

Colorectal cancer incidence in Aboriginal Ontarians: a cautionary ecologic tale

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Ottawa, Ontario

June 25, 2014

Outline

- Cancer burden in Ontario's Aboriginal population
- Methods and results
- Discussion and cautionary messages
- Conclusions

Ontario's Aboriginal population

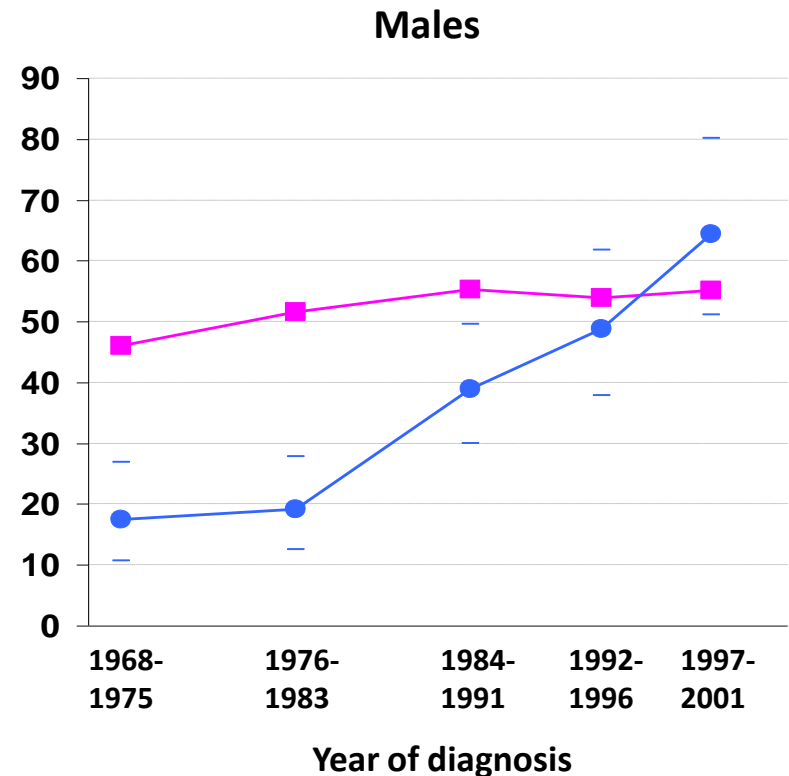
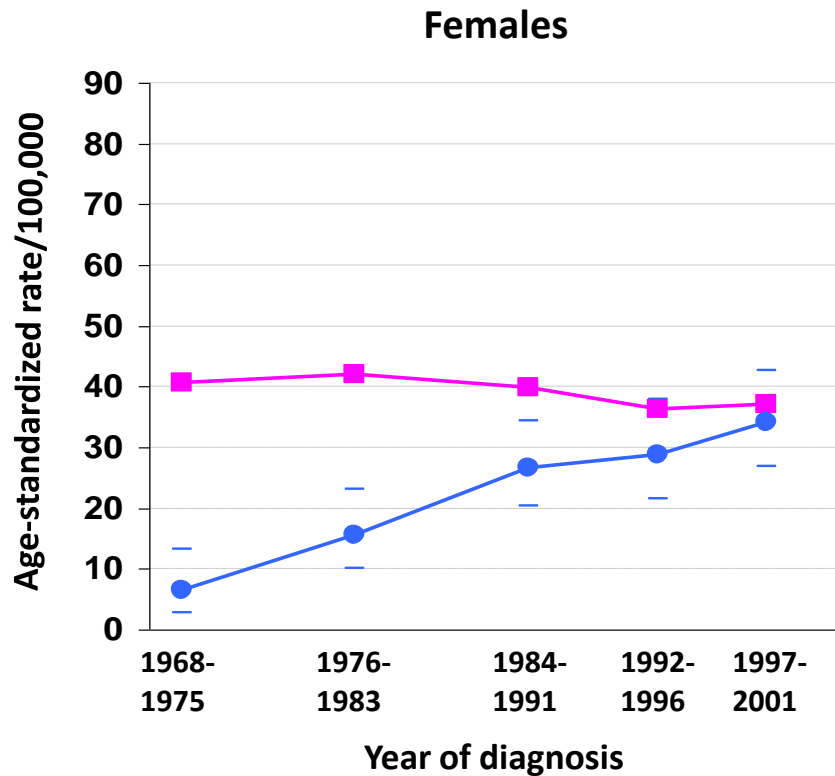
- 301,430 in 2011 (2.4% of population)
 - First Nations (201,100, 67%)
 - Métis (86,015, 29%)
 - Inuit (3,360, 1%)
- First Nations (FN) people can be further divided:
 - Registered or non-registered
 - Living on or off an Indian reserve



