International Health 3 (2011) 193–198

Contents lists available at ScienceDirect

International Health

journal homepage: http://www.elsevier.com/locate/inhe

HIV diagnoses in indigenous peoples: comparison of Australia, Canada and New Zealand

Beverley Shea[a], Clive Aspin[b], James Ward[c], Chris Archibald[d], Nigel Dickson[e], Ann McDonald[f], Mera Penehira[g], Jessica Halverson[d], Renee Masching[h], Sue McAllister[e], Linda Tuhiwai Smith[g], John M. Kaldor[i], Neil Andersson[j,*]

[a] *CIETcanada, 1 Stewart Street, Ottawa, Canada*
[b] *Poche Centre for Indigenous Health, Sydney Medical School, University of Sydney, Australia*
[c] *Aboriginal and Torres Strait Islander Health Program, NCHECR, University of New South Wales, Sydney, Australia*
[d] *Surveillance and Risk Assessment Division, Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada*
[e] *AIDS Epidemiology Group, Department of Preventive and Social Medicine, University of Otago, New Zealand*
[f] *Surveillance and Evaluation Program for Public Health, NCHECR, University of New South Wales, Sydney, Australia*
[g] *Te Kotahi Research Institute for Innovation, Wellbeing and Inspiration, University of Waikato, New Zealand*
[h] *Canadian Aboriginal AIDS Network, Vancouver, British Columbia, Canada*
[i] *Public Health Interventions Research Group, NCHECR, University of New South Wales, Sydney, Australia*
[j] *Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Acapulco, Mexico*

A R T I C L E I N F O

Article history:
Received 9 December 2010
Accepted 30 March 2011
Available online 10 May 2011

Keywords:
HIV
Generalised epidemic
National surveillance
Indigenous
Australia
Canada
New Zealand

A B S T R A C T

In industrial countries, a number of factors put indigenous peoples at increased risk of HIV infection. National surveillance data between 1999 and 2008 provided diagnoses for Aboriginal and Torres Strait Islanders (Australia), First Nations, Inuit and Métis (Canada excluding Ontario and Quebec) and Māori (New Zealand). Each country provided similar data for a non-indigenous comparison population. Direct standardisation used the 2001 Canadian Aboriginal male population for comparison of five-year diagnosis rates in 1999–2003 and 2004–2008. Using the general population as denominators, we report diagnosis ratios for presumed heterosexual transmission, men who have sex with men (MSM) and intravenous drug users (IDU). Age standardised HIV diagnosis rates in indigenous peoples in Canada in 2004–2008 (178.1 and 178.4/100 000 for men and women respectively) were higher than in Australia (48.5 and 12.9/100 000) and New Zealand (41.9 and 4.3/100 000). Higher HIV diagnosis rates related to heterosexual contact among Aboriginal peoples, especially women, in Canada confirm a widening epidemic beyond the conventional risk groups. This potential of a generalised epidemic requires urgent attention in Aboriginal communities; available evidence can inform policy and action by all stakeholders. Although less striking in Australia and New Zealand, these findings may be relevant to indigenous peoples in other countries.

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1. Introduction

In Australia, Canada and New Zealand, indigenous people account for 2.5%, 3.8% and 15.5% of the populations respectively. These wealthy nations have comprehensive publicly funded health care systems yet there are major health disparities between non-indigenous populations and indigenous peoples in Australia (Aboriginal and Torres Strait Islanders),[1,2] Canada (including First Nations, Métis and Inuit)[3,4] and New Zealand (Māori).[5–7]

Several countries report high rates of HIV infection among indigenous peoples.[8] A study of HIV prevention

* Corresponding author.
E-mail address: andersson@ciet.org (N. Andersson).

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doi:10.1016/j.inhe.2011.03.010

among indigenous people is under way in Australia,[9] Canada[10] and New Zealand,[11] focusing on health related resilience and its relationship to the HIV epidemic. In this context, we compared rates of new HIV diagnoses in Australia, Canada and New Zealand to inform HIV prevention for indigenous peoples.

2. Methods

2.1. The surveillance programmes

2.1.1. Australia

HIV testing is free, widely available and done with informed consent. There is a legal obligation on the diagnosing doctor or HIV reference laboratory to report newly diagnosed HIV to the State or Territory health authority. These authorities send to the National HIV Registry details including sex, date of birth, date of diagnosis, self-reported indigenous status and self-reported exposure to HIV.

