

HPV Infection and Cervical Cancer Among Canadian Aboriginal Women

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ABSTRACT

Background: Cervical cancer is one of the most common gynecological cancers worldwide, considered to primarily result from infection with oncogenic strains of human papillomavirus (HPV) [1]. Recently, Canadian cervical cancer incidence has generally declined [2]. However, cervical cancer prevalence remains relatively high among Aboriginal women [3].

Purpose/objectives: This review aims to examine the disproportionate prevalence of cervical cancer among Canadian Aboriginal women in comparison to their non-Aboriginal counterparts, while addressing possible explanatory factors. It intends to analyze whether an association exists between HPV infection rates and higher cervical cancer prevalence.

Methods: A structured literature review was conducted to compare HPV prevalence in Aboriginal and non-Aboriginal Canadian women. Peer-reviewed studies were obtained from PubMed (MEDLINE) & CINAHL (EBSCO) and assessed for quality before inclusion.

Results: Although overall HPV infection prevalence remains similar between Aboriginal and non-Aboriginal women, the prevalence of high-risk HPV (HR-HPV) appears to be greater among Aboriginal women. Differential exposure to risk factors associated with HPV infection within the Aboriginal population may explain these findings.

Conclusions: Differences in HPV prevalence between Aboriginal and non-Aboriginal women may explain why cervical cancer prevalence is higher among Canadian Aboriginal women. Further studies are recommended to identify underlying factors explaining these observed differences.

INTRODUCTION

What is human papillomavirus?

Human papillomavirus (HPV) infects the skin and genital area [4]. There are over 100 types of HPV; at least 13 are considered oncogenic or “high-risk” [1]. Most are transmitted sexually [4].

How is HPV associated with cervical cancer?

HPV infections are prevalent in nearly all cases of cervical cancer [5].

How does cervical cancer affect Canadian women?

About 1500 Canadian women are newly diagnosed with cervical cancer each year [2]. Aboriginal women appear to be at an increased risk of developing cervical cancer relative to their non-Aboriginal counterparts [3].

Research Question: Are the differences in cervical cancer prevalence rates between Aboriginal and non-Aboriginal Canadian women attributable to HPV infection rates?