Cancer burden in Aboriginal Ontarians

- Cancer incidence is expected to increase more for Aboriginals than other Ontarians
- Survival rates for major cancers in FN, Inuit and Métis (FNIM) communities are lower when compared with general population
- Need for routine monitoring of cancer burden in Aboriginal populations
 - **But** Canadian cancer registries do not collect information on Aboriginal status or other racial and ethnic groups

Colorectal cancer incidence, Ontario, 1968-2001, ages 15-74



Rates age-standardized to the 1991 Canadian population
Horizontal bars around First Nations rates indicate 95% confidence limits

Registered First Nations
All Ontario

Objectives

- To estimate colorectal cancer incidence in Aboriginal Ontarians by using an ecologic approach
- To evaluate the ecologic approach used by estimating the colorectal cancer burden in Ontario First Nations people living on Indian reserves

Methods: Colorectal cancer cases

- Invasive colorectal cancer cases (ICD-O-3 codes C18, C19, C20, and C26.0) diagnosed 1998–2009 identified from Ontario Cancer Registry (N=84,157)
- Assigned census geographic identifiers using the Postal Code Conversion File plus (PCCF+)

**Dissemination area
(DA)**

**Census subdivision
(CSD)**

- PCCF+ uses a population-weighted random allocation procedure to handle rural areas where postal codes often cover multiple DAs and CSDs

Methods: Residence in high-Aboriginal areas

- Captured individuals who self-identified as being an Aboriginal person of First Nations, Métis, or Inuit identity on the 2001 and 2006 Canadian censuses
- Identified DAs where relatively high percentages of population report Aboriginal identity
 - Cut-off of 33% to distinguish between ‘high’ and ‘low’

