Flin Flon Soils Study: Follow-up Exposure Study Results

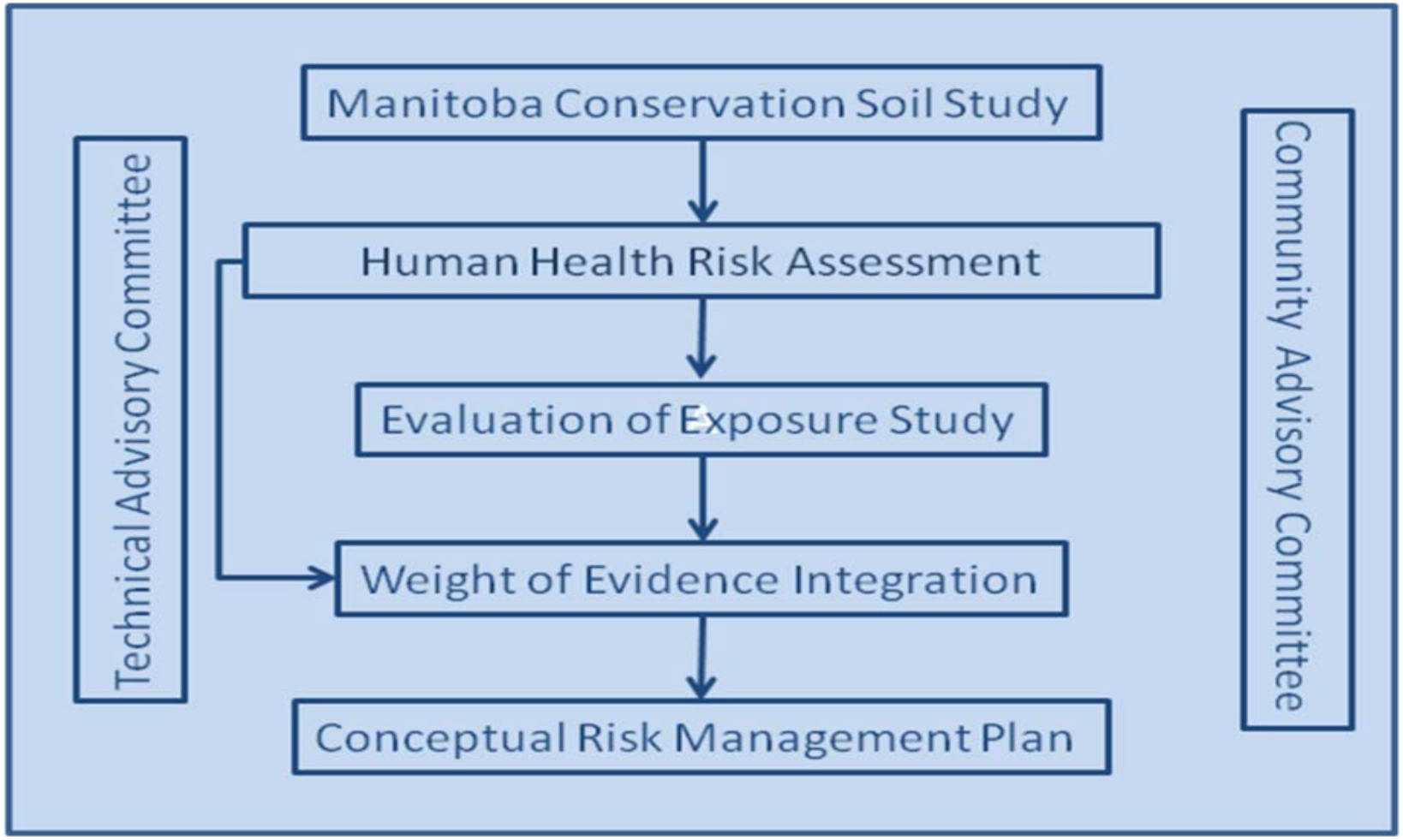
- **Study Questions and Design**
- **Results from Blood Lead Sampling**
- **Results from Environmental Sampling**
- **Conclusions**

Community Advisory Committee Meeting, Monday, February 25, 2013

Background

- Flin Flon Soils Study
  - One component was the *Evaluation of Exposure (2009)*
    - Arsenic, Inorganic Mercury, Lead
    - Focused on children; 202 blood samples
    - Environmental data was NOT collected concurrently for each participating residence; it was collected during other phases of the Flin Flon Soils Study

The Flin Flon Soils Study



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Re-cap of findings from 2009 Evaluation of Exposure

- Exposure to mercury and arsenic was similar to levels found in studies of similar populations.
- Blood lead levels were slightly higher than larger population level studies (e.g. Canada and US). Note difference (e.g. age, community characteristics).
- Lead exposure results for the Flin Flon area children were comparable to communities with point sources for lead exposure.
- Possible different sources of potential lead exposure including diet, activities, housing stock, soil levels.