METHODS

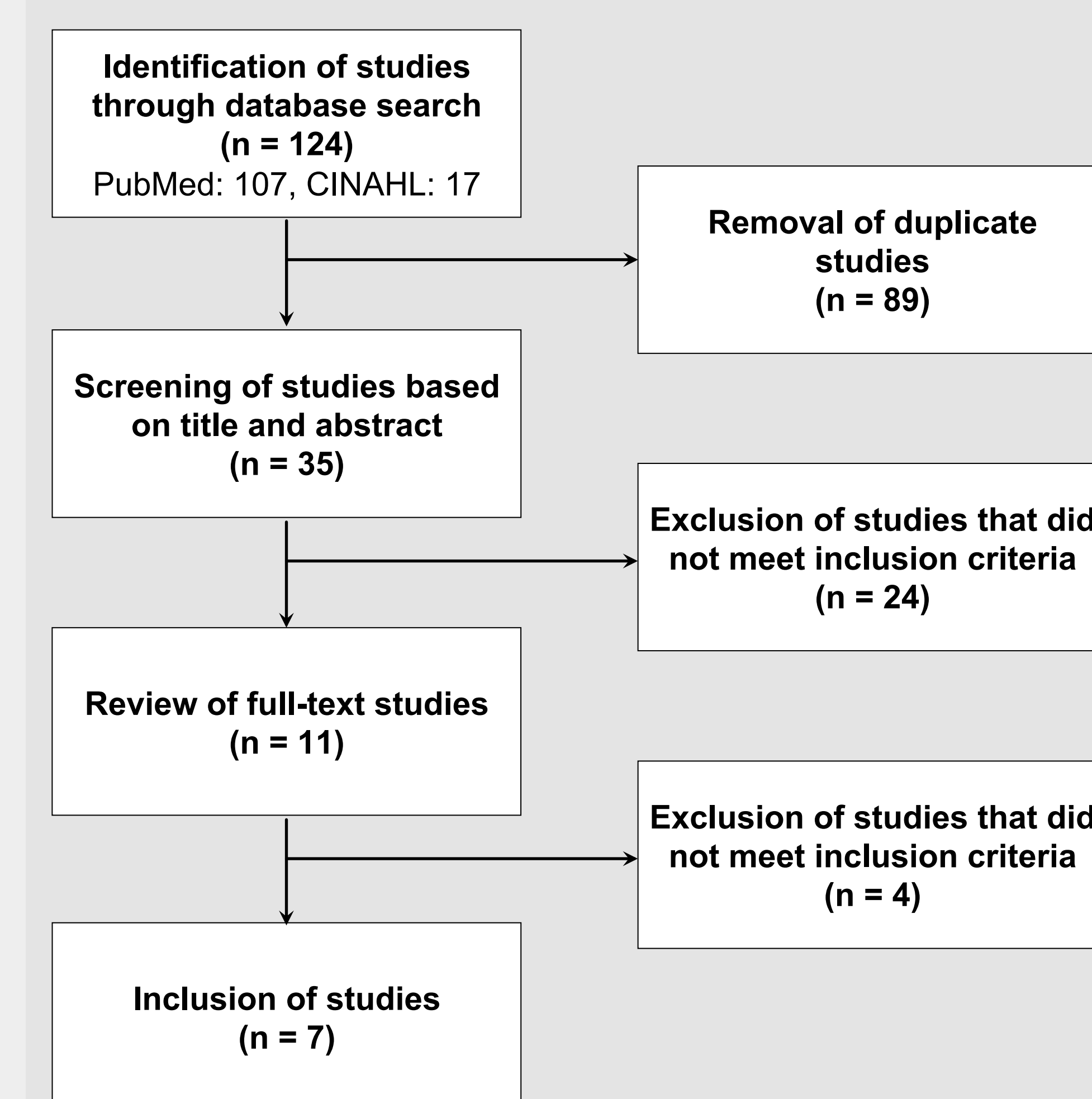


Figure 1. Flow chart illustrating the process of identifying studies for inclusion in the literature review. Databases were selected based on accessibility through the University of Ottawa and ease of use.

Inclusion criteria

- Canadian populations
- Evaluation of Aboriginal status, HPV prevalence & cervical cancer
- Peer-reviewed
- Publication date: 1995 – 2014

Exclusion criteria

- Focus on other ethnic groups
- Discussion only of cultural factors associated with HPV and cervical cancer
- Discussion only of vaccination against HPV

Agreement between raters

- Studies were selected using a 4-rater system; there was perfect agreement between raters ($\kappa = 1.00$).

DISCUSSION

- Although some studies suggested a higher HPV prevalence among Aboriginal women, results were inconclusive. HR-HPV appears to be more prevalent among Aboriginal women. Study findings suggest an association between HR-HPV and SIL that may explain the increased risk of cervical cancer among Aboriginal women.
- The association between HPV and Aboriginal status adjusted based on risk factors is modest in comparison to crude values; an increased exposure to risk factors among Aboriginal women may explain their increased risk of HPV.
- Adjusted ORs suggest an association between Aboriginal status and HR-HPV that is unexplained by studied risk factors; further research is needed to explore other biological and behavioral risk factors for HR-HPV among Aboriginal women.
- There was a U-shaped relationship observed between age and HPV prevalence among Aboriginal women (Fig. 2). Factors underlying the increased HPV prevalence among older Aboriginal women remain unclear, but may be the result of a cohort effect given the cross-sectional nature of the included studies.
- Study findings have limited comparability and generalizability. Study populations were geographically restricted (Fig. 3) and may represent heterogeneous subgroups within the Aboriginal population.
- All studies used convenience sampling of women presenting to health clinics; samples may not be representative of the general population in terms of health-related behaviours mediating HPV risk.

RESULTS

Table 1. Summary of results and limitations of selected articles^a.