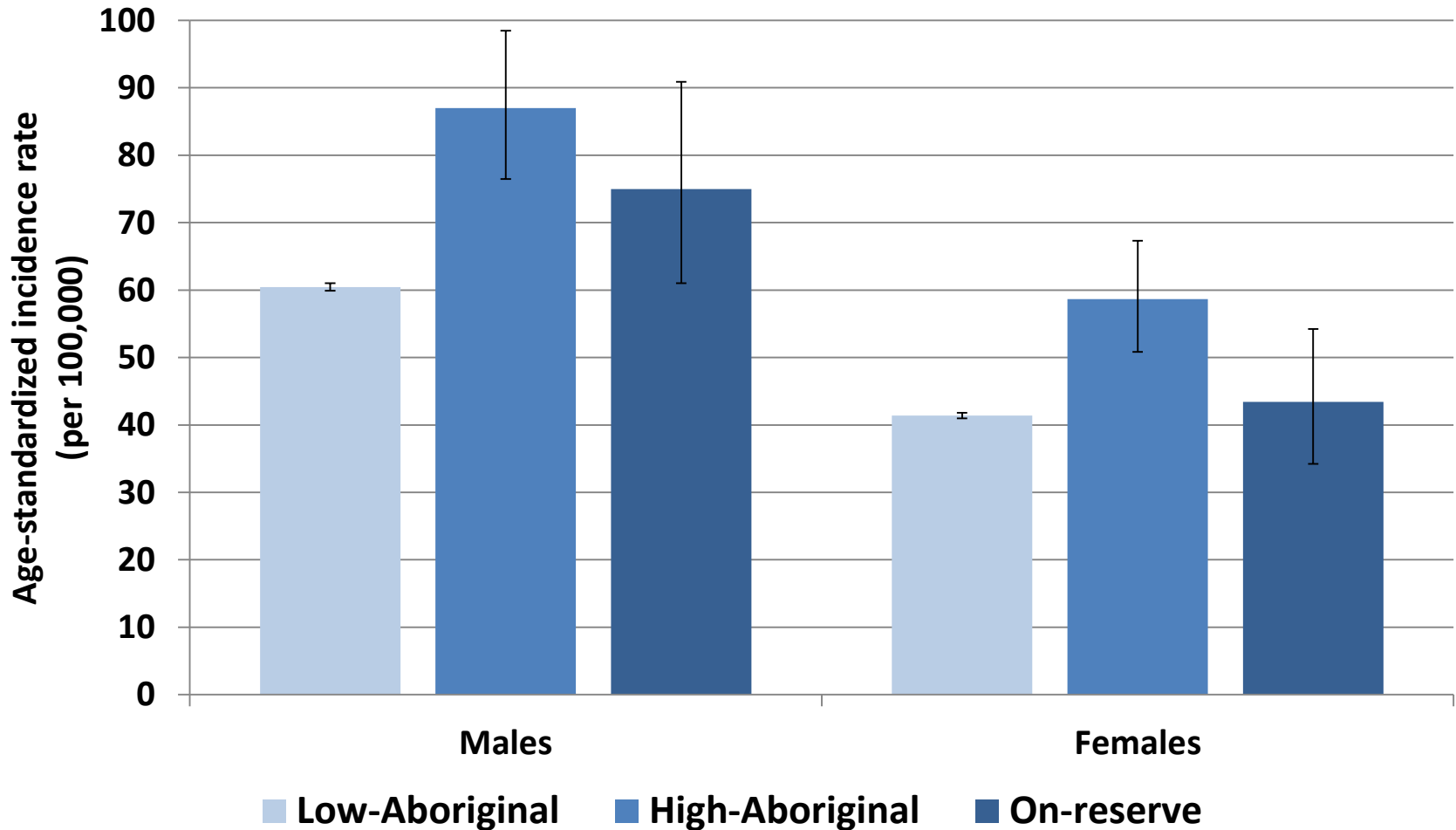
Methods: Residence on Indian reserves

- Sensitivity analysis using only cases that had a high probability of residing on an Indian reserve at diagnosis
- Identified Indian reserves in Ontario from the CSD type in the 2001 and 2006 Canadian censuses
- Identified reserves where the accuracy of assignment using PCCF+ was high
 - Reserves covered by one or more postal codes, each which mapped to the reserve with a probability of 0.90 or greater

