HEALTH EFFECTS MONITORING PROGRAM

Community Results Presentation
Yellowknife, NT

Yellowknife, February 20, 2023

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BACKGROUND INFORMATION

WHAT is the Health Effects Monitoring Program?

A long-term program to monitor levels of arsenic and other metals of concern in residents of Yellowknife, Ndılǫ and Dettah.

WHY a monitoring program?

- Address Measure 9 of the 2013 Mackenzie Valley Review Board Report of Environmental Assessment

- Giant Mine Remediation Project (GMRP) required to implement a health monitoring program

Objectives

Establish baseline levels of arsenic & other metals in body.

Monitor levels of metals in the body over time.

Ensure remediation efforts do not negatively impact people's health.

Address public concerns through clear and transparent communication.

Longitudinal study

Baseline Sample Collection

2017-18

Child and Adult participants

Follow-up Sample Collection

2023

Child participants

2028

Child and Adult participants

Advisory Committee

Yellowknives Dene First Nation

North Slave Metis Alliance

City of Yellowknife

Government of Northwest Territories
Environment and Natural Resources

Giant Mine Oversight Board

Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

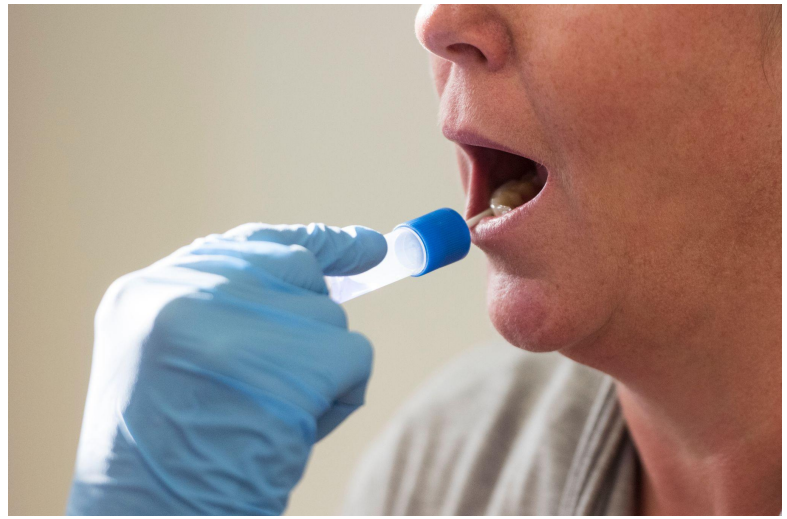
uOttawa

Health Canada
Santé Canada

Government of Northwest Territories
Health and Social Services

2017-18 BASELINE SAMPLE COLLECTION


HEALTH EFFECTS
MONITORING PROGRAM



Who participated?

A total of **2,037** individuals

- YK Randomly selected: **890**
- YK Volunteers: **876**
- YKDFN: **225**
- NSMA: **46**

506
Children and Youth

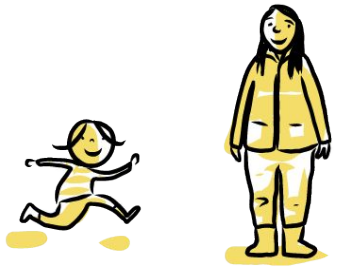
1531
Adults

WHAT was collected?

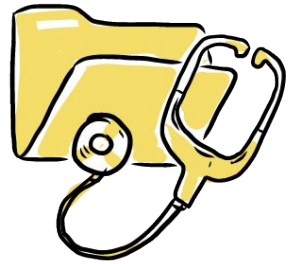
Urine

Toenails

Saliva



Questionnaire

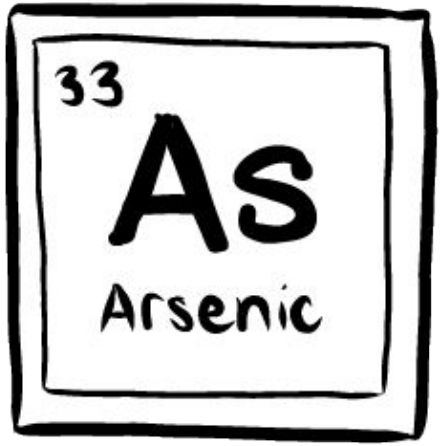


Medical Files

We can't see historical arsenic exposure

- Arsenic does not accumulate in the body
- **Urine** shows arsenic exposure for past **3-5 days.**
- **Nails** show arsenic exposure from **2-12 months.**