Study	Statistical analysis	Primary findings	Limitations	Quality Rating
Brassard et al., 2012. [6]	Crude & adjusted ORs for HR-HPV by risk factor	↑ likelihood of HR-HPV infection in AB women (adjusted OR = 2.40; 95% CI: 1.65-3.49)	Recall & response bias Sampling bias	4.5
Healey et al., 2001. [7]	Adjusted ORs for HPV by risk factor Adjusted ORs for SIL by risk factor Crude & adjusted ORs for SIL by HPV viral load	Strong association between HPV & SIL (adjusted OR = 37.9; 95% CI: 17.7-80.8) Similar likelihood of HPV in Inuit vs. Non-Inuit women (adjusted OR = 1.01; 95% CI: 0.6-1.6 for Non-Inuit, using Inuit as reference) ↓ likelihood of SIL in non-Inuit women (HPV-adjusted OR = 0.75; 95% CI: 0.3-1.9)	Recall & response bias Difficult comparison to other studies; testing for only oncogenic HPV types	4.0
Jiang, Brassard, et al., 2013. [8]	Type-specific prevalence & AAPR of HPV χ^2 comparing HPV in AB vs. non-AB women Adjusted ORs, ARFs, PARs for SIL by any HPV, HR_s, HR_m, LR_s, LR_m, & HR/LR HPV	↑ HPV & HR-HPV AAPR in AB women; similar HPV16/18 AAPR ↑ proportion of HR-HPV in infected AB women OR for SIL with HR_m infection: 71.93 (95% CI: 52.55-98.47) OR for SIL with HPV16/18 infection: 50.82 (95% CI: 37.85-68.23) OR for SIL with HR/LR mix infection: 35.35 (95% CI: 25.01-49.98)	Recall & response bias Difficult comparison to studies using other HPV testing methods; used new Luminex technique Sampling bias: different recruitment methods in different regions, no universal coverage of target population Cross-sectional study; does not allow assessment of persistence of HPV infection & Pap abnormalities	4.0
Jiang, Hanley, et al., 2013. [9]	χ^2 comparing exposure and HPV in AB vs. non-AB women Crude & adjusted ORs for HPV by sociodemographics Adjusted ORs for abnormal Pap & SIL by HPV type	Similar likelihood any type of HPV in First Nations vs. non-First Nations (crude, adjusted OR = 1.6, 1.3; 95% CI: 0.8-1.8) Similar likelihood of HR-HPV (OR = 1.9, 1.5; 95% CI: 0.98-2.3) Similar likelihood of α -7 HPV (OR = 3.2, 1.6; 95% CI: 0.8-3.1) Similar likelihood of α -9 HPV (OR = 1.7, 1.2; 95% CI: 0.7-2.1) Strong association between SIL & HPV	Recall & response bias Difficult comparison to studies using other HPV testing methods; used new Luminex technique Sampling bias: convenience sampling, low participation rate (41%) Cross-sectional study; does not allow assessment of persistence of HPV infection and Pap abnormalities	4.75
Jiang et al., 2011. [10]	HPV prevalence by type & age group AAPR for HPV PAR for SIL associated with HPV infection	↑ HPV AAPR in AB women (28.0% vs. 18.8%) ↑ HR-HPV prevalence in AB women in all age groups (23.0% vs. 14.1%) Similar HPV16/18 prevalence in AB women vs. non-AB women (5.9% vs. 4.6%) ↑ prevalence of HR-HPV and HPV16/18 with level of cervical abnormalities PAR for cervical abnormalities associated with HPV: 89.5% (any type), 40.3% (HR-HPV_s), 27.1% (HPV16/18)	Difficult comparison to studies using other HPV testing methods; used new Luminex technique Sampling bias: convenience sampling, low participation rate (35%) Limited investigation of multiple HPV infections	4.75
Hamlin-Douglas et al., 2008. [11]	Prevalence & age-specific HPV prevalence by type, oncogenic risk group & α species Observed & expected frequencies of joint positivity of infection with HPV types Prevalence of HPV infection by cytology result	Prevalence of at least one type of HR-HPV among those with HPV infections: 70.6% ↑ prevalence of HPV-16, HPV-31 & HPV-58 in women with SIL ↑ prevalence of HPV-6, HPV-11, HPV-16 & HPV-18 & ↓ HPV-31 prevalence compared to other Canadian populations	Recall & response bias Sampling bias: small n, convenience sampling, possible participation bias Cross-sectional study; possibility of cohort effect	4.25
Young et al., 1996. [12]	χ^2 comparing prevalence of selected exposures, HPV & abnormal cytology in AB vs. non-AB Prevalence of HPV by risk factor AB status-adjusted ORs for HPV by risk factor ORs for HPV by number of sexual partners	Similar HPV prevalence in AB vs. non-AB women Most common HPV type in AB women: 18 (15%) Most common HPV type in non-AB type: 16 (13%) Association between 20+ lifetime partners and HPV in both AB & non-AB women	Recall & response bias Interviewer bias	4.0

^a Age of study participants ranged from 13 years to 60+ years. Aboriginal groups investigated in detail included First Nations, Métis, & Inuit, although some studies did not specify. All studies evaluated were cross-sectional studies using convenience sampling techniques. Sample sizes ranged from 554 to 14, 598. Variables assessed were HPV status, cervical cytology status and sociodemographic data.