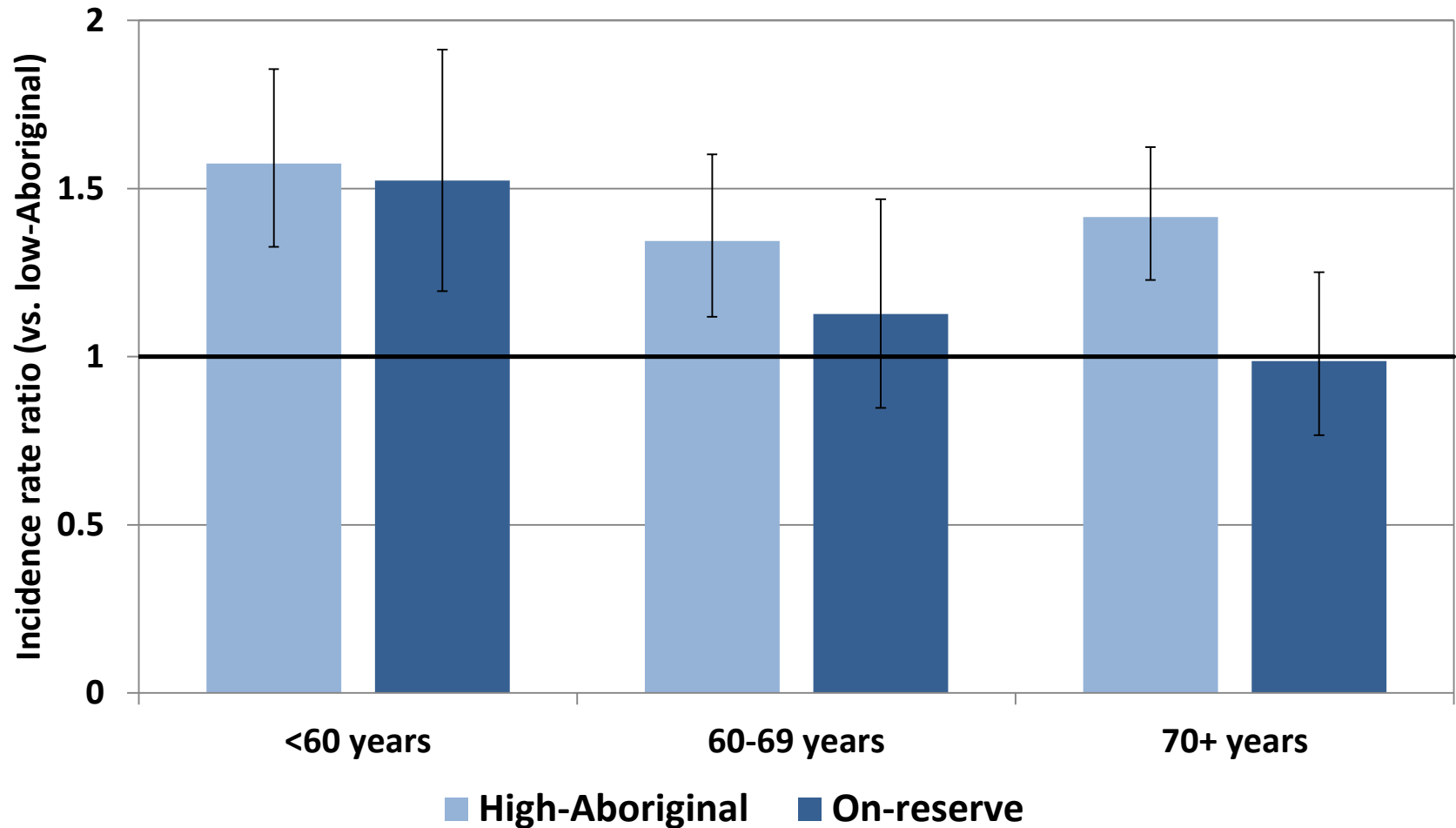
Methods: Statistical analysis

- Classified each case as residing
 - In a high- or low-Aboriginal area
 - On or off an accurately-assigned Indian reserve
- Calculated age-standardized incidence rates and 95% confidence intervals to compare colorectal cancer incidence in
 - High-Aboriginal areas
 - Low-Aboriginal areas
 - Indian reserves

Colorectal cancer incidence by type of Aboriginal area and sex, Ontario, 1998–2009