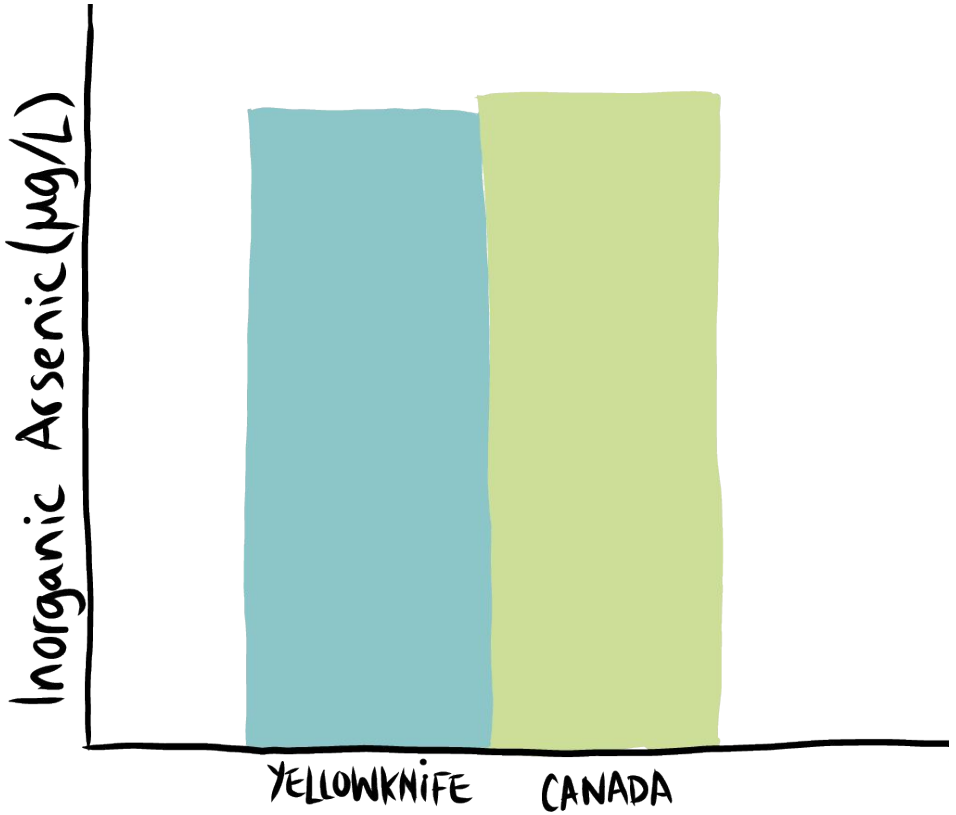
No current technology to test arsenic exposure beyond one year.



Main findings:

1. Most people tested had arsenic levels comparable to the average Canadian.

2. We found no evidence that people's health is at risk at the arsenic levels we are currently seeing.



NEW RESULTS

WHAT are the new results?

Medical Files

Arsenic in toenail samples

Biomarkers of effect

Genetics

Results: Medical Files

MEDICAL FILES: Intro

- We wanted to see if there was a **relationship** between people's medical conditions and the arsenic levels measured in their urine and toenails.

- We **asked permission** to review the previous 5 years of medical files.

MEDICAL FILES: Intro

- **Only accessed** health conditions potentially related to arsenic exposure.
- **Compared** results to national and NWT data.
- **Looked for relationships** between measured arsenic levels and different health conditions.

