; they were more inclined toward market food. When we conducted focus group discussions with school children, the majority of them (about 70 %) mentioned that they do not prefer to eat fish unless it is cooked in a special way, for example, prepared by grandparents. As well, children who go fishing with their families tend to like and eat fish. There are varying opinions within the community regarding why children are reluctant to eat fish. According to several elders, children develop a taste for fish when they start to eat fish at an early age.

Sharing fish and other wild foods

> "Us… First Nations people have been sharing with each other for generations and generations. That's how we thrive; when one family did not have much and another family had many… they share with each other… that's what we do in our communities. It was never about who has this and who has that, not about greed and power. Our tradition is to share with each other to make sure we thrive as a community. When we have fish and wild meat, we share it with each other. Nowadays the government is providing all these government food… everybody is getting caught up with paying bills and losing our tradition of living off the land."- Commercial fisher A (intensive harvester), March, 2014

Sharing is a big part of Cree culture. We asked both commercial and food fishing households about the number of households with whom they shared their harvests of fish and wild food (Fig. 3), and also the number of households from whom they received fish and wild food (Table 3).

Both commercial (40 %) and food fishing (54 %) households shared their harvests mostly with one or two other

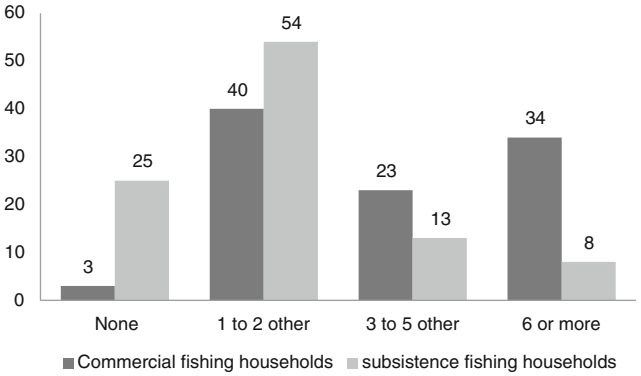


Fig. 3 With how many Norway House households did you regularly share your harvest (fish and other wild foods) in the year 2012–13?

households. Some 34 % of commercial fishing households shared their harvests with six or more households. Only 3 % of the commercial fishing households reported not to share their harvests (Fig. 3). However, these numbers are misleading in estimating the actual level of sharing, based on in-depth interviews with commercial fishers. During the fishing season each commercial fisher typically has two fisher helpers with them on the boat at all times. Almost all the commercial fishers share their catch with their own circle of households as well as the households of their helpers.

Based on Fig. 3 (where the numbers indicate percentages), the 50 commercial fishers seem to be sharing their fish with a minimum of 125 other households. If the two helpers shared their fish in a similar pattern, the fish taken by the commercial fishery may be reaching three times that number or 375 households. At six persons per household (based on our community survey estimate), this catch may be reaching 2250 people or nearly half of the total population of Norway House. Such widespread sharing is often highlighted by commercial fishers:

> "In our community everybody shares food with somebody. When a person is not fishing, he is getting fish from somebody else. And if a person fishes, he shares his catch with somebody else. Everybody is sharing"- Commercial fisher B (active harvester), March 2014

Table 3 How many other Norway House households regularly shared their harvest with yours in the year 2012–13?

	Commercial fishing households (%)	Food fishing households (%)
None	31	19
1 to 2 other	54	59
3 to 5 other	9	14
6 or more	6	8

Some of the commercial fishers indicated that they have a certain number of households (parents, siblings, elderly relatives) with whom they regularly shared their harvests. Other kinds of sharing often follow rules of reciprocity, and may be initiated by someone wanting fish. Culturally appropriate asking usually involves indirect questions and dropping hints of need. Nevertheless, it is a common phenomenon during the season that people who need fish to ask for them.

> "I would go and ask a commercial fisher or an old person who has a net in the water, if he would share some of his fish with me. Anybody who has a net in the water, I would go and ask them for fish"-Food fisher C (occasional harvester), May 2014

We asked a commercial fisher about his methods of sharing as he reported sharing his catch with six or more other households. In addition to households in his usual sharing network, he indicated that he would share his extra fish by announcing it on the local radio. Whoever in the community wants fish would be welcome to receive it from his house. This way, he estimated that he shared his catch with some 10–12 additional households during the fishing season in a given year.