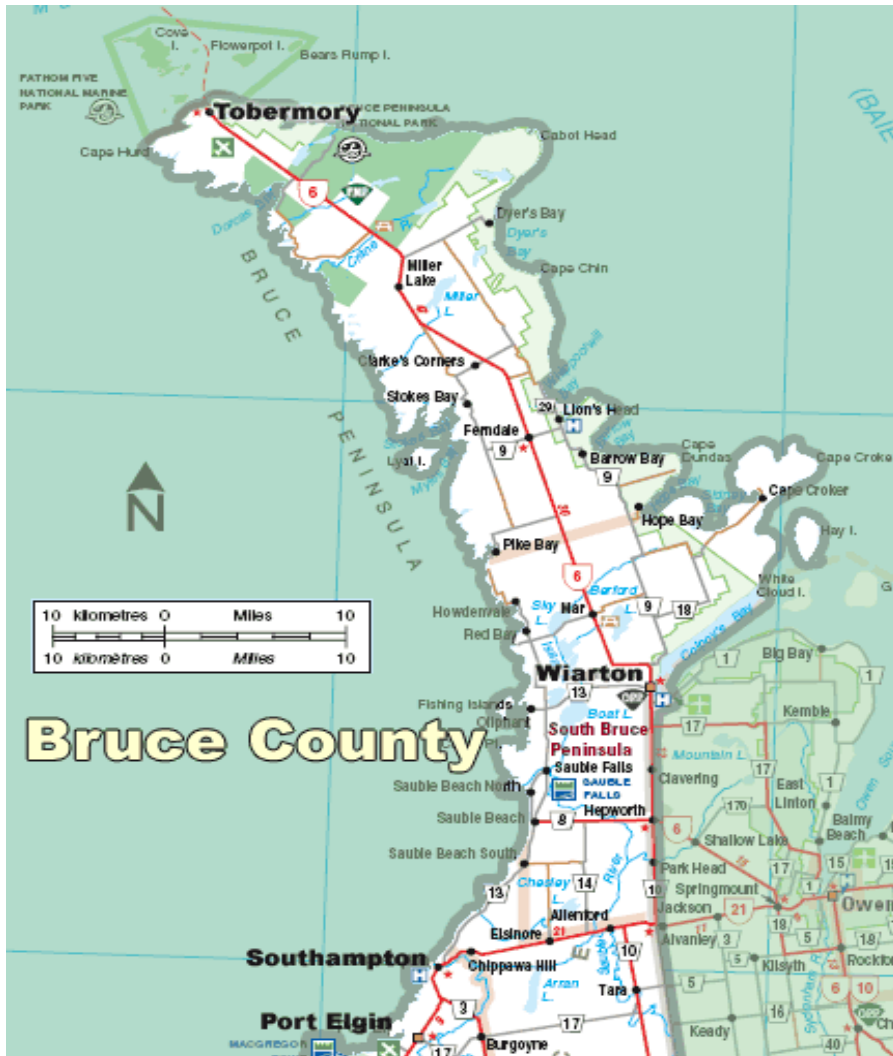
Colorectal cancer incidence rate ratios (vs. low-Aboriginal areas) by age group, Ontario, 1998-2009



High-Aboriginal areas vs. Indian reserves

- Compared with low-Aboriginal areas, colorectal cancer incidence was
 - 43% higher for residents of high-Aboriginal areas
 - 14% higher for residents of Indian reserves
- Why such a large difference and why differences by age group?
 - Short answer: PCCF+!
 - All reserves are captured as high-Aboriginal areas
 - Many reserves are located in rural areas where accuracy of assignment of reserve residents to reserves using PCCF+ varies

A PCCF+ example: Wiarton, Ontario



- N0H 2T0, a rural postal code, covers three CSDs
 - South Bruce Peninsula, Bruce County
 - Cape Croker Reserve, Bruce County
 - Georgian Bluffs, Grey County
- Covers 21 DAs