MEDICAL FILES: Results

- Similar to the rest of Canada, **hypertension and diabetes** were the most commonly reported chronic health conditions.

- **Arsenic** levels measured in urine or toenails were **not a predictor** of diseases, including skin cancer.

MEDICAL FILES: Results

- The prevalence of **heart conditions and hypertension was lower** in the Yellowknife population compared to the NWT and national statistics.

- The prevalence of **melanoma and other skin cancers was higher** in the Yellowknife population compared to NWT and national statistics.

MEDICAL FILES: What this means

- In general, people in Yellowknife, Ndılǫ, and Dettah have **health outcomes similar to other Canadians**.
- All we know at this time is that there was **no association** found between skin cancer and arsenic levels in urine and toenail.
- **Following participants in coming years** may provide us with more definitive information.

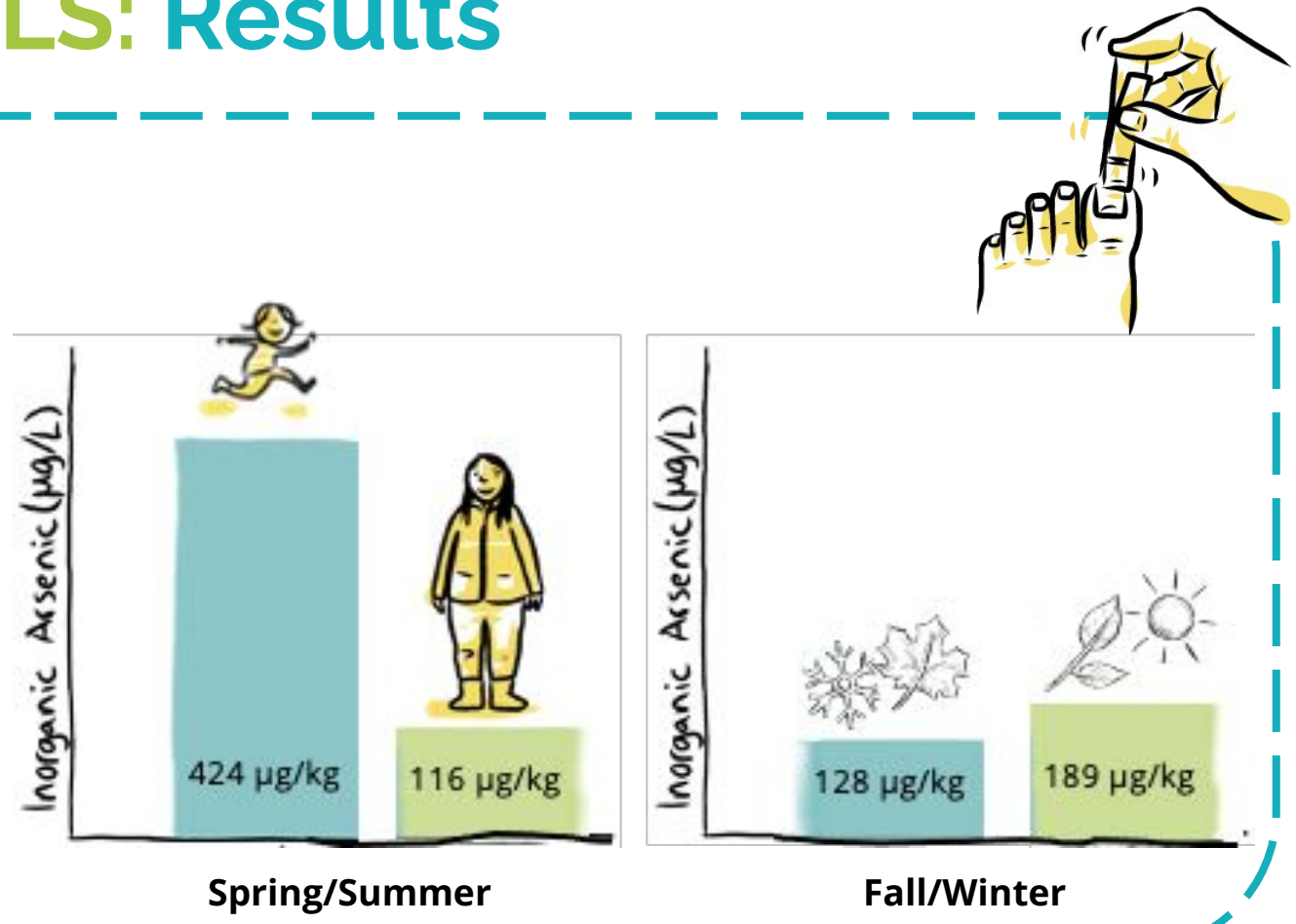
Results: Arsenic in Toenail Samples