2.1.2. Canada

HIV infection is notifiable throughout the country with non-nominal data collated for national surveillance by the Public Health Agency of Canada. Health care providers consult with newly-diagnosed cases on ethnicity (including indigenous status) according to predefined categories. Ontario and Quebec do not report ethnicity information to the national level so we excluded these provinces, which account for some 30% of indigenous and 60% of non-indigenous Canadians.

2.1.3. New Zealand

Reporting is not obligatory but laboratories conducting confirmatory Western Blot testing have collated new cases since 1985. Indigenous status data were not collected before 1996, since which time the clinicians who arranged HIV testing provided anonymous information on indigenous status. Since 2002, laboratories performing viral load tests also provided reports. Western Blot or first viral load test in the study period confirmed each case reported here.

2.2. Identification as indigenous and non-indigenous persons

In Australia, identification as Aboriginal or Torres Strait Islander requires that the person is of this descent, that the person identifies as of this origin and their community accepts them.[12] In Canada, Aboriginal identification relies on self-reporting as First Nations, Inuit, Métis or 'Indigenous Not Specified'. In keeping with the New Zealand national census, a person is Māori who identifies as Māori and has Māori ancestry.

In Australia, non-indigenous rates exclude cases from sub-Saharan Africa, Burma, Cambodia and Thailand. In Canada, only HIV cases identified as 'White' were the reference group; non-indigenous figures presented here do not include other ethnic/racial groups in Canada. Similarly, in New Zealand the non-indigenous rates were those for European ethnicity.

From national surveillance systems of each country, we extracted new diagnoses of indigenous and non-indigenous cases along with age, sex, and exposure category during two five-year periods: 1999–2003 and 2004–2008. During these periods there was no screening in indigenous communities and testing was voluntary in all three countries. All countries tested donated blood and HIV testing was available in antenatal care.

2.3. Statistical methods

We based direct age standardisation of HIV diagnosis rates on the 2001 Aboriginal male population in Canada to allow inter-country comparison of overall rates. We had no reliable population figures for the number of men who have sex with men (MSM), intravenous drug users (IDU) or heterosexual people in each country. To facilitate comparisons, we calculated exposure-specific diagnosis ratios, recognising these dramatically underestimate actual diagnosis rates. We divided male heterosexual, MSM and male IDU by the male population aged 15–64 years and the female heterosexual and female IDU by the female population aged 15–64 years. We classified men reporting infection through same sex contact, but who also used injection drugs, as MSM.

3. Results

For the decade 1999–2008, Australia, Canada and New Zealand respectively analysed 7589, 5838 and 923 cases of new HIV diagnoses in people aged 15 years and older, of whom were 185, 1799 and 129 respectively were indigenous. Information on indigenous status at HIV diagnosis was not available for 518 cases in Australia, who we excluded from the analysis.

3.1. Indigenous and non-indigenous rates

Indigenous and non-indigenous men in Australia and New Zealand had similar age standardised rates of HIV diagnosis. In Canada, the rate of HIV diagnosis in indigenous men was four-fold that of non-indigenous men (Table 1). Across the three countries, non-Indigenous diagnosis rates were generally higher in men than in women. While male non-indigenous rates were similar across the three countries, rates for non-indigenous Canadian women were at least double those of non-indigenous women in Australia and New Zealand.

3.2. Time trends

In Australia, HIV diagnosis among indigenous women was six and three times higher than that in the non-indigenous population in 1999–2003 and 2004–2008 respectively. In Canada, HIV diagnosis among indigenous women was 14 times more common than among non-indigenous women in 1999–2003, the gap increasing to almost 20 times the non-indigenous rate in 2004–2008. Rates of HIV diagnosis among non-indigenous men showed a small increase over time, particularly in the 40–49 year age group. In Canada there was a drop in diagnosis among

Table 1
New HIV diagnosis rates per 100 000 over five years among adult (15+ years) indigenous and non-indigenous populations in Australia, Canada and New Zealand (two time periods, age and sex).