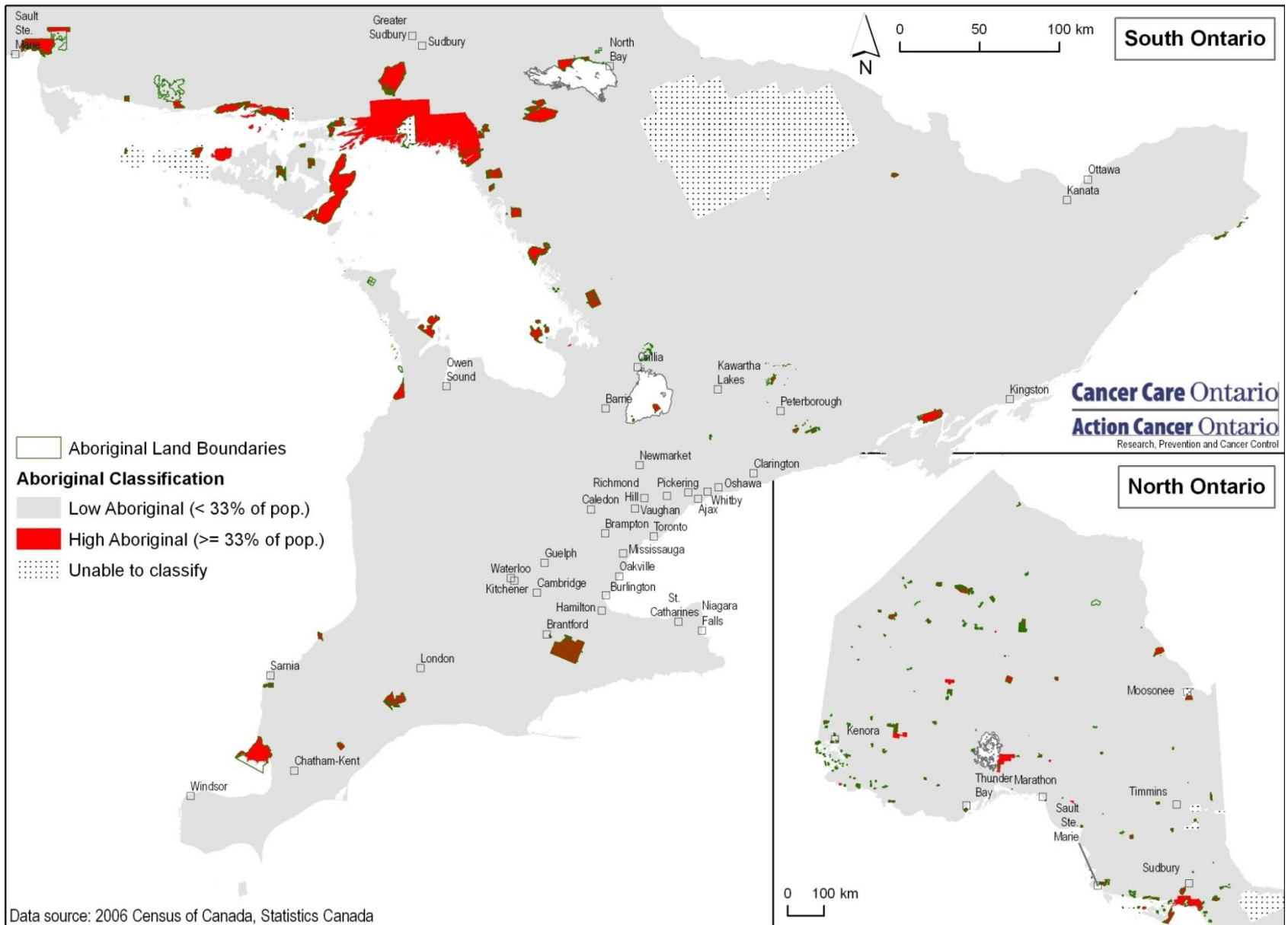
The age distributions are different

Age Group	Age distribution of on-reserve population, Canada	Age distribution of total population, Ontario	Ontario colorectal cancer incidence rates, crude (per 100,000)
0-14 years	34.1%	18.2%	0.0
15-24 years	18.6%	13.4%	0.7
25-54 years	36.5%	43.7%	17.8
55-64 years	6.0%	11.2%	111.6
65+ years	4.9%	13.6%	301.2

- Compared to general population:
 - On-reserve population is younger
 - Colorectal cancer patients are older
- PCCF+ assigns too many older, non-Aboriginal colorectal cancer patients to reserves when random allocation is required

Caution: using an ecologic approach

- Area-level % of Aboriginal residents is not necessarily representative of individual-level Aboriginal status
- Limited ability to capture entire Aboriginal population of Ontario
 - 😊 On-reserve First Nations: All DAs belonging to Indian reserves are high-Aboriginal
 - 😞 Off-reserve First Nations and Métis: Less than 10% of high-Aboriginal DAs are off-reserve



Caution: using PCCF+ to assign geographic identifiers

- Potential for misclassification by DA/CSD of residence when population-weighted random allocation is used
- Potential for even greater misclassification when age distribution of study population differs from total population

Conclusions

- Area-level analyses can be used to address data gaps in Aboriginal health, but do so with caution
- Can examine subgroup of First Nations people living on accurately-assigned Indian reserves to reduce influence of PCCF+
- We still observed elevated rates of colorectal cancer in Indian reserves
- Imperative to address risk factor prevalence and screening uptake to reduce future colorectal cancer burden in Ontario's Aboriginal population

Acknowledgements

Co-authors:

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Elisa Candido

Lorraine Marrett