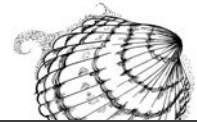
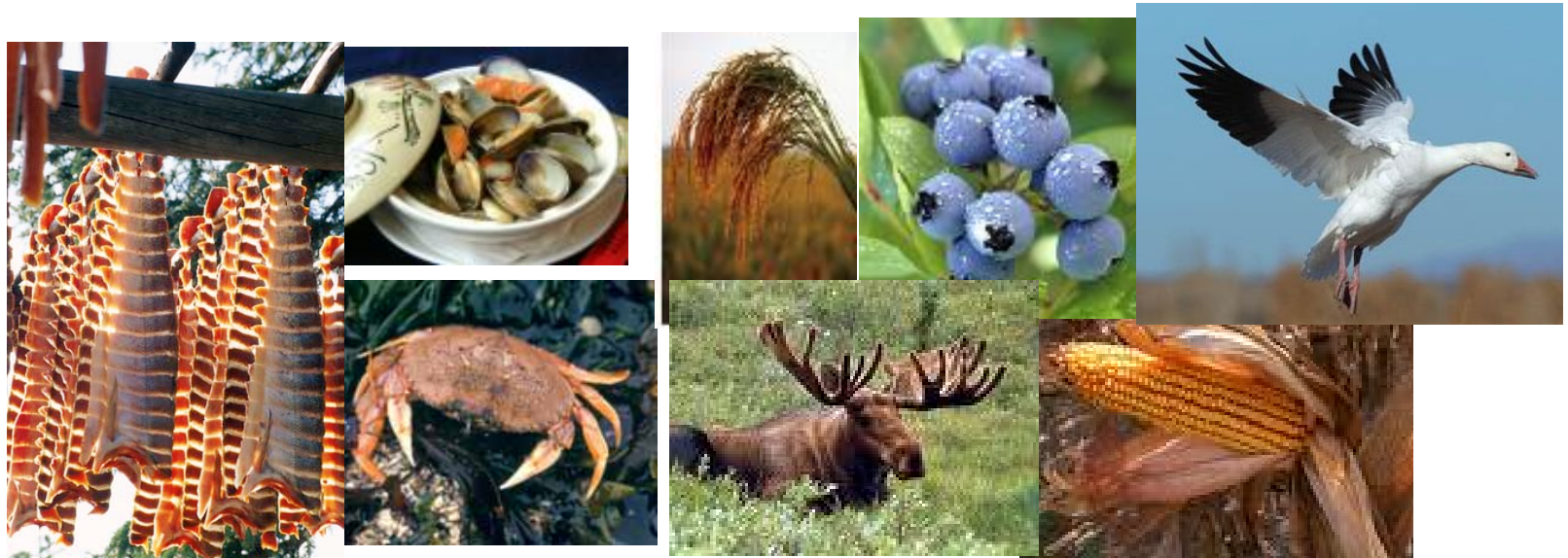


The importance of shellfish in the traditional diet of First Nation Communities: findings from the First Nations Food, Nutrition and Environment Study

Dr. Laurie Chan, Professor, Department of Biology & Canada Research Chair in Toxicology and Environmental Health





First Nations Food, Nutrition and Environment Study

Funding for this study is provided by Health Canada.

The information and opinions expressed in this presentation are those of the authors/researchers and do not necessarily reflect the official views of Health Canada.



What was the study about?

To find out:

- ◆ What kinds of traditional and market foods were people eating?
- ◆ How well were people eating?
- ◆ Is traditional food safe to eat?
- ◆ What level of mercury were people exposed to?
- ◆ What amount of trace metals and pharmaceuticals were in the water?



This study is led by

- **Dr. Laurie Chan**, Toxicologist and Professor, **University of Northern BC**
- **Dr. Olivier Receveur**, Nutritionist and Professor, **Université de Montréal**
- **Dr. Donald Sharp**, **Assembly of First Nations**
- With contributions from: **Dr. Constantine Tikhonov**, **Dr. Harold Schwartz**, and **Dr. Caroline Mimeault**.



