Recovery of Yellowknives Dene Dietary Survey

Olivier Receveur
Amy Ing
Laurie Chan
Harriet Kuhnlein

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Centre for Indigenous Peoples' Nutrition and Environment
Macdonald Campus of McGill University
Ste Anne de Bellevue, Quebec, Canada, H9X3V9

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SUMMARY

This report presents a secondary data analysis of dietary interviews collected in the communities of Dettah and Ndilo, between 1993-95 by the Mackenzie Regional Health Services. The objectives of this secondary data analysis was to process previously collected data to compare them with data collected by the Centre for Indigenous Peoples' Nutrition and Environment (CINE) in 16 other Dene/Métis communities in 1993.

The food system of the communities of Dettah and Ndilo shared many characteristics with the food system in other Dene/Métis communities, in particular the communities of Rae and Edzo. These parallels were used to impute values for variables not available in the Dettah and Ndilo data set. Imputations appeared to have been constructive for arsenic and mercury exposure assessments, but not so for nutritional assessment.

Results from the sociocultural questionnaire, however, were consistent: in Dettah and Ndilo, as in other Dene/Métis communities, traditional food appeared essential to health, culture, and the economy.

The presence of contaminants in traditional food was raised as an important concern, and constant monitoring of their presence is encouraged, in particular for mercury in Yellowknife-Back Bay fish. Conversely, potential health risk resulting from arsenic exposure through fish consumption was estimated to be low.

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INTRODUCTION

Issues related to nutrition and the environment are fundamental to the survival of Indigenous Peoples worldwide (Johns et al., 1994; Kuhnlein and Receveur, 1996). Recent dietary and contaminant exposure assessments in Dene/Métis communities have documented some of the benefits and risks of these food systems (Receveur et al; 1996; 1997; Receveur and Kuhnlein,1998). The communities of Dettah and Ndilo were not included in these reports.

A study was initially developed in 1992 to address the concerns these two Denendeh communities had about the quality of the water and fish in the Yellowknife-Back Bay areas. A report published in 1996 (Jackson et al, 1996) described the results of tests conducted on the water, sediment and fish in the two bay areas.

The present report used data obtained in a series of dietary interviews conducted by the Mackenzie Regional Health Services to define market and traditional food intake of the two communities. These data were compared to previous reports in other Dene/ communities (Receveur et al, 1996; 1997) and are used to estimate exposure to two contaminants of potential concern due to nearby

mining activities: arsenic and mercury.

METHODS

In each community, a local interviewer was trained to administer interviews in English or in the local language, depending on the respondent's choice. A project supervisor worked with the interviewer to provide guidance and ensure quality control. Each interview lasted approximately one hour and included a frequency of traditional food use, a 24-hour dietary recall, and a sociocultural questionnaire.

1) Traditional Food Frequency Questionnaire

Respondents were asked the frequency of consumption of traditional food species in the three months prior to the visit. This list of traditional food species had been derived in group meetings with representatives from each of the Dene/Métis communities that participated in a larger dietary survey conducted by CINE (Receveur et al, 1996). For each species, the different modes of food preparation and a list of part/organs consumed were specified as separate questions. If the respondent reported consuming a particular food species, the interviewer would proceed by asking the frequency of consumption. The following choices were offered: (1) less than once a week, (2) once to twice a week, (3) every other day, (4) every day or so. This part of the interview lasted approximately 20 minutes.

2) 24-hour Dietary Recall.

After completing the traditional food frequency questionnaire, participants were asked to remember in detail the types and quantities of food consumed on the day prior to the visit. Locally available bowls, cups and spoons, as well as a 2-dimensional representation of bannock serving-sizes were used to facilitate serving size estimation. Each interviewer had been trained to administer the interview using standard questions. This part of the interview lasted, on average, 15 minutes.

Nutrient analyses of dietary data for this report were performed using two food composition databases: a database of the composition of traditional Dene/Métis food derived from published reports (Kuhnlein et al, 1994; Morrison and Kuhnlein, 1993; Appavoo, Kubow and Kuhnlein, 1991) supplemented with traditional food previously analyzed from samples collected in the Eastern Arctic (Kuhnlein, Kubow and Soueida, 1991; Kuhnlein and Soueida, 1992); and a market food composition database (Murphy and Gross, 1987) derived from Agricultural Handbook No. 8 series adjusted to include Canadian food items and nutrient fortification levels (Thompson and Brulé,1992).

3) Sociocultural Questionnaire.

The individual interview was completed by a series of 27 questions related to household demography, food preferences and perceptions related to traditional

and market food. Each question content and format had been pretested (Receveur et al, 1996) and no particular difficulties were encountered during its administration which lasted approximately 10 minutes.

Data collection took place over 3 time-periods, November of 1993 (n=21), February and March of 1994 (54), and March of 1995 (n=18). One record had the date of interview missing and 3 participants did not complete the 24hr recall.

Data were sent to CINE in hard copy and electronic forms. As the electronic files were incomplete, data were re-entered using Epi-Info, version 6.04.

RESULTS

1) SAMPLE CHARACTERISTICS

Table 1 presents the number of participants from each community, by age and gender. There were 54 participants from Dettah (27 men and 27 women) and 40 from Ndilo (22 men and 18 women), a total of 94 participants in all.

Table 2 presents selected characteristics of the study sample. A total of 74 households participated in this study . There was an average of 4 people living in each household at the time of the interviews. Approximately 30% (ie.27/96) of respondents said that they could not afford to buy all their food from the store if traditional food was not available. The majority of households reported hunting (76%) and fishing (69%). 53% of household reported having sufficient access to hunting equipment and 50% to fishing equipment.

2) TRADITIONAL FOOD CONSUMPTION

The percent of the sample population that reported consuming each traditional food species during the three months of summer (July-September) or three months of winter (December-February) are presented in Table 3 by age-groups. Since so few people were interviewed during the fall (n=21) versus late winter (n=72), both seasons are analyzed together. Data on frequency of consumption were not collected, therefore, only the percentage of participants who reported consuming a particular food species is presented. Nine species of

fish, 11 species of land animals, 13 species of birds and 20 species of plants and berries were reported to be consumed. The most commonly consumed food species were whitefish, trout, barrenland caribou, and moose. The percent of the sample consuming each traditional food species was generally similar to that reported by Dogrib participants in the Dene/Métis survey (Receveur et al, 1996).