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Risk Management

- As a result of the findings of the original study, several risk management activities have occurred since 2010
    - HBMS facility/site/operations related
    - Community related
- The risk management plan also included a recommendation to complete a follow-up study to assess the status of blood lead levels in the community

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Approach to the 2012 Follow-up Exposure Study

- Similar to the 2009 Evaluation of Exposure with focus specifically on lead
  - CAC and TAC oversight
  - Same collection procedures; same laboratory
  - Focus on children under 7 years old
  - Same season (September-October)
- Shorter interviews
- Soil, dust and water sample collection and paint analysis added

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Study Questions

1. *What is the current level of internal exposure to lead in the child population residing in the Flin Flon Area?*

2. *Compared to the lead exposure levels measured in 2009, have levels in Flin Flon Area children increased, decreased, or remained the same in 2012?*

3. *Are the personal factors associated with children's lead exposure measured in 2009 (e.g., place of residence, age, gender) similar in 2012?*

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How the exposure study was implemented

- **Research team-** led by Dr. Murray Lee (Habitat Health Impact Assessment), in partnership with Intrinsik, Goss Gilroy, and Environmental & Occupational Health Plus (EOHP). Experience in large-scale field studies on human health (medicine and epidemiology) and toxicology.

- **Oversight-** Technical Advisory Committee and Community Advisory Committee.

- **Review-** Local health authorities and independent scientific reviewers familiar with these types of studies who were not part of the study team.

- **Funding-** As with the Flin Flon Soil Study, Hudson Bay Mining and Smelting payed for costs associated with the study. HBMS does not have input into the study design, analysis, or interpretation.

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Participants providing blood samples

- 118 children provided samples
- Gender:
  - 48% boys
  - 52% girls
- Age of children:
  - Under 2 – 25%
  - 2 years old – 14%
  - 3 years old – 9%
  - 4 years old – 16%
  - 5 years old – 20%
  - 6 years old – 15%

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Participants providing blood samples

- Region
  - East Flin Flon – 65%
  - West Flin Flon – 15%
  - Creighton – 20%
  - Channing – 1%
- Compared to 2009 sample
  - Similar age
  - More children from East Flin Flon; fewer from other three regions

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Environmental Samples

- Yard soil
  - 91 composite samples
- House dust
  - Kitchen floor - 92 samples
  - Common play area floor - 70 samples
- Kitchen tap water
  - Flushed samples – 93
  - Stagnant samples – 184
- Paint analysis
  - 93 households

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What is the current level of internal exposure to lead in the child population residing in the Flin Flon Area?

- the geometric mean was 1.4 µg/dL
- levels ranged from less than 0.1 µg/dL to 8.4 µg/dL
- 95% of samples were below 3.5 µg/dL.
- Children living in West Flin Flon were more likely to have higher levels
- Boys were more likely to have higher blood lead levels
- Toddlers between 2 and 3 years of age were most likely to have higher levels

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Compared to the lead exposure levels measured in 2009, have levels in Flin Flon Area children increased, decreased, or remained the same in 2012?

- Children's blood lead levels were statistically significantly lower in 2012 than in 2009.
  - 2009 → 2.7 µg/dL
  - 2012 → 1.4 µg/dL
  - This finding is consistent across all sub-groups according to age, gender and region.
- 2009 → 13% of samples were above 5µg/dL
- 2012 → 2% of samples were above 5µg/dL.

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Are the personal factors associated with children's lead exposure measured in 2009 (e.g., place of residence, age, gender) similar in 2012?

- Only age of house was found to be associated with blood lead levels
- Not surprising to find fewer factors
  - Low blood lead levels makes it difficult to distinguish pathways from regular background
  - Smaller number of participants

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Findings from Environmental Samples

- Yard soil
  - Geometric mean = 74.7 µg/g
  - Levels ranged from 3.4 to 791 µg/g
  - 4 samples exceeded PTC of 370 µg/g
- Indoor dust
  - 60% had levels below detection
  - All samples were below HUD guideline of 0.043 µg/cm^2

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Findings from Environmental Samples

- Tap water
  - All flushed samples contained lead at a level below the CCME Drinking water guideline (10 µg/L)
  - For one household, lead levels within both stagnant samples (47 µg/L and 11 µg/L) were above the CCME guideline
  - Overall, concentrations of lead in the stagnant water samples were significantly higher than in the flushed samples
- Paint
  - Eight households had painted surfaces that tested positive for lead-based paint.
  - Of these, four were exterior housing surfaces.

Findings from Environmental Samples

- concentrations of lead in indoor dust appear to be independent of concentrations of lead in either outdoor soil or paint
- environmental media concentrations are poor indicators of blood lead levels
  - additional factors likely represent a greater influence on blood lead levels in children in the Flin Flon Area

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