First Nations First Nations Food, Nutrition and Environment Study

First Nations Food,
Nutrition and
Environment
Study
(FNFNES)

1. Household
Questionnaire

2. Food Sampling for
a Suite of
Contaminants

3. Water Sampling for
Trace Metals

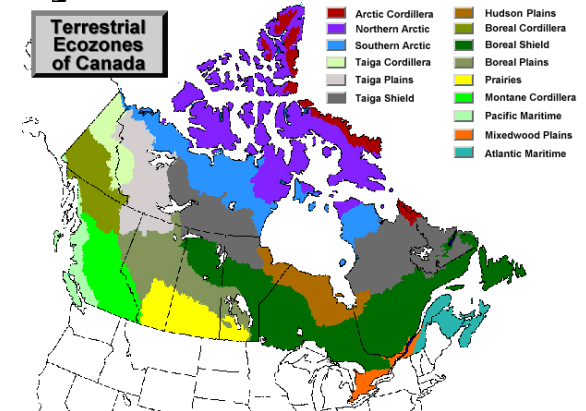
4. Surface water
Sampling for
Pharmaceuticals

5. Hair sampling
for Mercury



First Nations First Nations Food, Nutrition and Environment Study

- 100 communities from 2008-2018
- ~8 - 12 communities per year and returning back in the last 2 years
- Systematic Random Sampling by region and ecozone



21 BC communities in 5 Ecozones participated in the study in 2008-9



Which communities participated?

- Kitsumkalum
- Nat' oot' en Nation
- Namgis
- Hagwilget Village
- Fort Nelson
- Sliammon
- Moricetown
- Prophet River
- Samahquam
- Tahltan First Nation
- Doig River
- Douglas
- Iskut
- Saulteau
- Lil' wat
- Tsay Keh Dene
- Skidegate
- Lower Nicola
- Ti' azt' en Nation
- Nuxalk Nation
- Splatsin



Who participated

- 19 years or older
- Able to provide written consent
- Self-identifies as a FN persons living on reserve
- ◆ 1103 adults from BC from 1624 households
- ◆ 705 women and 398 men
- ◆ average age:
 - ◆ 44 years old (women)
 - ◆ 46 years old (men)



6 communities in the Pacific Maritime/Subarctic/Northwest Coast Ecozone

- Kitsumkalum
- Namgis
- Hagwilget Village
- Sliammon
- Skidegate
- Nuxalk Nation



What kinds of traditional and market foods were people eating?

| Top 5 traditional foods eaten in BC: | Average amount eaten per week | Top 5 market foods eaten in BC: | Average amount eaten per week |
|---|--------------------------------------|--|--------------------------------------|
| 1. Moose meat | 1/2 cup | 1. Soup | ~2 1/2 cups |
| 2. Salmon | 1/2 cup | 2. Vegetables | 2 cups |
| 3. Deer meat | ~3 tbsp | 3. Potatoes | 1 1/2 cups |
| 4. Trout | 2 tbsp | 4. Fruits | 1 1/2 cups |
| 5. Elk meat | 2 tbsp | 5. Grains (rice, barley) | 1 1/3 cups |



Consumption of shellfish and salmon in BC First Nations (N=1103)

| | consumers n (%) | Total population | | | Consumers only | | |
|--------|--------------------|------------------|--------|---------|----------------|--------|------------|
| | | mean (SD) | median | range | mean (SD) | median | range |
| Clam | 275 (25) | 0.71 (2.48) | 0 | 0-37.4 | 2.85 (4.3) | 1.56 | 0.25-37.4 |
| Crab | 278 (25) | 0.79 (2.7) | 0 | 0-31.2 | 3.12 (4.7) | 1.56 | 0.25-31.2 |
| Oyster | 124 (11) | 0.32 (1.75) | 0 | 0-31.2 | 2.86 (4.5) | 2.08 | 0.25-31.2 |
| Mussel | 71 (6) | 0.13 (0.82) | 0 | 0-15.6 | 2.06 (2.58) | 1.56 | 0.25-15.6 |
| Salmon | 940 (86) | 16.37 (22.4) | 7.96 | 0-130.1 | 19.21 (23.1) | 10.11 | 0.36-130.1 |

Values are mean intakes in grams per day;

SD: standard deviation



Consumption of shellfish and salmon in 6 BC First Coastal Nations (N=369)

| | Consumers | Consumers only | | |
|--------|-----------|----------------|-----|------|
| | n (%) | mean | min | max |
| Clam | 244 (66) | 3.0 | 0.3 | 37.4 |
| Crab | 216 (59) | 3.3 | 0.3 | 31.0 |
| Oyster | 83 (22) | 3.0 | 0.3 | 31.2 |
| Mussel | 50 (14) | 1.8 | 0.3 | 16 |
| Salmon | 359 (97) | 26.7 | 0.4 | 130 |