The percent of each community reporting consuming different parts within each species is documented in Table 4. Figure 1 illustrates the percent consumption of both cooked and dried flesh of the 9 fish species listed on the questionnaire.

Twenty-four hour recalls were obtained from 91 participants (Table 5). Traditional food was reported to be consumed on 52% of the days recorded, with a total of 85 traditional foods consumed. On average, traditional food was consumed 1.8 times per day for consumers only. The average rate of consumption was 0.6 times per day for the total sample population, including those who did not report eating any traditional food on the day prior to the interview.

3) MARKET FOOD CONSUMPTION

The twenty most consumed market foods are listed in Table 6. The most popular item is coffee, with an average of 441 grams or about 2 cups consumed

per day. The second most popular item is tea. Compared to participants from the Dogrib region, Dettah and Ndilo participants reported consuming more beef/chicken and vegetable stew, vegetable and beef soup, spaghetti and meat sauce, 2% milk, and macaroni and cheese. Dogrib participants reported consuming more pork (lean cuts) and rice. As in the Dene/Métis survey, soft drinks, potatoes, french fries, chicken and hamburgers were popular food items.

Table 7 compares intake of market food by gender and age group. Coffee, powdered drinks and soft drinks are consumed more by younger respondents than by older ones, who prefer to drink tea. Chicken noodle soup was not reported to be eaten at all by those in the older age group. Older women did not report consuming any milk.

4) NUTRIENT INTAKES

The majority of 24hr recall records did not contain serving sizes of foods consumed, therefore, these values had to be imputed from the larger Dene/Métis survey (Receveur et al., 1996). As well, assumptions had to be made about foods that were not recorded precisely, for example, type of milk and juice beverages.

Table 8 shows the resulting estimates. The low energy intake of all age-groups implies that these data are underestimating real intake. It is also unknown whether this downward bias is particular to certain food items or common to all

food reported. Further evaluation of diet quality was therefore not appropriate.

Assuming however that existing biases were consistent across communities, Table 9 shows that traditional food is likely to be a major contributor to numerous nutrients, and more so in Dettah than Ndilo.

Table 10 presents the ten most important contributors to energy and other selected macro and micronutrients. Caribou meat was the main source of energy, protein, iron, and zinc in the diet. Bread was the main source of carbohydrate and french fries the main source of fat and dietary fibre.

5) SOCIOCULTURAL CHARACTERISTICS

Tables 11-19 present answers to selected questions on the sociocultural questionnaire. These answers confirmed the importance of traditional food as previously documented in other Dene/Métis communities (Receveur et al, 1996).

Table 11 lists the percentage agreement on various attributes of traditional food. These attributes were derived from group discussions with community leaders while developing the questionnaire. There was over 90% agreement on all attributes, indicating the unique value of traditional food and its role in the communities of Dettah and Ndilo. Traditional food is particularly felt to be essential to people health (Tables 12-13).

Table 14 shows the traditional food species particularly appreciated: caribou first, and various species of fish second. These food-items were sometimes substituted for market food items (Table 15). Decreasing traditional food use, however, would affect the budget of the majority of households (Table 16). Table 17 shows that a third of the households could not afford to buy all the food needed from the store.

A number of questions aimed at recording perceived changes in the health of traditional food species, and associated risks. Twenty-nine percent of people said that they avoided certain traditional foods due to fear of becoming ill. The number one food item was local fish from Yellowknife-Back Bay (Table 18). Table 19 shows that approximately half the respondents noticed changes in traditional food species. Fish appeared the main food species affected.

6) EXPOSURE TO CONTAMINANTS

This analysis focuses on arsenic (As) and mercury (Hg), potential contaminants from gold mining activities. Table 20 compares the range of heavy metals in fish from Yellowknife-Back Bay to literature values (Chan, 1998). Values are generally within normal range observed in the Northwest Territories. It is notable, however, that the highest arsenic levels have been observed in the Yellowknife-Back Bay for whitefish, loche and walleye. All values still within working guideline levels used by Health Canada (3 μg/g for As in fish meal and 0.5

μg/g for Hg in fish; personal communication, Vicki Jerome, Health Canada). In this Table, mean values obtained from the literature are presented for trout, connie and grayling since these food species were reported consumed but were not sampled in the Yellowknife-Back Bay.

In Table 21, exposure to As and Hg from the consumption of fish collected from the Yellowknife-Back Bay was estimated by multiplying the average fish intake by the metal concentrations presented in Table 20. Body weights were assumed to be 75Kg for men and 65 Kg for women. The provisional tolerable daily intake (PTDI) levels used by Health Canada are 2 μg/Kg body weight/day for As and 0.47 μg/Kg body weight/day for methylmercury. We used the guideline for methylmercury instead of total mercury as we assume most of the mercury found in fish muscle is in organic form. The estimated daily exposure levels for arsenic were all below the PTDI. However, the range of Hg exposure for men and women of both age groups consistently exceeded the PTDI. The major source of Hg was from whitefish mainly due to the relatively large amount consumed. The Hg intake from the consumption of trout, however, may be underestimated since no trout was collected for analysis. The average concentration found in trout from the NWT (0.351 μg/g) was used for estimation. Since trout is a predatory fish and usually contains higher level of Hg due to biomagnification, the maximum Hg concentration in trout harvested from the Yellowknife-Back-Bay, if any, is likely to be higher than the average concentrations found in the whitefish (0.62 μg/g).

CONCLUSION

This data set had major limitations: 1) The unbalanced sample size between seasons, and lack of frequency in the traditional food use questionnaire did not allow for accurate estimation of yearly intakes; 2) The incomplete or absent serving sizes in 24-hr recalls made it inadequate to evaluate nutrient intakes.