> "Say I have extra fish, I don't throw them away. I put it on a radio for people to come and take it from my house. Sometimes I have seven to ten tubs of fish I bring home"-Commercial fisher C (intensive harvester), March 2014

Despite extensive sharing, some people commented on a decline of the sharing ethic and a narrowing of sharing circles, perhaps most seriously affecting people who are not part of food sharing networks. Some of the elderly persons we interviewed mentioned that they would like to see more sharing of fish and other traditional food among community members. An elderly widow mentioned that when her husband was around, she had many people offering fish and wild foods. Now that she is on her own, she hardly receives fish and other traditional food. She feels that band council could take some initiatives to make sure that fish and traditional foods are equally distributed to elderly persons, widows, female-headed households who are not in a position to harvest fish and other traditional foods themselves.

Turning to receiving fish and other traditional foods (as opposed to giving away), we see that the majority of the commercial (54 %) and food (59 %) fishing households receive harvests from one to two other households, indicating a narrowing of food sharing networks (Table 3). These households fall under the category of "intensive" or "active" harvesting and other community members perceive them as harvesting their own food and sharing (giving) more than receiving. Perhaps surprisingly, 31 % of the commercial fishing and 19 % of the food fishing households reported that they did not receive any harvests from other households (Table 3).

Significance of fisheries in household food security

To understand the state of food security in Norway House, we used the standard questions for food security analysis using Health Canada (2007) to make our results comparable with other communities. One of the questions was modified on the basis of pretesting with Norway House community members. We asked respondents how they would best describe their household food consumption over "the past 1 month". Because the surveys were conducted over several months, "the past 1 month" for different households occurred during the period, September–December, 2013. There were three response options: "not adequate"; "just adequate"; and "more than adequate". Almost two-thirds of the commercial fishing households (63 %) reported that they had "more than adequate"; about one-third (34 %) reported "just adequate" food consumption over the past month in their households. Of the subsistence fishing households (81 %) reported to have "just adequate". Only 3 % of the commercial fishing households and 9 % of the food fishing households reported "not adequate", that is, food insecure (Fig. 4).

In another food security question, we asked respondents to describe the food eaten in their households in the past 12 months (2012–13). They had to choose from four given options: (1) "always had enough of the kinds of food you wanted to eat"; (2) "always had enough but not always the kind of food wanted"; (3) "sometimes did not have enough to eat"; and (4) "often did not have enough to eat" (Health Canada 2007). Some 71 % of the commercial fishing households reported always having enough of the kinds of food they wanted, and 26 % reported that they always had enough but not always the kind of food they wanted (Fig. 5). Among subsistence fishing households, 49 % and 43 % reported, respectively, "to always have enough of the kind of food they wanted to eat" and "always had enough but not always the kind of food".

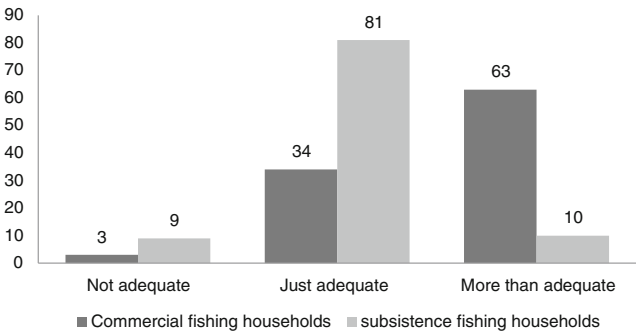


Fig. 4 Food consumption status of Norway House households over 1 month (any month from September to December 2013)

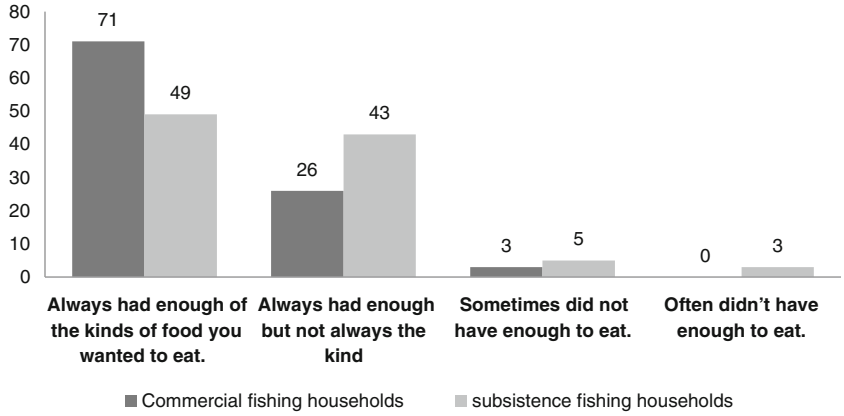


Fig. 5 The statements that best describes the food eaten in your household in the past 12 months (2012–13)