Nutrient contents in shellfish and salmon

| | protein | calcium | iron | zinc |
|--------|---------|---------|------|-------|
| clam | 25.55 | 92 | 2.81 | 2.73 |
| mussel | 23.8 | 33 | 6.72 | 2.67 |
| oyster | 8.87 | 92 | 7.16 | 61.04 |
| crabs | 22.32 | 59 | 0.43 | 5.47 |
| salmon | 25.72 | 28 | 0.91 | 0.56 |

Values per 100 g of edible portion (g/100g)



Nutrient contribution from clams among consumers in 6 BC Coastal First Nations

| Clams | | | | | | | | | | | |
|---------|----|------|---------|----------------|---------|----------------|------|----------------|------|-----|--|
| | N | Food | Protein | % contribution | Calcium | % contribution | Iron | % contribution | Zinc | | |
| males | n | | | | | | | | | | |
| 19-50 | 44 | 2.9 | 0.75 | 1.3 | 2.7 | 0.3 | 0.08 | 1.4 | 0.08 | 0.9 | |
| >50 | 48 | 3.1 | 0.79 | 1.4 | 2.9 | 0.3 | 0.09 | 1.5 | 0.08 | 0.9 | |
| females | | | | | | | | | | | |
| 19-50 | 87 | 3.1 | 0.80 | 1.6 | 2.9 | 0.4 | 0.09 | 1.1 | 0.09 | 1.3 | |
| >50 | 65 | 2.9 | 0.69 | 1.4 | 2.7 | 0.3 | 0.08 | 1.6 | 0.08 | 1.2 | |



Nutrient contribution from clams among consumers in 6 BC Coastal First Nations

Crabs

| | N | Food | Protein | % contribution | Calcium | % contribution | Iron | % contribution | Zinc | |
|---------|----|------|---------|----------------|---------|----------------|------|----------------|------|-----|
| males | | | | | | | | | | |
| 19-50 | 44 | 4.5 | 1.0 | 1.8 | 2.7 | 0.3 | 0.02 | 0.3 | 0.2 | 2.6 |
| >50 | 38 | 4.0 | 0.9 | 1.5 | 2.4 | 0.2 | 0.02 | 0.3 | 0.2 | 2.3 |
| females | | | | | | | | | | |
| 19-50 | 80 | 3.0 | 0.6 | 1.3 | 1.7 | 0.2 | 0.01 | 0.2 | 0.2 | 2.3 |
| >50 | 54 | 2.6 | 0.6 | 1.1 | 1.5 | 0.1 | 0.01 | 0.2 | 0.1 | 2.0 |



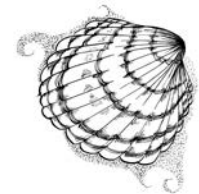
Nutrient contribution from clams among consumers in 6 BC Coastal First Nations

| Mussels | | | | | | | | | | | |
|---------|----|------|---------|----------------|----------------|----------------|----------------|------|------|-----|--|
| | | Food | Protein | Calcium | | Iron | | Zinc | | | |
| | | | | % contribution | % contribution | % contribution | % contribution | | | | |
| N | | | | | | | | | | | |
| males | | | | | | | | | | | |
| 19-50 | 11 | 1.1 | 0.3 | 0.4 | 0.4 | 0.0 | 0.1 | 1.3 | 0.03 | 0.3 | |
| >50 | 5 | 2.6 | 0.6 | 1.1 | 0.9 | 0.1 | 0.2 | 2.9 | 0.07 | 0.7 | |
| females | | | | | | | | | | | |
| 19-50 | 17 | 1.5 | 0.4 | 0.7 | 0.6 | 0.1 | 0.1 | 1.3 | 0.05 | 0.7 | |
| >50 | 17 | 2.4 | 0.6 | 1.1 | 0.8 | 0.1 | 0.2 | 3.1 | 0.07 | 1.0 | |



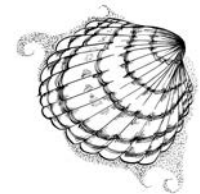
Nutrient contribution from clams among consumers in 6 BC Coastal First Nations

| Oysters | | | | | | | | | | | |
|---------|----|------|---------|----------------|---------|----------------|------|----------------|------|------|--|
| | | Food | Protein | | Calcium | | Iron | | Zinc | | |
| | N | | | % contribution | | % contribution | | % contribution | | | |
| males | | | | | | | | | | | |
| 19-50 | 21 | 3.0 | 0.3 | 0.5 | 2.8 | 0.3 | 0.2 | 3.7 | 1.9 | 19.8 | |
| >50 | 16 | 4.2 | 0.4 | 0.6 | 3.9 | 0.4 | 0.3 | 5.4 | 2.6 | 27.2 | |
| females | | | | | | | | | | | |
| 19-50 | 30 | 2.6 | 0.2 | 0.5 | 2.4 | 0.3 | 0.2 | 2.2 | 1.7 | 24.9 | |
| >50 | 16 | 2.5 | 0.2 | 0.4 | 2.3 | 0.2 | 0.2 | 3.5 | 1.5 | 22.0 | |