Given the apparent similarity in traditional food use between the communities of Dettah, Ndilo and Rae, Edzo, an attempt to circumvent the data limitations was made by borrowing strength from data previously collected in these last communities (Receveur et al, 1996). Serving sizes and yearly frequency of traditional food use were imputed accordingly. These imputations did not suffice to correct for underestimation of energy intake. This implies that not only serving sizes, but food-items as well may have been overlooked in collecting 24-hr recalls.

For traditional food use, the imputations seemed to have worked reasonably well. Community members from Dettah and Ndilo will best be able to evaluate whether these imputed estimates of traditional food use were indeed appropriate.

Based on these estimates, it was concluded that, although a large quantity of arsenic is present in the Yellowknife-Back Bay area, exposure to arsenic through fish consumption does not appear as a problem (exposure to arsenic through drinking water may be more appropriate to monitor). Mercury levels in fish from

the Yellowknife-Back Bay area, however, need to be monitored.

Finally, the most consistent data collected in this study related to the importance of traditional food in the life of these communities. In Dettah and Ndilo, as in other Dene/Métis communities (Receveur and Kuhnlein, 1998), traditional food appeared essential to cultural integrity, economic viability, and physical health of the Dene/Métis population . Attention to diet quality and monitoring of contaminants distribution is encouraged.

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Table 1. Number of individual interviews by community, age-group, and gender.

		No. of participants		
Community	Age (y)	Men	Women	Total
Dettah	20-40	16	19	35
	40-60	6	5	11
	60+	5	3	8
				54
Ndilo	20-40	12	11	23
	40-60	8	6	14
	60+	2	1	3
				40

Table 2. Profile of participants based on sociocultural questionnaires

	Dettah	Ndilo	Total
# of participants	54	40	94
# of participating HH	42	32	74
Ave. # of participants per HH	1.3	1.2	1.3
# of persons in HH (mean, range)	4(1-7)	4(1-9)	4 (1-9)
# of respondents who could not afford to buy all the food they need from the store	10	17	27
# of HH that hunt	31	25	56
# of HH that fish	27	24	51
# of HH that collect plants	24	14	38
# of HH that plant gardens	0	2	2
# of HH with access to sufficient:			
hunting equipment	28	23	51
fishing equipment	24	24	48

Table 3. Percentage of population consuming each traditional food species, by age group, as measured by the Food Frequency Questionnaire, both seasons combined.

	AGE GROUP	
Species	20-40 (n=58)	41+ (n=36)
	% population	
Fish		
Whitefish	95	97
Inconnu	12	33
Cisco	2	8
Trout	83	94
Loche	12	47
Northern pike	26	50
Grayling	7	33
Walleye	9	36
Longnose sucker	3	8
Land animals		
Woodland caribou	21	33
Barrenland caribou	97	92
Moose	60	78
Rabbit	28	31
Beaver	15	36
Muskrat	24	36
Lynx	9	25
Porcupine	0	8
Dall sheep	0	0
Bear	5	17
Buffalo	19	33

Table 3, continued

Species	AGE GROUP 20-40 (n=58)	41+ (n=36)
	% population	
Birds		
Spruce hen	9	39
Prairie chicken	22	36
Ptarmigan	53	53
Black ducks[1]	53	56
Mallards	41	61
Fish ducks	0	19
Oldsquaw	2	28
Wigeon	7	33
Canvasback	3	19
Canada goose	33	42
Snow goose	12	42
Pintail	14	44
Seagull eggs	14	31
Plants		
Labrador tea	5	28
Low (grey) blueberries	15	44
High (black) blueberries	26	44
Cranberries	52	69
Gooseberries (green)	15	39
Gooseberries (purple)	19	47
Blackberries	21	44

Table 3, continued

	AGE GROUP	
Species	20-40 (n=58)	41+ (n=36)
	% population	
Wild raspberries	43	61
Wild strawberries	27	58
Cloud berries/ knuckleberries	26	47
Red currants	2	8
Black currants	2	11
Saskatoon berries	5	42
Rosehips	3	14
Wild peppermint	2	3
Mushrooms	0	5
Wild greens	0	3
Wild onions	0	8
Wild rhubarb	2	8

[1]local name for surf scoter and white-winged scoter

Table 4. Frequency of traditional food consumption as percentage of the population consuming each species and part

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Fish:				
Whitefish	flesh cooked	87	80	84
	flesh smoked/dried	65	58	62
	head	48	45	47
	eggs	61	45	54
	fish-pipe	46	40	44
	Other: liver			
Inconnu	flesh cooked	28	10	20
	flesh smoked/dried	18	2	12
	head	17	2	11
	eggs	13	2	8
	fish-pipe	13	2	8
Cisco	flesh cooked	2	8	4
	flesh smoked/dried	2	-	1
	head	-	2	1
	eggs	-	2	1
	fish-pipe	-	2	1
Trout	flesh cooked	78	78	78
	flesh smoked/dried	41	40	40
	head	44	45	45
	eggs	31	35	33

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Trout	fish-pipe	30	25	28
	Other: cheeks			
Loche	flesh cooked	35	8	23
	flesh smoked/dried	15	-	8
	head	11	2	7
	eggs	24	-	14
	fish-pipe	15	2	10
	Other: liver, stomach			
Northern pike	flesh cooked	33	35	34
	flesh smoked/dried	18	12	16
	head	11	5	8
	eggs	18	8	14
	fish-pipe	13	8	11
	Other: liver, stomach			
Grayling	flesh cooked	17	18	17
	flesh smoked/dried	9	5	7
	head	4	2	3
	eggs	7	-	4
	fish-pipe	6	2	4
	Other: stomach			
Walleye	flesh cooked	20	15	18
	flesh smoked/dried	13	5	10

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Walleye	head	6	-	3
	eggs	6	-	3
	fish-pipe	6	-	3
Longnose sucker	flesh cooked	2	8	4
	flesh smoked/dried	-	2	1
	eggs	2	-	1
	fish-pipe	2	-	1
Other fish: arctic char				
Land animals:				
Caribou, woodland	flesh cooked	33	12	24
	flesh smoked/dried	33	8	22
	head	28	8	19
	brain	11	2	7
	tongue	28	10	20
	liver	20	5	14
	blood	20	2	13
	stomach	17	2	11
	bone marrow	31	12	23
	kidney	28	5	18
	bones	26	8	18
	ribs	31	12	23
	fat	28	8	19