	Australia				Canada excluding Ontario and Quebec				New Zealand			
	Male		Female		Male		Female		Male		Female	
	1999–2003	2004–2008	1999–2003	2004–2008	1999–2003	2004–2008	1999–2003	2004–2008	1999–2003	2004–2008	1999–2003	2004–2008
Indigenous rates												
HIV cases	62	74	28	21	455	460	378	506	43	73	5	8
Population	135 391	157 967	142 698	164 827	221 650	268 780	241 610	294 985	156 828	172 206	172 974	193 188
Overall[a] (95% CI)	44.5	48.5	19.0	12.9	205.3	178.1	154.8	178.4	26.5	41.9	2.9	4.3
	(33.4,55.7)	(37.4,59.6)	(12.0,26.1)	(7.4,18.4)	(186.4,224.1)	(161.7,194.5)	(139.1,170.4)	(162.7,194)	(18.5,34.5)	(31.9,51.8)	(0.35,5.4)	(1.3,7.3)
Age group												
15–19y	8.9	7.3	4.5	7.7	22.7	26.9	75.6	108.2	0.0	0.0	4.0	3.4
20–29y	60.6	62.3	18.8	15	174.1	173.4	227.2	268.1	38.8	39.6	4.6	9.3
30–39y	72.6	79.1	41.2	19.2	387.1	309.5	227.3	247.6	55.3	103.1	2.4	4.7
40–49y	48.8	68.9	25.3	17.7	302.0	249.7	172.8	182.4	21.7	34.0	0.0	2.7
50+	18.7	7.4	0.0	3.2	87.8	86.3	29.4	42.5	3.4	13.5	3.1	0.0
Non- indigenous rates												
HIV cases	3157	3726	220	301	1668	1745	338	288	355	386	32	21
Population	7 450 889	8 046 065	7 697 064	8 278 576	3 692 370	3 819 035	3 855 240	3 960 550	893 268	981 042	1 070 271	1 091 817
Overall[a] (95% CI)	46.3	50.6	3.4	4.4	47.4	49.2	11.0	9.04	36.3	44.5	3.3	2.5
	(44.6,48.0)	(48.9,52.2)	(2.9,3.9)	(3.9,4.9)	(45.0,49.8)	(46.7,51.7)	(9.8,12.2)	(7.9,10.2)	(32.3,40.3)	(39.8,49.2)	(2.09,4.6)	(1.3,3.6)
Age group												
15–19y	4.5	4.9	2.2	1.4	1.5	1.9	4.2	3.5	9.5	4.2	2.2	1.1
20–29y	57	57.1	5.5	8	41.8	46.1	18.0	13.1	49.9	52.8	6.7	5.9
30–39y	93.3	91.3	5.7	8.5	92.5	84.2	16.7	13.8	63.0	70.7	4.4	1.6
40–49y	48	68.5	2.3	3.6	65.8	77.3	10.8	9.9	34.7	64.2	1.4	2.0
50+	17.2	20.1	0.9	1.1	21.3	24.3	1.5	2.4	11.8	18.2	0.6	0.9

[a] Overall rates for males and females aged 15y+ are standardized directly to the age distribution of the 2001 Canadian male indigenous population. Age-specific rates are not adjusted.
Australia: non-indigenous cases in 1999–2003 excludes 13 people whose sex was reported as transgender and one person whose sex was not reported; indigenous diagnoses in 1999–2003 excludes 171 cases whose indigenous status was not reported; non-indigenous cases in 2004–2008 excludes six persons whose sex was reported as transgender and one whose sex was not reported; total number of new diagnoses in 2004–2008 excludes 324 cases whose indigenous status was not reported. For the population at risk for 1999–2003 we used the 2001 population, and the 2006 population for 2004–2008.

males and non-indigenous female IDU from 1999–2003 to 2004–2008, with an increase among indigenous female IDU (Table 2). Non-indigenous MSM diagnosis ratios increased in all three countries between the two periods; indigenous MSM ratios decreased in Canada.

3.3. *Analysis by reported mode of acquisition*

Diagnosis ratios for IDU cases were higher among indigenous than non-indigenous peoples in Australia and Canada. Generally diagnosis was more common among men than women (Table 2). Although ratios of cases attributed to heterosexual transmission were low in indigenous peoples in Australia and New Zealand, female ratios were notably higher than male in both countries. In Canada, diagnoses related to heterosexual transmission were much higher among indigenous than non-indigenous men and women. HIV diagnosis ratios for MSM were similar in the indigenous and non-indigenous populations in the three countries (Table 2).

4. Discussion

In Australia, Canada and New Zealand, HIV diagnosis rates were generally higher in indigenous than non-indigenous women, particularly among younger women. Indigenous rates in Canada were substantially higher than in New Zealand and Australia.

In the non-indigenous populations of all three countries, there were higher overall rates of new diagnoses in men than in women. In Canada, rates among 15–19 year old indigenous and non-indigenous women were higher than among their male counterparts. High levels of heterosexual and IDU transmission seem to account for this, raising urgent policy and programme issues.