Only 5 % of subsistence fishing households indicated that they "sometimes did not have enough to eat", while only 3 % of the commercial fishing households fell in the same category. None of the commercial fishing households responded with "often did not have enough to eat", that is, extreme food insecurity; however 3 % of the subsistence fishing households did.

Discussion: towards an integrated approach

Findings of the household food security questionnaire survey indicate that the 97 % of the commercial fishing and 91 % of the subsistence fishing households are food secure in Norway House, keeping in mind year-to-year variations and other uncertainties inherent in such studies. Numbers in Norway House are comparable to the Canadian average of 92 % and seem to be considerably better than that for many other communities in the Canadian North for which data are available, but these data are not strictly comparable, in part because of lack of representation of on-reserve populations, as First Nations have opted out of such government surveys (Council of Canadian Academies 2014). Can Norway House be a model for other northern communities? What is it that Norway House community is doing that makes a difference in food security?

Part of the explanation is that people still go on land and participate in traditional activities of fishing, hunting, and trapping. However, all of these activities have declined considerably over the decades. For example, according to our surveys, only about 4 % of the Norway House households consider themselves as "intensive" harvesters (along with 18 % "active", 58 % "occasional", and 20 % non-harvesters). We only have qualitative information in the present study, but the number of days spent on the land has declined, consistent with other northern communities (Council of Canadian Academies 2014). Fewer people go subsistence fishing, spend fewer days in harvesting, and tend to use rod-and-reel fishing, as opposed to gillnets which often help bring back a surplus catch to the community. Hunting is reduced to a few days at a hunting camp and weekend hunting. Because of the collapse of fur markets since the 1980s, trapping does not even cover the cost of equipment and fuel. In Norway House, trapping is reduced largely to snowshoe hare (locally called rabbit) snaring. The sharing ethic is still relatively strong, but there is not much to share from the food that comes from the subsistence harvest. Nevertheless, the sharing of fish from the commercial fishery is part of the explanation for the relatively high level of food security. Norway House is rare in having a well-functioning commercial fishery; most Indigenous communities do not.

Another major factor behind high food security is that Norway House has an all-season road connection to the south and hence cost of southern foods in the community is not as high as elsewhere. By comparison, many northern Indigenous communities only have air connection or a seasonal winter road (using compacted snow and ice) to the south and seem to suffer from severe food insecurity (Thompson et al. 2012). Norway House does have problems of resource access due to hydroelectric development, similar to many other Indigenous northern communities, and mines in the area, but perhaps not as much as elsewhere.

Having a commercial fishery and a strong sharing ethic are no doubt important, but not sufficient in themselves to fully explain food security in Norway House. To understand the larger picture of food security in Norway House and elsewhere, an integrated approach is needed. To do so would help to analyze Indigenous food systems and tease out what distinguishes Norway House from others.

Allen (1999) has argued that, the food system in Canada has produced abundance on the one side and food insecurity on the other, because production and consumption of food have been dealt with as separate issues. To address food insecurity, it is important to consider the entire food system and the linkages between different parts of the system – production, distribution and consumption. In this respect, we argue that a holistic understanding of Indigenous food security requires an integrated approach which takes production,

distribution and consumption into consideration. Such an approach effectively combines Sen's entitlement thinking (Sen 1981) and the food sovereignty concept (Desmarais et al. 2011). The reason why both approaches are necessary is that food sovereignty considers production and distribution aspects of the food system, whereas entitlement theory emphasises distribution and consumption (Fig. 6).