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Caribou, woodland	Other: heart			
Caribou, barrenland	meat cooked	94	83	89
	meat smoked/dried	91	52	74
	head	68	60	65
	brain	24	12	19
	tongue	81	78	80
	liver	48	40	45
	blood	35	10	24
	stomach	37	15	28
	bone marrow	67	72	69
	kidney	63	42	54
	bones	59	48	54
	ribs	91	88	89
	fat	78	48	65
	Other: heart			
Moose	meat, cooked	56	50	53
	meat, smoked/dried	48	38	44
	head	31	18	26
	brain	15	10	13
	tongue	39	38	38
	heart	31	25	29
	liver	31	18	26

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Moose	kidney	33	32	33
	blood	24	10	18
	bones	33	30	32
	ribs	52	52	52
	fat	39	38	38
	Other: marrow			
Rabbit	meat, cooked	24	25	24
	meat, smoked/dried	22	10	17
	head	18	12	16
	liver	13	10	12
	blood	11	10	11
	brain	17	10	14
Beaver	meat, cooked	26	18	22
	meat, smoked/dried	17	5	12
	tail/feet	20	12	17
	liver	7	2	5
	blood	6	-	3
	brain	6	-	3
Muskrat	meat, cooked	30	28	29
	meat, smoked/dried	18	5	13
	tail	24	8	17
	liver	2	-	1

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Moose	blood	4	-	2
	brain	6	-	3
Lynx	meat, cooked	17	12	15
	meat, smoked/dried	13	-	7
	head	2	-	1
	liver	2	-	1
	blood	2	-	1
	brain	2	-	1
	Other: hindquarter, liver, arm, leg			
Porcupine	meat, cooked	4	2	3
	meat, smoked/dried	4	-	2
Bear	meat, cooked	13	5	10
	meat, smoked/dried	9	-	5
	fat	6	-	3
	blood	4	-	2
	brain	2	-	1
	Other: liver, heart			
Other land animals: buffalo, muskox				
Birds:				
Spruce hen	meat, cooked	22	15	19
	meat, smoked/dried	7	5	6
	gizzards	15	12	14

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Spruce hen	kidney	13	12	13
	heart	9	12	11
	liver	7	8	7
	eggs	4	-	2
Prairie chicken	meat, cooked	33	10	23
	meat, smoked/dried	11	8	10
	gizzards	20	10	16
	kidney	15	12	14
	heart	15	12	14
	liver	11	10	11
	eggs	6	2	4
Ptarmigan	meat, cooked	65	25	48
	meat, smoked/dried	11	8	10
	gizzards	28	15	22
	kidney	24	18	21
	heart	26	18	22
	liver	18	12	16
	eggs	9	-	5
Black ducks[1]	meat, cooked	61	32	49
	meat, smoked/dried	17	20	18
	gizzards	35	22	30
	kidney	33	22	29

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Black ducks	heart	28	25	26
	liver	24	25	24
	eggs	9	10	10
Mallards	meat, cooked	41	50	45
	meat, smoked/dried	15	10	13
	gizzards	28	28	28
	kidney	22	32	27
	heart	24	25	24
	liver	20	28	23
	eggs	11	12	12
Fish ducks	meat, cooked	13	-	7
	meat, smoked/dried	6	-	3
	gizzards	7	-	4
	kidney	7	-	4
	heart	7	-	4
	liver	6	-	3
	eggs	2	-	1
Oldsquaw	meat, cooked	19	2	12
	meat, smoked/dried	9	-	5
	gizzards	11	-	6
	kidney	9	-	5
	heart	9	-	5

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Oldsquaw	liver	7	-	4
	eggs	4	-	2
Wigeon	meat, cooked	28	2	17
	meat, smoked/dried	13	-	
	gizzards	20	2	13
	kidney	17	2	11
	heart	17	2	11
	liver	17	2	11
	eggs	11	-	6
Canvasback duck	meat, cooked	15	2	10
	meat, smoked/dried	7	-	4
	gizzards	13	2	8
	kidney	13	2	8
	heart	15	2	10
	liver	13	2	8
	eggs	9	-	5
Canada goose	meat, cooked	41	18	31
	meat, smoked/dried	18	10	15
	gizzards	24	15	20
	kidney	26	15	21
	heart	26	15	21
	liver	20	15	18