4.1. *Limitations*

The background and data collection dynamics differ from country to country, requiring caution in comparisons. Diagnoses in all three countries do not come from population based screening but voluntary testing, usually in a clinical context. Part of the differences between the countries could be due to differences in access to the diagnostic opportunity. We used five years of diagnoses and a single year population estimate; while robust for internal study comparisons, our results are not comparable with other diagnosis rates without further manipulation.

Without denominators for the acquisition categories, we used segments of the relevant general population as denominators for comparability. Table 2 thus dramatically underestimates the subgroup diagnosis rate and average individual risk for MSM and IDU transmission.

Canadian data exclude Ontario and Quebec, provinces that do not report ethnicity to the national level. Lower HIV infection rates in these provinces, especially among indigenous peoples, could explain part of the higher rates in Canada compared with the other two countries. But it cannot explain the higher rates among younger Canadian indigenous women and it does not explain the especially

Table 2
Crude ratios[a] of new HIV diagnoses per 100 000 (number of cases over five years) by reported mode of acquisition during the two time periods.

	Australia		Canada excluding Ontario and Quebec		New Zealand	
	1999–2003 ratio/100000 (*n*)	2004–2008 ratio/100000 (*n*)	1999–2003 ratio/100000 (*n*)	2004–2008 ratio/100000 (*n*)	1999–2003 ratio/100000 (*n*)	2004–2008 ratio/100000 (*n*)
Indigenous ratios						
Heterosexual males/all men 15–64 years	9.2 (12)	5.3 (8)	51.1 (107)	47.6 (120)	1.3 (2)	5.0 (8)
Heterosexual female/all women 15–64 years	15.4 (21)	9.6 (14)	51.0 (116)	59.3 (165)	3.1 (5)	4.4 (8)
IDU males/all men 15–64 years	7.7 (10)	9.2 (14)	120.4 (252)	95.3 (240)	0.7 (1)	0.6 (1)
IDU females/all women 15–64 years	5.1 (7)	4.5 (7)	106.8 (243)	118.3 (327)	0.0	0.0
MSM[b]/all men 15–64 years	29.2 (38)	33.6 (51)	38.2 (80)	33.0 (83)	24.9 (37)	36.8 (59)
Non-indigenous ratios						
Heterosexual males/all men 15–64years	3.5 (266)	4.5 (369)	8.7 (273)	8.5 (271)	3.0 (27)	3.3 (27)
Heterosexual females/all women 15–64 years	2.4 (191)	2.9 (245)	4.8 (151)	4.4 (140)	2.9 (28)	2.1 (18)
IDU males/all men 15–64 years	1.5 (115)	1.2 (98)	14.7 (462)	10.6 (340)	1.0 (9)	0.4 (3)
IDU females/all 15–64 years	0.2 (18)	0.3 (27)	5.8 (181)	4.3 (138)	0.3 (3)	0.0
MSM[b]/all men 15–64 years	34.2 (2593)	37.5 (3079)	29.1 (914)	34.7 (1114)	33.2 (301)	43.1 (348)

IDU: Intravenous drug users; MSM: Men who have sex with men.
[a] As population denominators are unknown, MSM and IDU ratios refer to the appropriate population aged 15–64 years.
[b] Men reported as MSM and IDU were counted as MSM.

high levels of diagnosis attributed to IDU among indigenous women.

4.2. Significance of the findings

The increasing MSM diagnosis ratios fits with an international trend.[13] MSM diagnosis ratios were notably similar in the three countries; indigenous MSM were not at disproportionate risk compared with non-indigenous MSM. If any of the striking inter-country differences are attributable to variations in access to diagnosis, this does not seem to affect MSM.

The HIV risk related to IDU is well recognised in Canadian Aboriginal peoples.[14–16] Social disadvantages precipitated by discrimination, the after-effects of residential schools and barriers to health care all play a role.[17,18] IDU studies in Vancouver suggested that indigenous people might carry a disproportionately high risk of HIV transmission by this route.[19,20]

High HIV risk in IDU among Aboriginal peoples is not unique to Canada. In Australia, indigenous IDU were more likely to begin injecting drugs at a younger age than non-indigenous users.[21] There is also an increasing use of cocaine by Aboriginal and Torres Strait Islander IDUs.[22] In New Zealand, needle exchange programmes may have had little success in preventing hepatitis C transmission among IDU, but they may have helped to prevent HIV in the same group.[23] All three countries operated needle exchange programmes for many years[24,25] but differences may help to explain the IDU HIV variance between countries. In contrast with Australia and New Zealand, most Canadian needle exchange programmes initially operated a one-for-one exchange, instead of providing a contingency supply; they also initially operated from fixed sites with limited hours of operation.[26] Higher use of cocaine requires more frequent injections, which could have increased needle demand in Canada; unstable housing may also have played a role.[27,28]