ARSENIC IN TOENAILS: Intro

- When ingested, arsenic is processed by the body and turned into different forms.
- Toenail samples were measured for the different forms of arsenic.
- We also tested different layers of the toenail to see if arsenic is deposited from inside the body or from external contacts.

ARSENIC IN TOENAILS: Results

- Arsenic toenail concentrations were **higher in some children** than in adults.
- Toenails collected in the spring and summer had higher arsenic levels.



ARSENIC IN TOENAILS: Results

- **In toenails,** most of the arsenic we measured was in the form of inorganic arsenic (*more toxic form, commonly found in the environment*.
- **In urine,** arsenic was mostly in the form of organic arsenic (*generally non-toxic form, commonly found in seafood*).

ARSENIC IN TOENAILS: What this means

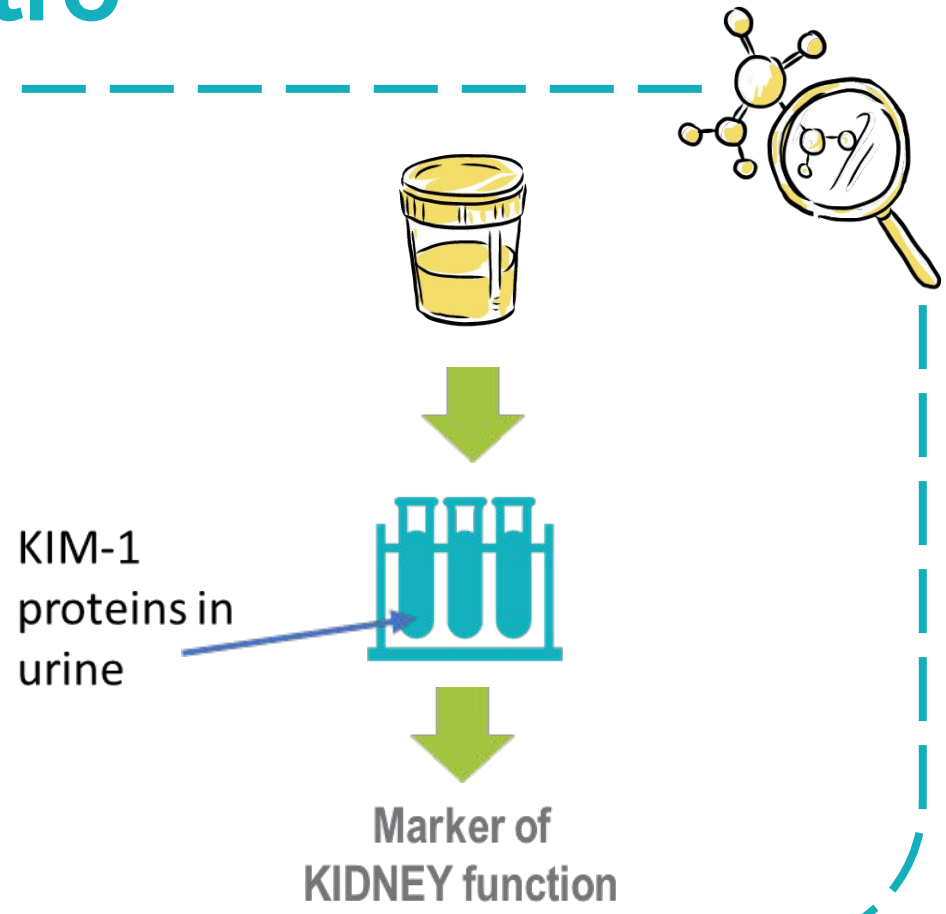
- The higher levels of inorganic arsenic suggest that people may be mostly exposed to arsenic through external contact (*e.g. soil, sediment or dust*).

