

# Design challenges associated with ascertaining exposures and contaminant levels among recent newcomer women

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February 13, 2014

# Newcomers & Environmental Exposures (i)

- Higher contaminant exposures in countries of origin  
e.g.
  - Organochlorine compounds used in vector control & agriculture
  - Lead exposures have been found to be particularly high in low- and middle income countries, including India (Blacksmith Institute, 2012)
- Consumption of foods or use of products from countries of origin e.g.
  - higher mercury levels in fish - cases in Ontario
  - metal levels in skin whitening products

## Newcomers & Environmental Exposures (ii)

- Consumption of Canadian foods with higher contaminant levels e.g. sportfish (Cole et al 2004)
- Occupational and other sources of exposure in Canada as per environmental justice critiques.
  - Higher proportion of immigrant and minority women employed in higher risk occupations, resulting in increased exposures and health related disparities. (Premji et al, 2010)
  - Possibilities of environmental injustice among immigrant communities that have not been examined

# Scoping Review

(Chakravartty et al, in revision)

- Aim - to determine the extent, range and nature of studies on differential environmental exposures among Canadians as a function of sex and gender and race and ethnicity.
- Synthesis - among 65 included articles
  - 18% conducted subgroup analysis by race/ethnicity
  - 6% provided reasons for observed differences in exposure or outcome by race/ethnicity.
  - 3% articles analyzed elevated exposure by sex/gender and race/ethnicity

# Recent Biomonitoring data

- Surveillance

- Canadian Health Measures Survey (Cycle 1, 2007-2009; Cycle 2, 2009-2011) <http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/chms-ecms/index-eng.php>

## Cohort

- MIREC (Maternal-Infant Research on Environmental Contaminants) women recruited during pregnancy, 19% born outside of Canada, results pending <http://www.mirec-canada.ca/>

# CHMS (Cycle 1, 2007-2009)

Lye et al, 2013

In modeling Least Squares Geometric Mean (LSGM, 95% CI) total blood mercury ( $\mu\text{g/L}$ )\* among participants aged 6 to 79 Years, significant were:

Canadian citizenship/place of birth ( $p=0.0015$ )

- Born in Canada/Canadian citizen at birth (ref adjusted\*) 0.62 (0.52-0.72)
- Not born in Canada or non-Canadian citizen at birth 1.09 (0.75-1.58)

Cultural/racial background ( $p=0.0274$ )

- Caucasian (ref adjusted\*) 0.62(0.54-0.72)
- Asian 1.41 (0.6-3.3)
- Other or multiracial 1.14 (0.86-1.51)

\*Contributing co-variates were smoking status, alcohol consumption, education, income, fish & shellfish consumption, and amalgam count

# Policy-Maker & Practitioner Interest

- Policy makers and public health practitioners at all levels of government are concerned that...
- the higher concentrations of contaminants observed in population studies may be among...
- vulnerable newcomer groups.
  
- Hence desire for additional data, particularly among women, to answer the question:
  - Are newcomer women more likely to report exposures and have higher contaminant levels in their tissues than those born in Canada or long-term resident in Canada?

# What is an appropriate study design?

Surveillance?

Cross-sectional survey?

Above with interventions?

Qualitative component?



## Population focus - life stage

- All ages, particularly elderly with lifetime accumulation e.g. lead, cadmium increase with age, given long half life and higher past exposures
- Childbearing age, as women mobilize contaminants during pregnancy and breastfeeding - could affect their and their children's health
- During early pregnancy -potential opportunity to counsel women re practices and reduce exposures

## Population focus - countries of origin

- By those with the highest potential exposures from international literature?
- Entire regions e.g. South East and South Asians? Or specific countries e.g. India, Bangladesh, Vietnam...
- Entire countries or provinces/states/areas within countries? E.g. coastal areas given fish consumption
- Based on prevalence of practices which might increase exposures e.g. use of skin whiteners?