Table 4, continued

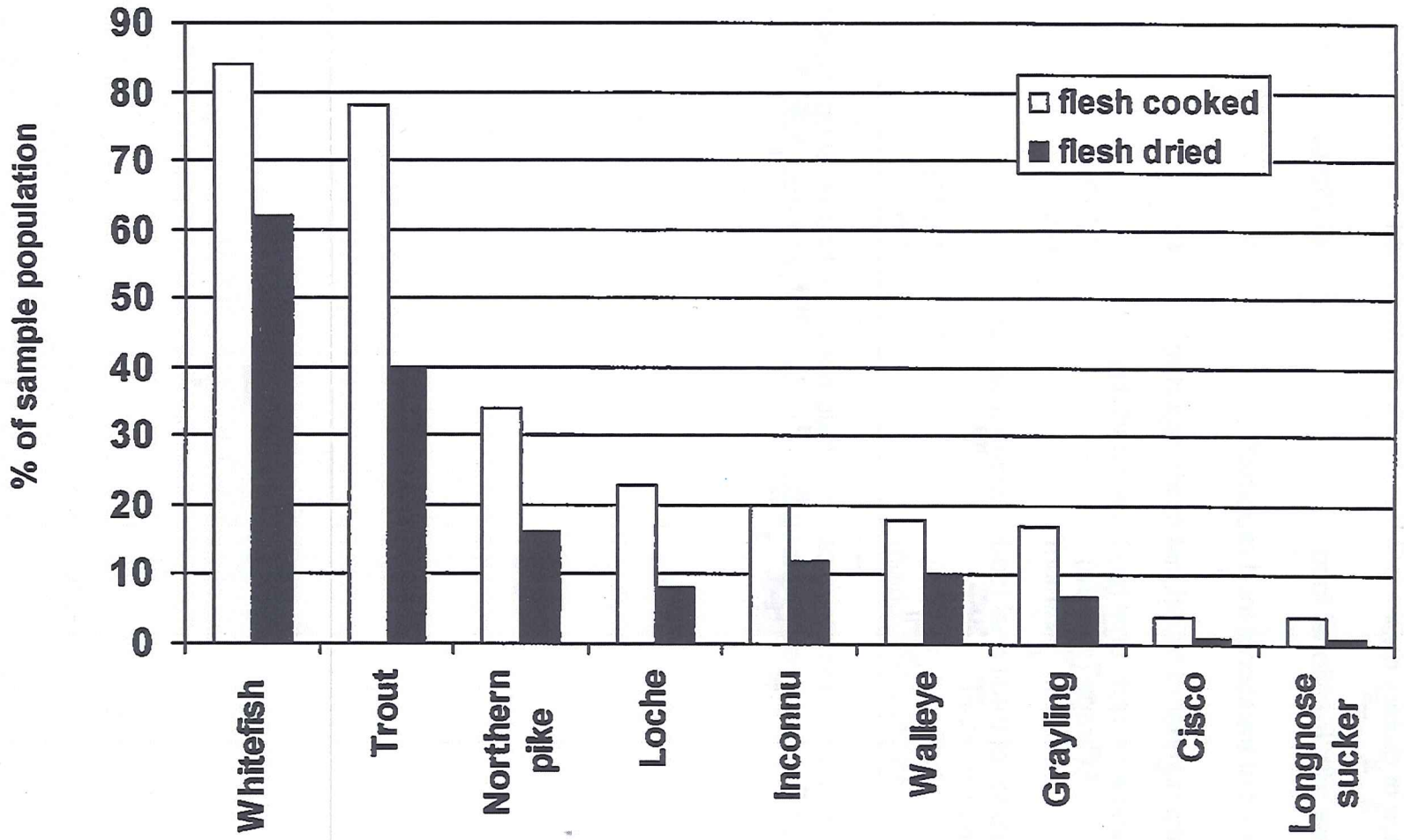
Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Canada goose	eggs	11	8	10
	Other: fat			
Snowgoose	meat, cooked	33	5	21
	meat, smoked/dried	15	2	10
	gizzards	20	5	14
	kidney	20	5	14
	heart	20	5	14
	liver	18	5	13
	eggs	7	2	5
Pintail duck	meat, cooked	31	12	23
	meat, smoked/dried	17	5	12
	gizzards	24	12	19
	kidney	22	10	17
	heart	18	10	15
	liver	20	10	16
	eggs	9	2	6
Plants:				
Labrador tea		15	12	14
Low (grey) blueberries		30	22	26
High (black) blueberries		39	25	33

Table 4, continued

Species	Part	Dettah (n=54)	Ndilo (n=40)	Total (n=94)
		Percentage of population consuming		
Cranberries		56	62	58
Gooseberries (green)		31	15	24
Gooseberries (purple)		35	22	30
Blackberries		37	20	30
Wild raspberries		44	58	50
Wild strawberries		41	38	39
Cloud berries/ knuckleberries		48	15	34
Red currants		6	2	4
Black currants		4	8	5
Saskatoon berries		24	12	19
Rosehips		7	8	7
Wild peppermint		-	5	2
Mushrooms		4	-	2
Wild greens		2	-	1
Wild onions		4	2	3
Wild rhubarb		4	5	4
Other plants: rat roots				

[1]local name for surf scoter and white-winged scoter

Figure 1. Percent of population consuming selected fish species[1]



[1]Data from traditional food frequency questionnaire, all participants included (n=94), both seasons combined

Table 5. Use of traditional food reported in 24-hr recalls

Days of dietary data	91
Days with traditional food	47 (52%)
Types of traditional food reported[1]	9
Total number of traditional foods reported	85
Number of traditional foods reported/day	
Average (median)	0.6 (0)
Minimum-maximum	0-5
Number of traditional foods reported/day for consumers only	
Average (median)	1.8 (2)
Minimum-maximum	1-5

[1]caribou meat and stew, caribou dried meat, caribou rib soup, caribou tongue, caribou eyeball, moose meat, caribou fat, whitefish flesh and trout flesh.

Table 6. Twenty most consumed market foods (ranked by mean grams of daily intake) averaged over total population

Food	Mean grams/day
coffee	441
tea	296
powdered drinks	92
white bread	46
soft drinks	43
potatoes	41
french fries	41
chicken	38
beef hamburger	30
eggs	28
beef and vegetable stew	27
chicken noodle soup	27
sugar	23
soup, vegetable and beef	23
spaghetti and meat sauce	21
2% milk	20
macaroni and cheese	20
bannock	16
oatmeal	16
orange juice, frozen concentrated	16

Table 7. Estimated intake of market food (g/person/day) by gender and age group, ranked by overall decreasing amount of consumption

	Female		Male	
Food	Age 20-40 n=29	Age 41+ n=14	Age 20-40 n=27	Age 41+ n=20
coffee	399	206	569	492
tea	215	549	222	336
powdered drinks	70	68	187	12
soft drinks	25	-	103	18
french fries	30	27	62	38
potatoes	28	59	39	52
soup, chicken noodle	53	-	34	-
bread, white	44	34	51	51
bannock	1.2	50	13	20
orange juice, frozen concentrate	50	-	-	-
beef & vegetable stew	21	22	45	15
milk, 2%	8	-	45	18
chicken	42	23	36	45
beef, hamburger	26	18	44	25
spaghetti and meat balls	39	27	14	-
eggs	13	28	37	39
soup, vegetable and beef	29	35	9	24
beef, chuck blade	8	34	4	6
oats	25	34	-	12
macaroni and cheese	23	16	8	34
sugar, white	27	20	21	21
milk, whole	25	21	-	-
soup, creamed	-	18	-	24
pork	24	5	16	-