Sen's entitlement theory and the food sovereignty concept, which use a rights based approach, complement each other. Sen's entitlement theory is applicable in the context of Indigenous people in Canada, as there is a surplus of aquatic food resources in most places in northern Canada (McCart and Den Beste 1979) and yet many communities are food insecure (Council of Canadian Academies 2014). Sen (1999, 1981) pointed out that famine occurred in Bangladesh in 1974 despite peak grain production. He argued that people suffered from severe food insecurity and died of starvation in the middle of abundance, as they did not have access or entitlement to food. Similarly, in the Canadian Indigenous context, there is an abundance of natural resources, especially fish, and yet many communities are suffering from food insecurity. Sen's argument holds here as communities have, in part, lost their entitlement due to the complex of reasons summarized in the introduction of this paper. This loss is manifested by a decline in the Indigenous way of life and in the nutrition transition from traditional foods to store-bought foods (Council of Canadian Academies 2014).

The apparent high levels of food security in Norway House can be interpreted using Fig. 6. Focusing on the food system with respect to fisheries, there is no overfishing problem (at least at present, Ayles et al. 2011). Norway House fishers can use this production since they have harvesting rights for both commercial and subsistence fisheries. Food production and distribution overlap through an effective sharing system (Fig. 3 and Table 3) that reaches half of the total population, when sharing from the commercial fishery is factored in. Beneficiaries of the sharing include non-harvesters of traditional foods, providing direct and transfer entitlement and resulting in increased food security.

However, the local fishery can never be the only answer to local food security problems. The contemporary Indigenous food system comprises traditional foods and market foods (Lambden et al. 2006). The production, distribution and consumption of these two kinds of foods are fundamentally different (Table 4). Because of shifting cultural values, as well as the complex of factors militating against traditional foods, the consumption of traditional food has declined, and the consumption of market food has increased (Kuhnlein and Receveur 1996; Council of Canadian Academies 2014). Nutrition transition in the Canadian north need not necessarily lead to food insecurity. However, high unemployment and lack of financial resources result in people purchasing market foods of low nutritional quality. Thus, the combination of the financial inability to afford nutritionally high quality market foods, and lack of access to traditional foods, contribute to poor nutrition and food insecurity within Indigenous communities (Kuhnlein et al. 2013; Kuhnlein and Soueida 1992).

Indigenous people collect traditional foods through harvesting, that is, Sen's (1981) "direct entitlement". When it comes to distribution of traditional foods, Indigenous people share their harvest, known as "transfer entitlement" (Sen 1981). Consumption of traditional foods play an integral role in maintaining nutritional quality in the diet, as compared to cheap market food, which is often of inferior nutritional quality (Kuhnlein and Receveur 1996; Council of Canadian Academies 2014). Although, traditional food is nutritious, tasty, healthy, inexpensive (assuming people have the appropriate equipment and skills/knowledge), and socially and

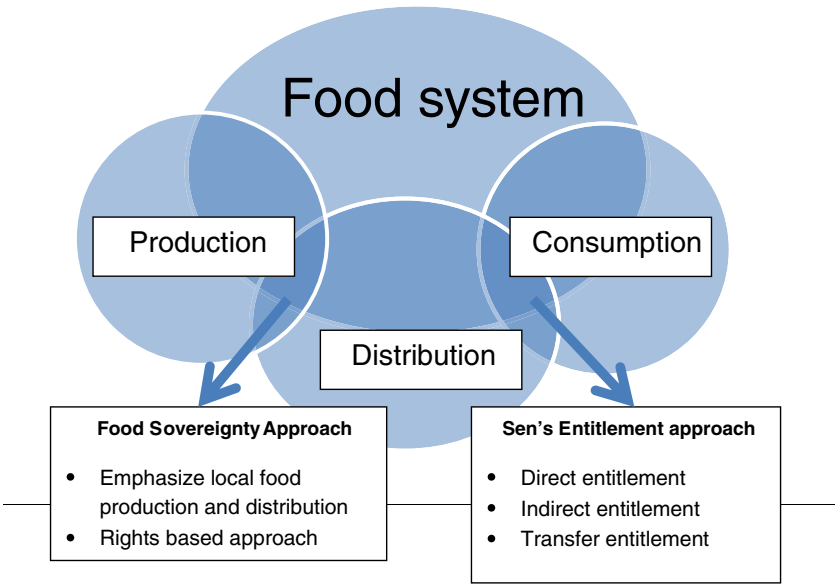


Fig. 6 An integrated approach to look at the overall food system to address food security/insecurity

Table 4 First Nation food system comprises of both traditional food and market food

Type of food	Production	Distribution	Consumption
Traditional food	Local natural resources; based on traditional knowledge and skills	Locally harvested and shared within family and communal networks	Culturally important; based on traditional taste and values
Market food	Industrially produced and processed	Usually imported from southern urban centers; bought from grocery stores; often expensive; not shared	Related to economic ability to purchase; convenience; change in taste

culturally beneficial (Kuhnlein et al. 2004), Indigenous communities are inclining more towards market food, "indirect entitlement" in Sen's (1981) terminology.

