

# USING HIV NOTIFICATION DATA TO IDENTIFY PRIORITY MIGRANT GROUPS FOR HIV PREVENTION, NEW SOUTH WALES, 2000–2008

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## Abstract

Non-Australian-born people comprise a third of HIV notifications in Australia. With increasing numbers of immigrants in Australia, public health and health promotion programs will need to adapt to the emerging epidemic of HIV among people from culturally and linguistically diverse (CALD) backgrounds. This study uses HIV notification data to compare Australian-born and non-Australian-born cases in New South Wales and aims to determine if income of source country is useful in identifying high priority CALD groups. Notified cases of newly diagnosed HIV between 2000 and 2008 in New South Wales were divided into Australian-born, persons born in high-income countries and persons born in middle and low-income countries based on World Bank classifications. These three groups were then compared to determine their risk factors for HIV infection. Of the 3,397 newly diagnosed HIV infections in New South Wales, 2,906 (86%) had a country of birth reported from 102 different countries. Cases born in high-income countries were similar to Australian-born cases; predominantly men reporting homosexual acquisition. Both these groups were different to cases born in middle and low-income countries; they were younger, more commonly female and reported heterosexual acquisition of HIV. Using income from source countries is useful as a model to better understand and target responses to HIV in non-Australian-born populations in New South Wales as it suggests that the public health and health promotion response in New South Wales and Australia should also focus on the priority communities drawn from low and middle income countries. *Commun Dis Intell* 2011;35(2):185–191.

Keywords: HIV, immigrants, income, epidemiology

## Introduction

There are 33 million people living with HIV worldwide and an estimated 2.7 million people were newly infected with HIV in 2008. sub-Saharan Africa has by far the highest prevalence of HIV in the world, at 5.2% in 2008, with the Caribbean, Eastern Europe, Central Asia, North America and Latin America having prevalence's between 0.5 and 1%, the remaining regions have less than this.<sup>1</sup> Australia

has an estimated 17,444 people living with HIV or a prevalence of 0.1%, and between 2004 and 2008, non Australian-born people accounted for 33% of HIV notifications. With the exception of 2005, the highest annual incident rate over this period was among people born in sub-Saharan Africa.<sup>2</sup> Increasing cases of HIV among immigrants have been reported in other high-income countries in the European Union,<sup>3,4</sup> other European countries,<sup>5</sup> the United States of America (USA),<sup>6,7</sup> Canada,<sup>8</sup> Israel<sup>9</sup> and New Zealand.<sup>10</sup>

In New South Wales, where 54% of all newly diagnosed cases of HIV in Australia are located, HIV infection occurs predominately in men who have sex with men, although there has been a modest increase in the number of cases reporting heterosexual acquisition since the mid-1990s.<sup>11</sup> Non-Australian-born cases of HIV are drawn from multiple countries, but are concentrated in the countries of Asia and sub-Saharan Africa.<sup>12</sup> Surveys among these communities have found high levels of knowledge and awareness of HIV but variable practice to HIV prevention and poor health service access.<sup>13</sup> Recent migrants living with HIV are often faced with negotiating two major life disruptions simultaneously: an HIV diagnosis and the stressors of migration.<sup>14</sup>

Global population mobility and accelerating international migration has transformed the demography of most Western countries over the past 50 years,<sup>15</sup> facilitated by increased air travel and temporary migration.<sup>16</sup> Population mobility and migration have long been implicated in the history of the spread of infectious diseases like tuberculosis and hepatitis B, by bringing populations with disparate prevalence rates of disease into closer proximity with each other.<sup>17</sup>

Australia's annual migrant intake comprises 150,000 permanent settlers and more than 600,000 temporary residents per year.<sup>18</sup> The health requirements for permanent settlers aged over 15 years includes an HIV test,<sup>14</sup> which can occur in Australia or offshore.<sup>19</sup> For temporary visa applications, the health requirements vary depending on personal circumstance, intended activities in Australia, and country of origin or residence.<sup>20</sup> Applicants with health conditions that do not meet the health requirements (including HIV-positive applicants) may be granted a health

waiver. For the 2004/2005 financial year 156 such health waivers were granted from a total of almost 4.5 million visa applications to the Department of Immigration and Citizenship.<sup>19</sup> New South Wales is the most popular destination for both permanent settlers and temporary entrants<sup>18</sup> and has one of the most culturally diverse communities in Australia with 24% of the population born overseas and 16% speaking a language other than English at home.<sup>21</sup>

People from culturally and linguistically diverse (CALD) backgrounds are recognised as a priority population in the *NSW HIV/AIDS Strategy*.<sup>22</sup> According to this strategy, high priority groups within this population can be identified through HIV notifications in New South Wales, census and immigration data, and the prevalence of HIV in the countries-of-origin.<sup>22</sup> This study uses HIV notification data to compare Australian-born and non-Australian-born cases in New South Wales and aims to determine if income of source country is useful in identifying these high priority CALD groups.