- Some children have higher arsenic in the toenails most likely due to playing outdoors, being barefoot, or crawling on the ground.

Results: Biomarkers of effect

BIOMARKERS OF EFFECT: Intro

- Biomarkers of effect can be used to help detect future illnesses.
- We looked at specific molecules in the urine of children ages 3-11:
  - **Kidney injury molecule-1 (KIM-1)** is a protein produced by our kidneys when they are injured.



BIOMARKERS OF EFFECT: Results

- Higher amounts of KIM-1 were associated **with higher levels of inorganic arsenic** (AsIII+AsV) in the urine.
- Results are for **children under 11** years of age because significant relationships were observed in that age group.

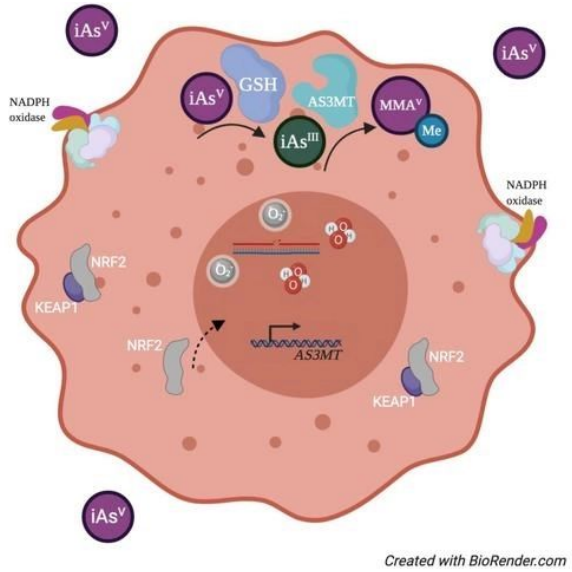
BIOMARKERS OF EFFECT: What this means

- KIM-1 could be used for detecting early effects of arsenic on kidney function in children.
- We will continue to measure KIM-1 in the urine of children to see if there is a relationship with arsenic exposure.

Results: Genetics

GENETICS: Intro

- The same level of arsenic exposure could impact different people in different ways, depending on how their body metabolizes arsenic.
- **Metabolizing** refers to how our bodies process arsenic.
- Arsenite methyltransferase (**AS3MT**) is an important enzyme involved in arsenic metabolism.



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GENETICS: Results

- We found that some people in the study are *less efficient at metabolizing* arsenic because of a genetic profile called **Haplotype-AS3MT**.

- Haplotype-AS3MT is associated with **increased levels of inorganic arsenic** in the body (*a toxic form of arsenic*).

- **282 participants** **(18%)** out of a total of 1,610, from the Yellowknife general population may be less efficient at processing arsenic because of having this specific genetic profile.

GENETICS: What this means

- The genetics information will help the study to better **understand the relationship between arsenic exposure and health outcomes.**
- However, the genetics information cannot be used to assess the risk of arsenic at the individual level.
- It will be useful to interpret the results at the **population level**.

2023 Child and Youth 5yr Follow-Up

WHAT IS NEXT?

- Re-sample children who participated in 2017-2018 and are currently 19 years old and under.

- April to June, 2023

Did you know? Our ability to study relationships between arsenic exposure and health outcomes would be most effective if we have maximum participation from our 2017 & 2018 participants!

WHAT IS NEXT?

- Also sample a *new* group of randomly selected Yellowknife children to form the 2023 cohort.

- All YKDFN and NSMA members, ages 3-19, will be invited to participate.

Mahsı cho. Thank you.

Questions? Contact us!

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