The Council of Canadian Academies (2014) advocated a complex of measures, including the import of higher nutritional quality store food and reducing transportation costs to make good food more accessible to communities. In fact, it is entirely feasible to achieve food security by making inexpensive, high quality food available. However, to achieve food sovereignty, which encourages food autonomy and the rights of Indigenous people to enjoy, consume and produce their traditional food in a culturally acceptable manner (Pimbert 2007; Patel 2009), communities need to be able to produce more of their own food, especially protein rich food. Therefore, we argue that food policy emphasis should be on decreasing indirect entitlement and increasing direct entitlement, in this case, by the use of traditional foods. However, this is not easy to do in the context of economic realities and changing cultural values. What can be done to increase direct entitlement?

One possibility is the development of one of the sectors of the traditional economy to act as an "engine" to increase the production of local food. In the case of Norway House, the commercial fishery provides this function; it acts as the engine of traditional food production through the community-wide sharing of the fish, including the by-catch and commercially under-utilized species. The traditional economy that supplies fish is supplemented by a continuing subsistence fishery. But the subsistence fishery alone is not sufficient for food security, simply because it does not provide much of a surplus to be shared.

Conclusion

Subsistence or food fisheries are often important for local food security but have been neglected in the literature (Kittinger et al. 2015). Our study shows some of the potentials and limitations in using the local fishery potential for increasing food security. Norway House, with more than 90 % food secure households, provides an example for other Indigenous communities in northern Canada in how to deal with food insecurity through fuller use of fish and other traditional foods, consistent with the recommendation of Council of Canadian Academies (2014). The key to food security of Norway House is the commercial fishery which brings in a greater harvest to share through communal networks than does the subsistence fishery alone.

Even though the commercial fishery involves a relatively small number of fishers and is primarily carried out to produce a profit, as in any commercial venture, it plays a major role in food security. Commercial fishers and their helpers share their catch with a large network of other households. The sharing ethic in the community results in an infusion of high quality protein mostly from species other than those that have a high market value, reaching about half of the Norway House resident population. This comes at a time when traditional fish and wildlife harvesting have declined throughout the Canadian north (Council of Canadian Academies 2014). Subsistence fisheries which used to produce much food for the community (Berkes 2012) no longer do so. Many food fishers use angling to cut down on fishing costs; this results in an individualized approach, fishing mainly for one's own household consumption, and results in the reduction of sharing within the community.

The commercial fishery is seasonal (spring/summer and fall) and takes place over only 11 weeks. However, households in the community use freezers to store fish to tide them over lean periods, and also carry out food fishing. Nevertheless, there are periods in which households are vulnerable to lack of local fish protein. As well, there are vulnerabilities by social group. Some people and households are vulnerable because sharing of food mostly occurs among households of extended families and a common network of people. This leaves out those who are not part of these networks, for example, widows, seniors, and female-headed households. Some community members, mostly seniors, recommended that a list of food sharing households be prepared and updated by the First Nation's Band office so that traditional foods may be distributed and shared more equitably among households to ensure increased food security at the community level. Such measures, and the more complete utilization of the available traditional foods, could result in the increase of direct entitlement and transfer entitlement, and thus improve food sovereignty.

Acknowledgments We thank the Chief and Band Council of Norway House Cree Nation for providing us the opportunity to work with the community. We are grateful to the President and many members of Norway House Fisherman's Co-op and households who participated in the survey. We are thankful to our community researchers Cheryl Mckay and Darrell Evans, and translator Maryann Ross. The research was supported by the Social Sciences and Humanities Research Council of Canada and the Canada Research Chairs program (http://www.chairs-chaires.gc.ca).

Compliance with ethical standards

Conflict of interest There is no potential conflict of interest.

Human participants Research involving human participants has been cleared by the University of Manitoba Ethics Committee.

Informed consent Informed consent forms were used in the questionnaire survey as well as formal interviews and focus groups.

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