AB = Aboriginal; HPV = human papillomavirus; HR-HPV = high-risk human papillomavirus; _s = single strain; _m = multiple strain; SIL = squamous intraepithelial lesions; OR = odds ratio; CI = confidence intervals; AAPR = age-adjusted prevalence rate; ARF = exposure attributable risk fraction; PAR = population attributable risk; ↓ = decreased; ↑ = increased.

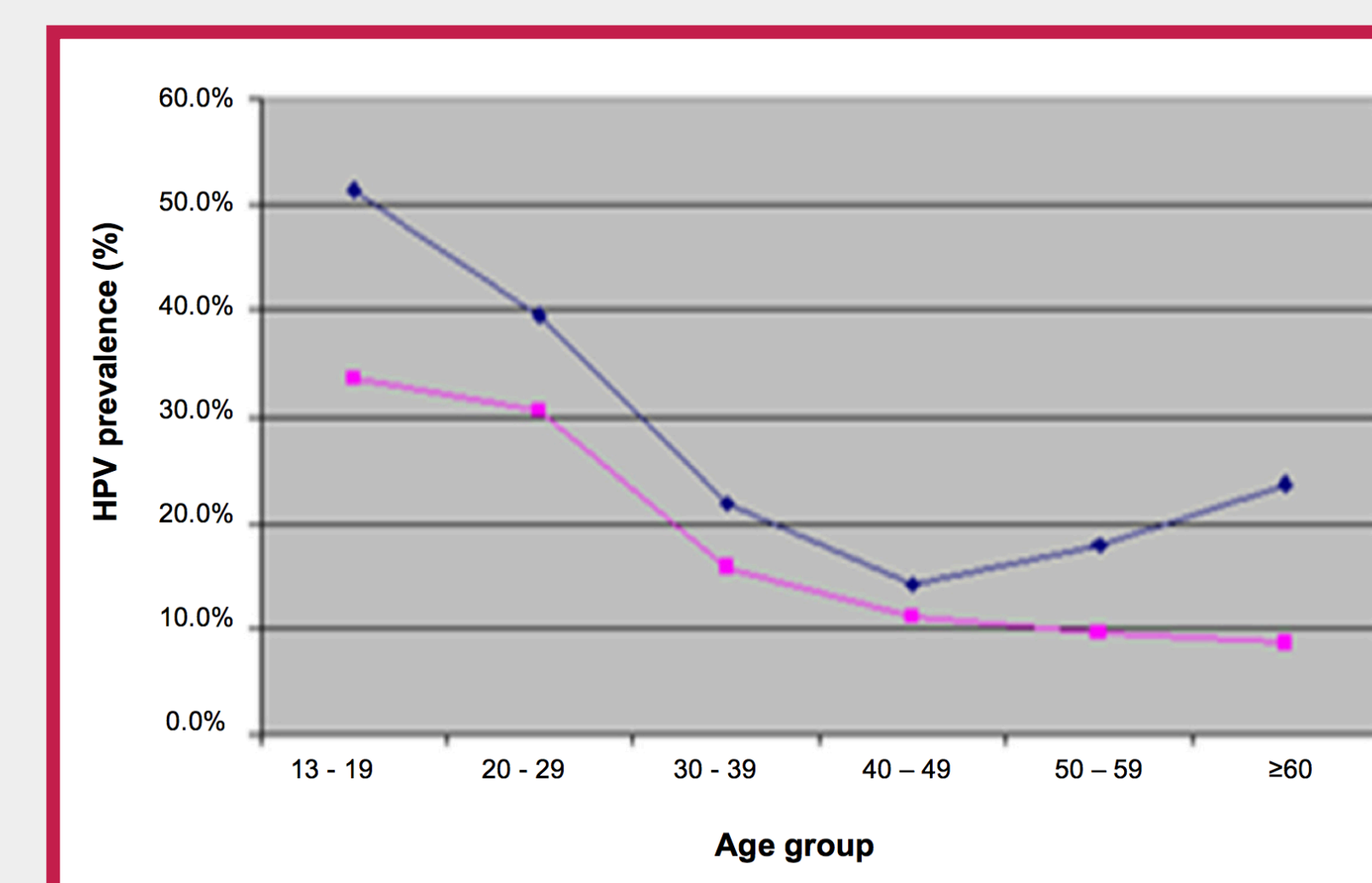


Figure 2. U-shaped relationship between HPV prevalence and age observed among Aboriginal women [8].