If the type of drugs used and different needle exchange schemes explain part of the inter-country differences in IDU risk, the higher diagnosis ratios due to heterosexual transmission in Australia and Canada are not so easily explained. Indigenous Canadians have a longer life expectancy and lower infant mortality rates than counterparts in Australia and New Zealand, so generally poorer health is not a likely explanation. Younger women are more likely to take up diagnostic opportunities during antenatal and other checks. This could explain part of the high female:male ratio, but it is unlikely to explain age-specific differences or higher HIV diagnosis rates in indigenous peoples, who tend to have less access to health care than does the non-indigenous population.

An increasing rate of heterosexual transmission is usually a sign the epidemic has moved beyond the recognised IDU and MSM risk groups. This was particularly prominent among indigenous women in Canada (Table 1) and shows the need for prevention in this vulnerable group. The evidence could inform policy and action to prevent development of a generalised HIV epidemic.

Our current data offer no detail on the gap between the Canadian and the other country rates. Similarities of indigenous and non-indigenous rates in New Zealand suggest that the gap between indigenous and non-indigenous diagnoses in Canada and Australia is not due to any intrinsic susceptibility of indigenous peoples. It is possible that these reflect gender-specific issues that increase risk for HIV infection: sexual abuse, transactional sex and trans-generational sex can all be accompanied by power gradients that increase HIV risk.[29]

Gendered power differentials might also help to explain some of the differences in IDU HIV risks. In IDU transmission can result from sharing contaminated injecting equipment. Another mechanism has to do with intoxication and its corollary, inability to negotiate safe sex.[30] In an environment where women are especially disempowered, the results of this choice disability falls unevenly.[31] Mehrabadi reported higher HIV rates among young Aboriginal female IDU (13.1%) in Canada than their male counterparts (4.3%).[32] Some 70% of young female IDU reported forced sex compared with 29% of men; among IDU who reported sexual abuse, 34 (15.2%) were HIV-positive compared with 4.4% who reported no sexual abuse.[33]

5. Conclusions

Comparisons between indigenous and non-indigenous diagnosis rates cannot summarise the full impact of HIV infection on indigenous peoples, for whom they are part of broader health disparities. The data nevertheless open a window to increase understanding of indigenous health in the face of ongoing challenges associated with HIV. Our results show the value of including indigenous status in HIV diagnosis notification.

Indigenous peoples have strengths that have helped them to survive and to overcome serious challenges to their health. Further research can draw on these strengths to identify factors that will help in overcoming the challenges of HIV.

In Canada, the HIV epidemic among Aboriginal peoples requires urgent attention, with available evidence informing policy and action by all stakeholders in the communities and all levels of government.

Authors' contributions: BS, CA, JH, ND, SM and AM contributed to study design, interpretation of the data, drafting the manuscript and reviewing the version; MP, ND, RM, LS, JW and JK interpreted the data and contributed to the current version of the manuscript; NA contributed to interpretation of the data in earlier drafts and wrote the current version of the manuscript. All authors read and approved the final manuscript. NA and BS are guarantors of the paper.

Acknowledgements: The Australian Bureau of Statistics, Statistics Canada and Statistics New Zealand provided information on the age and sex structure of their respective populations. The Australian authors thank the State and Territory surveillance officers who contributed data for national HIV surveillance, and the members of the Australian Steering Committee of the ICIHRP project. The Canadian authors acknowledge the provincial and territory surveillance officers who send non-nominal confidential

reports to national HIV surveillance. The New Zealand authors acknowledge the long-term commitment from clinicians who provide information on people diagnosed with HIV in New Zealand.

Funding: Under a 2002 trilateral agreement between the Australian National Health and Medical Research Council (NHMRC), the Canadian Institute of Health Research (CIHR) and the Health Research Council (HRC) of New Zealand, three complementary research projects received funding to improve the health of indigenous people in the three countries. Part of the Australian contribution to this publication was funded by the Australian Government Department of Health and Ageing. The Kirby Institute is affiliated with the Faculty of Medicine, University of New South Wales. John Kaldor receives a Research Fellowship from the National Health and Medical Research Council. The New Zealand AIDS Epidemiology Group receives funding from the New Zealand Ministry of Health. The views expressed in this publication do not necessarily represent the position of the Australian, Canadian or New Zealand Governments.

Conflicts of interest: None declared.

Ethical approval: None required.

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