# Population focus - recency of arrival

- All non-Canadian born (as per many studies to date)?
- Relative interest in current (could be modified in Canada) versus past (hard to change) exposures.
- Within the last decade - a commonly used time period for immigrant health studies, wearing off of “healthy immigrant” effects?
- Within the last five years - more commonly used for refugees, though some argue for even more recent e.g. 1-2 years?
- Take into account exposure reduction in source countries? e.g. “Mean blood-lead levels of children from [Indian] urban centres have fallen from 18.1  $\mu\text{g}/\text{dl}$  in the leaded petrol phase to 12.1  $\mu\text{g}/\text{dl}$  in the unleaded petrol phase [2000+]” (Singh & Singh 2006)

# Recruitment approaches

- Community organizations
  - Country of origin/language/ethnicity e.g. South Asian
  - Environmental
- Public health programs
  - Nutrition, pre-natal, other?
- Clinical services
  - Primary care - family health teams, community health centres, private providers
  - Speciality care e.g. obstetricians, midwives

# Implications of Recruitment Choices

- Extent of generalizability and to whom from any one route?
- Recruitment proportions with resultant
  - volunteer biases
  - cost implications (per study participant)?
- Power considerations
  - Which contaminants and likely range?
  - Extent of stratification, sub-group analysis by major co-variates?

# Community Engagement

- Newcomer groups and regional public health authorities approached BC colleagues to study contaminants among pregnant women
- Growing environmental awareness among diverse groups e.g. <http://futurewatch.net/> though historically public health reach has been limited (Gibson-Wood et al 2012)
- Recruitment requires motivation and interest, without unduly raising concern....how?
- Do we need additional qualitative work wrt
  - Understandings of links between practices and exposures
  - Perceptions of contaminant related risks

# Contaminants & Matrices of interest?

- Metals particularly mercury(Hg) and lead (Pb) have been documented in blood - Hg particularly can reflect recent exposures (months) and be reduced with lower intakes
- Organohalogen compounds - persistent, relatively easy to measure in blood, sources some Cdn e.g. PCBs, PBDEs - individual modifiability limited
- Other consumer products (particularly personal care and cleaning e.g. Triclosan? Bisphenol A, other) and Other environmental exposures e.g. arsenic via arsenates in urine. Different matrices & unclear modifiability
- Could focus on metals in blood and bank other specimens and matrices for future analytical work

# Exposures of Interest

- For **Hg**, in addition to fish and shellfish & occupational sources - skin whitening products, Ayurvedics and herbal medicines.
- For **Pb**, in addition to living near Pb-contaminated soils or in homes with Pb-containing paint, occupations involving batteries and metal work - use of traditional cookware & pottery, imported foods, kohl-based cosmetics, consumption of certain Ayurvedic and herbal medicines
- For **Cd**, in addition to smoking and occupational exposures, diet (phosphate based fertilizers with Cd & sewage sludge) (ATSDR, 2012)



# Questionnaire documentation

- Substantial set of practices and environments
- Larger set of questions with more contaminants
- Across individual history - what windows of exposure?
  - In Canada and in countries of origin?
  - Life stages e.g. pregnancies?
- How long can we make questionnaires and
  - maintain valid assessment?
  - promote participation?
- At home, centres or clinics? - links with specimen collection e.g. via private laboratory

# Interventions and Evaluation

## Interventions among those with higher contaminant concentrations

- Individual dietary or intake counselling - ethically required if above certain levels, as per Health Canada guidelines
- Awareness campaigns, as per imported consumer products with lead
- Informing regulatory authorities wrt imports e.g. of fish
- Other....?

## Include pilot evaluation with aim of:

- Understanding perceived benefits (qualitative)
- Demonstrating effectiveness (or lack thereof) of interventions
- Documenting associated resource costs

# Discussion

Open and emailed comments to  
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[Donald.cole@utoronto.ca](mailto:Donald.cole@utoronto.ca) or other  
team members known to you

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