Nutrient contribution from clams among consumers in 6 BC Coastal First Nations

| Salmon | | | | | | | | | | | |
|---------|-----|------|---------|----------------|----------------|----------------|----------------|------|-----|-----|--|
| | | Food | Protein | Calcium | | Iron | | Zinc | | | |
| | | | | % contribution | % contribution | % contribution | % contribution | | | | |
| N | | | | | | | | | | | |
| males | | | | | | | | | | | |
| 19-50 | 69 | 33.0 | 8.5 | 14.9 | 9.2 | 1.2 | 0.3 | 4.8 | 0.2 | 1.9 | |
| >50 | 65 | 31.7 | 8.1 | 14.0 | 8.8 | 0.9 | 0.3 | 4.7 | 0.2 | 1.8 | |
| females | | | | | | | | | | | |
| 19-50 | 140 | 21.4 | 5.5 | 10.9 | 6.0 | 0.7 | 0.2 | 2.4 | 0.1 | 1.8 | |
| >50 | 84 | 27.1 | 7.0 | 13.9 | 7.6 | 0.8 | 0.2 | 4.8 | 0.2 | 2.2 | |



Sampling of traditional food (30 samples/community)

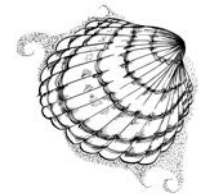
A total of 429 food samples representing 158 different types of traditional food were collected for contaminant analyses

- Contaminant measured include:
 - pesticide residues,
 - polychlorinated biphenyls (PCBs),
 - polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans,
 - Trace elements and heavy metals.
 - PBDE
 - PFCs
 - PAH



Selected contaminant levels in shellfish and salmon in BC

| | Hg | methyl-Hg | HCB | DDE | PCB |
|--------|-------|-----------|------|------|------|
| | µg/g | ng/g | ng/g | ng/g | ng/g |
| clam | 0.004 | 3.86 | 0 | 0 | 0 |
| mussel | 0.01 | 8 | 0.13 | 0.39 | 0.16 |
| oyster | 0.01 | 5 | 0 | 0 | 0 |
| crabs | 0.04 | 68.20 | 0 | 1.82 | 0 |
| salmon | 0.03 | 32.02 | 1.10 | 2.76 | 0.72 |



Contaminants in Traditional Food Samples

- ◆ Levels of contaminants are within levels that are typically found in this region.
- ◆ Intake of contaminants (except cadmium) from traditional food is below the guideline levels and is not a cause for concern.
- ◆ To decrease exposure to cadmium, limit intake of the following foods:
 - moose kidney and liver: not more than 1/2 a cup per month
 - seaweed: not more than 1/2 a cup per day
- ◆ It is recommended to replace lead shot with steel shot to avoid lead contamination.



41% of BC First Nations experienced food insecurity

- ◆ **40%** worried that their food would run out before they could buy more
- ◆ **36%** said that food they bought didn't last and there wasn't any money to buy more
- ◆ **12%** cut the size of their meals or skipped meals
- ◆ **7%** were hungry but did not eat because they couldn't afford enough food



91% of participants would like to eat more traditional food but..

- ◆ Lack of equipment or transportation
- ◆ Lack of availability
- ◆ Lack of time
- ◆ Difficult to access
- ◆ Government/firearms certificate regulations



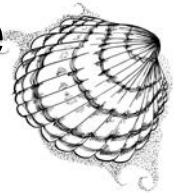
Current Nutrition Issues



- Nutrients of concern –
Vitamin A, calcium,
iron
- Food security

Diet related concerns

- Obesity
- Diabetes
- Heart disease



Traditional Food

- Important source of many nutrients that are not consumed in sufficient amounts.
- Diets are healthier when traditional food is eaten than if just market foods are eaten.



Acknowledgment

- All participants and the participating First Nations
- All the community research assistants
- The FNFNES research team
- Funding from Health Canada and the Canadian Institute for Health Research



Contact Information

WEB Site: www.fnfnes.ca