	Female		Male	
Food	Age 20-40 n=29	Age 41+ n=14	Age 20-40 n=27	Age 41+ n=20
banana	5	21	11	-
beef, round	-	-	-	21
soup, tomato	-	18	-	-
apple juice, canned	16	-	-	-
turkey	10	14	-	-
wheat flakes	-	-	1.6	14
wieners	10	-	12	4
orange	12	12	-	2
milk, skim	11	-	-	-
cake	2	11	8	4
apple	10	-	-	4
corn	8	10	3	-
spaghetti in tomato sauce	-	-	-	10
ice cream	-	-	10	-
peaches, canned heavy sirup	9	-	-	-
beef, corned, canned	-	-	-	8
coffee whitener	6	5	8	8
chili con carne with beans	8	-	5	-
hot chocolate mix	1	8	-	-
vegetables, mixed frozen boiled	3	6	8	4
jello	7	-	-	-
carrots	7	4	1.7	-
cantaloupe	7	-	-	-
pancakes	3	-	7	4
lard	2	4	7	6
fish, battered	3	-	6	-

	Female		Male	
Food	Age 20-40 n=29	Age 41+ n=14	Age 20-40 n=27	Age 41+ n=20
tomatoes	6	3	1.4	2
cookies	0.69	6	-	3
rice	-	-	-	6
spaghetti	-	-	6	-
cheese slices	0.72	-	5	2
margarine	5	5	4	5
lettuce	5	3	3	-
baked beans	-	-	5	-
gravy	-	4	-	-
cabbage	4	3	2	-
doughnuts	-	-	-	4
ham, canned	-	-	3	4
wheat cereal, cooked	4	-	-	-
potato chips	-	4	4	-
bread, whole wheat	-	4	-	-
bacon	2	-	4	4
sherbet	-	-	4	-
pie, apple	3	-	4	-
pork sausage	-	3	3	-
bread, cracked wheat	3	-	-	-
onions	3	-	3	-
honey	0.24	3	-	1
pizza with cheese	3	-	2	-
salmon, sockeye, canned	3	-	-	-
salmon, sockeye, cooked	3	-	-	-
pickles, dill	-	-	2	2

	Female		Male	
Food	Age 20-40 n=29	Age 41+ n=14	Age 20-40 n=27	Age 41+ n=20
syrup, corn	1.4	-	2	-
salad dressing	0.69	2	1.7	-
ketchup	1.2	-	1.8	-
pickles, sweet	1.2	-	-	-
peppers, green	1.7	-	-	-
cheese, cream	1.4	-	1.1	-
cheese, cheddar	-	-	1.0	-
jellies	0.48	-	1.0	0.35
cucumbers	1.03	-	-	-
corn flakes	0.96	-	-	-
bread, raisin	-	-	0.92	-
mayonnaise	0.34	0.71	0.92	-
mustard	0.52	-	0.74	-
popcorn	0.64	-	-	-
peanut butter	0.34	-	0.52	-
sugar, brown	0.52	-	-	-
wheat flour, white	0.24	-	0.26	0.35
crackers, saltine	-	-	0.22	-
salt, table	0.07	-	0.07	-

Table 8. Average daily intake (mean ± SE) of energy, macronutrients, saturated and polyunsaturated fats, vitamin A, selected minerals, fibre and sucrose, by site, gender and agegroup for total population (n=91)

	Male		Female	
Nutrient	20-40 yrs old (n=27)	41+ yrs old (n=21)	20-40 yrs old (n=29)	41+ yrs old (n=14)
Energy (kcal)	1750 ± 134	1460 ± 165	1360 ± 78	1645 ± 177
Carbohydrate (g)	160 ± 13	121 ± 19	134 ± 12	145 ± 19
Protein (g)	113 ± 13	107 ± 11	91 ± 7	129 ± 14
Fat (g): Total	73 ± 7	59 ± 8	51 ± 5	59 ± 11
Polyunsaturated (g)	14 ± 2	11 ± 2	8 ± 1	13 ± 3
Saturated (g)	25 ± 3	20 ± 3	17 ± 2	19 ± 4
Vitamin A (RE)	234 (155-354)	202 (136-303)	248 (149-412)	268 (166-431)
Iron (mg)	17 ± 2	16 ± 3	13 ± 1	19 ± 2
Calcium (mg)	360 ± 47	321 ± 65	288 ± 39	359 ± 55
Zinc (mg)	17 ± 2	14 ± 2	14 ± 2	20 ± 3
Fibre (g)	10 ± 1	10 ± 2	8 ± 1	10 ± 1
Sucrose (g)	50 ± 6	31 ± 7	46 ± 8	38 ± 8

Table 9. Percent of macro- and micronutrients derived from traditional food.

Nutrient	Dettah	Ndilo	Total
Energy	23 ± 3	14 ± 3	19 ± 2
Carbohydrate	0	0	0
Protein	45 ± 6	28 ± 6	37 ± 4
Fat	15 ± 3	9 ± 3	12 ± 2
Saturated fat	15 ± 3	9 ± 3	12 ± 2
Polyunsaturated fat	15 ± 3	11 ± 3	13 ± 2
Vitamin A	3 ± 1	1 ± 1	2 ± 1
Iron	41 ± 5	27 ± 6	35 ± 4
Zinc	47 ± 6	29 ± 6	39 ± 4
Calcium	7 ± 1	5 ± 1	6 ± 1
Copper	41 ± 6	28 ± 6	35 ± 4
Magnesium	31 ± 4	19 ± 4	26 ± 3
Sodium	12 ± 2	8 ± 2	10 ± 2
Phosphorous	39 ± 5	25 ± 5	33 ± 4
Potassium	36 ± 5	23 ± 5	30 ± 4

Table 10. Ten most important contributors to energy, macronutrients, saturated and polyunsaturated fats, vitamin a, selected minerals, fibre, and sucrose intakes

1) ENERGY	(% of total)
caribou meat	12.4
french fries	8.3
bread, white	7.9
sugar, white	5.7
beef hamburger	5.5
chicken	5.4
bannock	3.4
eggs	2.8
macaroni and cheese	2.7
lard	2.7