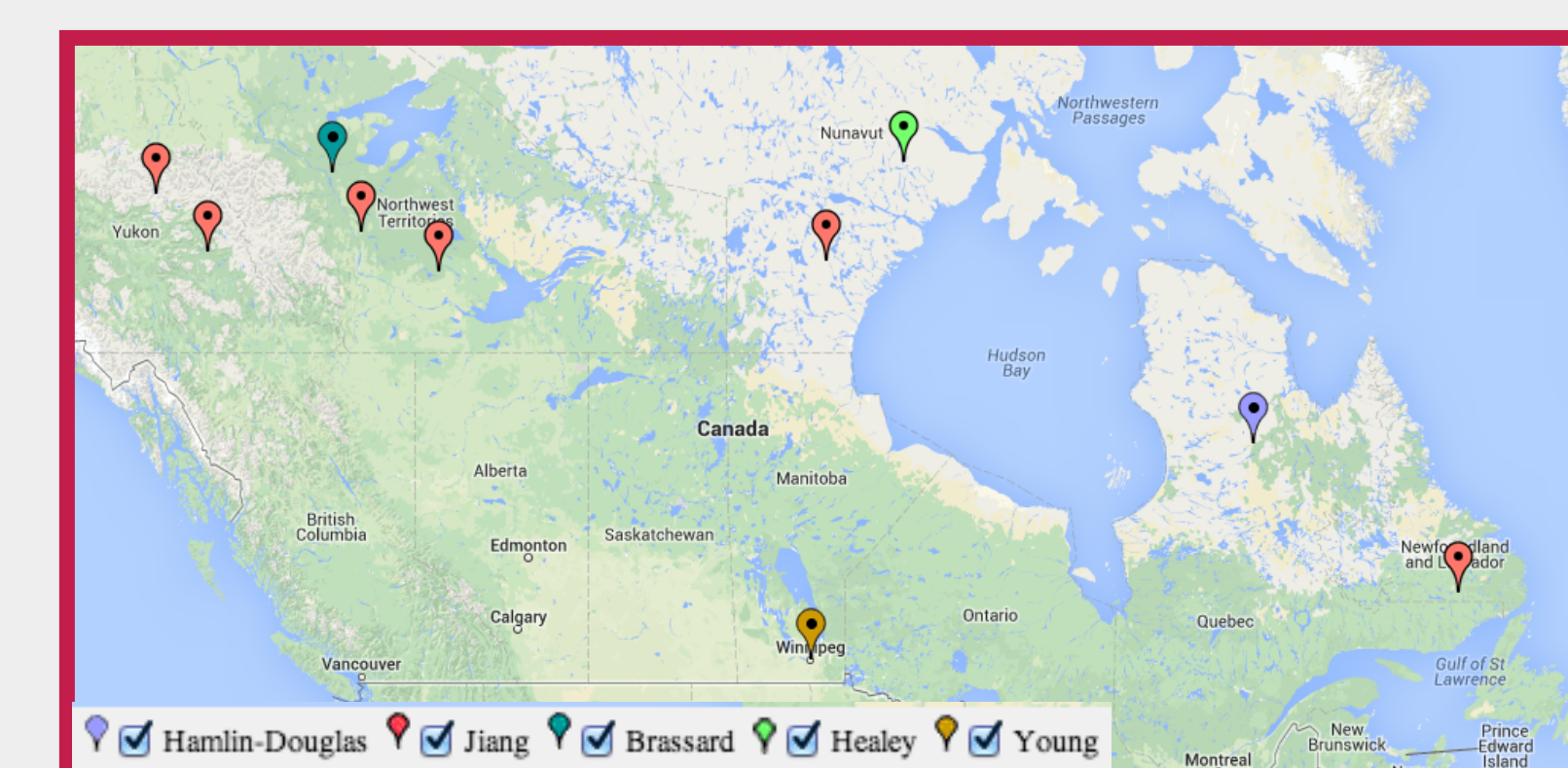


Figure 3. Map of study locations indicating the region of data collection.

CONCLUSIONS

- Differences in HPV prevalence among Aboriginal women and their non-Aboriginal counterparts may explain the increased prevalence of cervical cancer in this population.
- Given the strong association between HR-HPV and cervical cancer, more research is needed to explore why HR-HPV is particularly prevalent among Aboriginal women.
- Current research regarding HPV and cervical cancer among Canadian Aboriginal populations is limited to select subpopulations; similar studies should be conducted in other subgroups for comparison.
- Study findings are also important for vaccine development and policy to prevent infection with prevalent oncogenic HPV strains among Aboriginal women.
- Longitudinal studies are needed to explore factors underlying the increased HPV prevalence among older Aboriginal women and test for possible cohort effects. Such studies may also provide insight into the persistence of HPV and hold implications for cervical screening policies.