2) PROTEIN	(% of total)
caribou meat	36.8
chicken	8.9
beef hamburger	6.7
caribou, dried meat	6.0
whitefish, flesh	4.1
bread, white	3.7
pork	3.3
eggs	3.3
beef, chuck blade	2.5
moose meat	2.5

Table 10, continued

3) CARBOHYDRATE	(% of total)
bread, white	16.3
sugar, white	16.2
french fries	11.4
powdered drinks	6.8
bannock	6.0
potatoes	5.8
soft drinks	3.0
macaroni and cheese	2.8
spaghetti and meatballs	2.3
cake	2.2

4) FAT	(% of total)
french fries	11.1
beef hamburger	10.1
lard	7.6
chicken	7.3
margarine	6.3
beef, chuck blade	4.9
eggs	4.9
caribou meat	4.3
wieners	3.7
macaroni and cheese	3.6

Table 10, continued

5) VITAMIN A	(% of total)
carrots	20.7
margarine	12.4
eggs	11.4
beef&vegetable stew	6.4
macaroni and cheese	6.3
spaghetti and meatballs	6.1
vegetables, mixed	5.4
soup, vegetable/beef	4.3
coffee whitener	2.9
2% milk	2.8

6) CALCIUM	(% of total)
bread, white	11.6
macaroni and cheese	10.9
bannock	10.3
milk, 2%	8.7
cheese slices	4.3
eggs	4.2
milk, whole	4.0
coffee	4.0
spaghetti and meatballs	3.1
caribou meat	2.4

Table 10, continued

7) IRON	(% of total)
caribou meat	39.2
caribou, dried	8.1
bread, white	7.2
beef hamburger	4.5
chicken	3.6
wheat flakes	3.0
coffee	2.7
moose meat	2.5
bannock	2.3
eggs	2.1

8) ZINC	(% of total)
caribou meat	45.8
beef hamburger	9.6
caribou, dried	5.5
beef, chuck blade	5.3
chicken	4.0
moose, meat	3.6
pork	2.8
spaghetti with meatballs	1.8
eggs	1.8
beef&vegetable stew	1.7

Table 10, continued

9) SATURATED FAT	(% of total)
beef hamburger	11.5
french fries	9.9
lard	8.7
beef	6.1
macaroni and cheese	5.7
chicken	5.7
caribou	4.2
wieners	4.1
coffee whitener	4.1
eggs	4.1

10) POLYUNSATURATED FAT	(% of total)
french fries	28.3
bannock	9.9
margarine	9.0
chicken	8.4
caribou meat	5.2
lard	4.5
bread, white	4.2
potato chips	2.8
beef hamburger	2.6
eggs	2.5

Table 10, continued

11) DIETARY FIBRE	(% of total)
french fries	13.7
bread, white	13.1
potatoes	8.7
bannock	5.5
wheat flakes	5.1
banana	3.0
potato chips	2.3
beef&vegetable stew	2.2
oats	2.2
vegetables, mixed	2.0

12) SUCROSE	(% of total)
sugar, white	53.7
powdered drinks	10.6
soft drinks	9.3
cocoa mix/hot chocolate	2.6
cake	2.6
spaghetti and meatballs	2.1
banana	1.7
wheat flakes	1.7
cookies assorted	1.3
orange juice	1.2

The following foods were combined: barrenland and woodland caribou; canned chicken and chicken fryers; boiled potatoes and mashed potatoes; cola and gingerale type soft drinks; boiled carrots and raw carrots.

Table 11. Percentage agreement on selected attributes of traditional foods.

	Dettah	Ndilo	Total
Harvesting and using traditional foods by the family:		%	
Contributes to physical fitness and good health	87	100	92
Is a favourite outdoor recreation activity	96	89	93
provides people with healthy foods	100	92	97
Keeps people "in tune" with nature	94	95	94
Favours sharing in the community	96	97	97
Saves money	93	94	93
Successful harvest bring respect from others	94	95	94
Is an occasion for adults to display responsibility for their children	93	92	92
Build's one pride and confidence	94	94	94
Contributes to humility	83	83	83
Is one way to practice spirituality	100	86	94
Is an essential part of the culture here	100	97	99
Contributes to children's education in general	100	94	98
Provides education on natural environment	96	91	94
Provides skills in survival	98	97	98
Provides education on taste and food choices	98	91	95
Provides skills in food harvesting	94	97	95
Provides skills in food preparation and preservation	91	97	93
Provides education on healthy lifestyle	98	97	98
Provides community and social skills	100	88	95
Is an opportunity to teach spirituality	98	79	91
Is an opportunity to learn patience and other personality qualities	98	88	94

Table 12. Answers to the question: Does eating traditional food make you healthier?

98% of respondents said YES;
55% of respondents (52 people) gave explanations:

Explanation	% of responses	No. of people
Traditional food makes me feel more energetic, makes me feel good	36	19
I don't get sick easily	21	11
Low in fat, healthier than market food, nutritious	21	11
Fresh, no additives or chemicals	10	5
Raised this way	4	2
Tastes good	4	2
Both mentally and physically healthier	2	1
Traditional food is the best	2	1

Table 13. Answers to the question: " Would eating less traditional food affect your personal health?"

50% of respondents said YES;
37% of respondents (35 people) gave reasons:

Reason	% of responses	No. of people
I wouldn't feel good or healthy; feel less energetic	43	15
Quality of store food not as good as traditional food; less filling, feel hungry, more chemicals, more fat	29	10
Traditional food is culturally important: "used to eating traditional food"; "something would be missing"	14	5
I would gain weight , become depressed, be less active	14	5

Table 14. Answers to the question: "If you could buy all your food from the store, would you still eat traditional foods and what traditional foods would you choose?"

99% of respondents said YES;
86% of respondents (81 people) reported that they would choose these traditional foods:

Food	% of responses
Caribou (including meat, dried and smoked meat, ribs, tongue)	48
Fish (including trout, whitefish, dry fish)	32
Birds/ducks/geese (including ptarmigan and prairie chicken)	8
Moose	6
Rabbit	3
All traditional foods	1
Muskrat	1

Table 15. Answers to the question: "Are there store-bought foods you substitute for traditional foods?"

78% of respondents said YES;
66% of respondents (62 people) reported that they would use these market foods to substitute for traditional foods:

Store food	% of response
Pork (pork chops, spare ribs)	34
Beef (steak, roast, hamburger, stew)	31
Poultry (chicken, turkey)	30
Fish (tuna, fish sticks)	3
Liver	1
Berries	1

Table 16. Answers to the question: "Would eating less traditional food affect your household budget?"

62% of respondents said YES;
28% of respondents (26 people) provided explanations:

Explanation	% of responses	No. of people
Market food is more expensive than traditional food; more money would be spent on food, especially meat	88	23
Rely on caribou and fish	12	3

Table 17. Answers to the question: "Can you afford to buy all the foods you need from the store?"

30% of respondents said NO;
26% of respondents (24 people) provided explanations as to why they could not afford to buy all the foods they needed from the store:

Explanation	% of response	No. of people
Market food, especially meat, is too expensive	79	19
Prefer traditional food over market food	13	3
Traditional food is necessary, relied upon	8	2

Table 18. Answers to the question: "Are there any traditional foods that you do not eat now because of fear of illness?"

29% of respondents (27 people) had a traditional food they avoid:

Food	% of responses
Fish (especially local fish from Back Bay)	48
Bear	23
Beaver	10
Birds	6
Buffalo	6
Caribou	6

Table 19. Answers to the question: "Have you noticed any changes in traditional meats, fish or birds?"

43% of respondents said YES;
34 people (36% of respondents) reported the following changes in traditional meat, fish or birds:

Response	% of responses	No. of people
Fish (softer, skinny, deformed livers, red spots, different colour, oily taste, gassy odour, slimy liver)	74	25
Caribou (skinny, sickly, pus on caribou skin, yellow blotches)	18	6
Changes in birds	3	1
Changes in rabbits	3	1
Pollution	3	1

Table 20. Range or mean of heavy metal values measured in raw muscle of fish from Backbay[1] compared to literature[2] values collected from western Northwest Territories.

	Arsenic (µg/g)		Mercury (µg/g)	
Fish	Backbay	Literature	Backbay	Literature
Lake whitefish	<0.05-1.11	0.003-1.01	0.017-0.224	0.003-0.62
Trout	not analysed	0.136	not analysed	0.351
Northern pike	0.03-0.57	0.003-3.41	0.076-0.467	0-3.11
Burbot (Loche)	0.08-0.66	0.002-0.46	0.058-0.391	0-0.41
Connie	not analysed	0.24	not analysed	0.085
Walleye	0.01-0.2	0.01-0.03	0.073-0.239	0.02-0.5
Grayling	not analysed	0.13	not analysed	0.083
Longnose sucker	0.08-0.39	0.01-0.46	0.021-0.1	0-3.15

[1] Jackson et al, 1996. Yellowknife- Back Bay study on metal and trace element contamination of water, sediment and fish.
[2] Contaminant database (Appendix A)

Table 21. Estimates of average daily fish consumption[1] with corresponding range or mean of heavy metal exposure[2] by gender and age-group

MEN	20-40yrs			41 + yrs		
	fish intake (g/day)	As exposure range or mean (μg/d)	Hg exposure range or mean (μg/d)	fish intake (g/day)	As exposure range or mean (μg/d)	Hg exposure range or mean (μg/d)
Whitefish						
cooked/frozen	44			64		
dried	16			22		
total	60	3-67	1-13	86	4-95	1.5-19
Trout						
cooked/frozen	15			21		
dried	5			4		
total	20	3	7	25	3	9
Northern pike						
cooked/frozen	7			11		
dried	5			4		
total	12	0.4-7	0.9-6	15	0.4-8	1-7
Burbot (Loche)						
cooked/frozen	7	0.6-5	0.4-3	11	0.9-7	0.6-4
Connie						
cooked/frozen	11			16		
dried	11			7		
total	22	5	2	23	5	2
Walleye						
cooked/frozen	15	0.2-3	1-4	21	0.2-4	1.5-5
Grayling						
cooked/frozen	11	1	1	16	2	1
Total	147	13-91	13-36	197	15-124	17-47
Average exposure/kg body weight (75kg man)		0.17-1.21	0.17-0.48		0.2-1.65	0.23-0.63

[1]These estimates correspond to average consumption over the whole year for people consuming each specific food-item at least once per year. Average frequency of consumption and serving sizes are imputed from the Dogrib data in Receveur et al, 1998. Weight for dried fish are converted to wet weight. Fish species or fish preparations used by 10% or less of the respondents are not listed.
[2]Range calculated using Backbay data and mean values from literature when specific fish species were not analyzed.

Table 21, continued

WOMEN	20-40yrs			41 +		
	fish intake (g/day)	As exposure range or mean (μg/d)	Hg exposure range or mean (μg/d)	fish intake (g/day)	As exposure range or mean (μg/d)	Hg exposure range or mean (μg/d)
Whitefish						
cooked/frozen	43			52		
dried	16			24		
total	59	3-65	1-13	76	4-84	1-17
Trout						
cooked/frozen	14			17		
dried	5			4		
total	19	3	7	21	3	7
Northern pike						
cooked/frozen	7			9		
dried	5			4		
total	12	0.4-7	0.9-6	13	0.4-7	1-6
Burbot (Loche)						
cooked/frozen	7	0.6-5	0.4-3	9	0.7-6	0.5-4
Connie						
cooked/frozen	11			13		
dried	11			16		
total	22	5	2	29	7	2
Walleye						
cooked/frozen	14	0.1-3	1-3	17	0.2-3	1-4
Grayling						
cooked/frozen	11	1	1	13	2	1
Total	145	13-89	13-35	178	17-112	13-41
Average exposure/kg body weight (65kg woman)		0.20-1.40	0.20-0.54		0.26-1.72	0.20-0.63

APPENDIX A
ARCTIC FOOD CONTAMINANTS DATABASE
WESTERN NORTHWEST TERRITORIES
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