## Methods

Under the *Public Health Act 1991*, diagnosing laboratories are required to report all confirmed HIV infections that meet the national case definition<sup>23</sup> with further demographic, clinical, risk factor and testing history information collected from the diagnosing doctor. A case was defined as a person newly diagnosed with HIV between 2000 and 2008, who was a New South Wales resident at the time of diagnosis. Cases were excluded if they had a previous HIV positive test reported in New South Wales, they were not residents of New South Wales or reported a previous positive HIV test outside New South Wales.

Region of birth categories and New South Wales population by country of birth were obtained from the Australian Bureau of Statistics.<sup>24</sup> The two European regions were combined, and North Africa, the Middle East, and North East, Central and Southern Asia were combined due to small numbers of HIV cases. As population by country of birth was available for census years only (2001 and 2006), data were analysed in three 3 year groups: 2000–2002, 2003–2005 and 2006–2008 and the 2006 population data used as the denominator for the 2 later periods. Tests for trends were conducted using Poisson regression for rates and linear regression for proportions.

Gross national income as per the World Bank country classifications<sup>25</sup> were used to categorise the non-Australian-born into high and middle and low-income groups, and then compared these with Australian-born cases. Several categorical logistic regression models using backward elimina-

tion were constructed to compare these 3 groups: Australian-born with cases from other high-income countries (Model 1), Australian-born with cases from middle and low-income countries (Model 2), and cases from high-income countries with cases from middle and low-income countries (Model 3). Factors included in these models were age group, residence at diagnosis, exposure category and stage of HIV diagnosis. Gender was excluded from the models due to its high correlation with homosexually acquired exposure. Data were analysed using SAS version 9.1.3.<sup>26</sup>

Risk exposure information was provided by the treating medical practitioner on the notification form. Where more than one risk exposure was reported, a hierarchy of risk was used to designate the case's primary risk exposure; that most strongly associated with transmission of HIV. Where homosexually acquired infection was reported, it was considered the primary risk exposure. All heterosexually-acquired cases were combined in the models due to a small numbers in some categories.

Early diagnosis was defined as cases with either a negative or indeterminate HIV antibody test or a seroconversion illness in the 12 months prior to testing positive and late diagnosis was defined as having either a CD4 count less than 200 in the absence of a seroconversion illness or an AIDS defining illness within 3 months of HIV diagnosis. A third category of those with a CD4 count greater than 200 was also included. Residence at diagnosis, based on address information on the notification form, was categorised into Inner Sydney, comprising central and south-eastern Sydney, metropolitan comprising the remainder of Sydney, the Hunter and Illawarra areas and non-metropolitan comprising the rest of the State. Likely country of HIV acquisition has not been included in this analysis as it has only been collected since mid-2007.

## Results

Between 2000 and 2008, there were 3,367 newly diagnosed HIV infections in New South Wales. The rate of newly diagnosed HIV in New South Wales remained stable over the study period, with an annual average rate between 5.1 per 100,000 in 2006–2008 to 6.1 per 100,000 in 2003–2005 ( $P = 0.69$ ). Country of birth was reported for 2,906 newly diagnosed HIV cases (86%) and this proportion did not differ over the three periods ( $P = 0.22$ ).

### New HIV diagnoses by region and country of birth

There were 102 countries of birth reported for newly diagnosed HIV cases in New South Wales, with almost two-thirds (62%) of the study population

being Australian-born. Ten per cent were born in Europe, 9% in South East Asia, 5% in sub-Saharan Africa, 4% in Oceania (excluding Australia), 4% in North Africa, Middle East and Other Asia, 2% in Central and South America and 2% in North America.

Cases born in sub-Saharan Africa had the highest rates of new HIV diagnoses in New South Wales for each of the three periods, at over 30 per 100,000 population. This was followed by North America, where rates decreased over the study period, Central and South America, where the later period had the highest rates, and South East Asia. Although there was some fluctuation in the average annual rates by region of birth over the three periods for most regions, these were not significantly different (Figure).

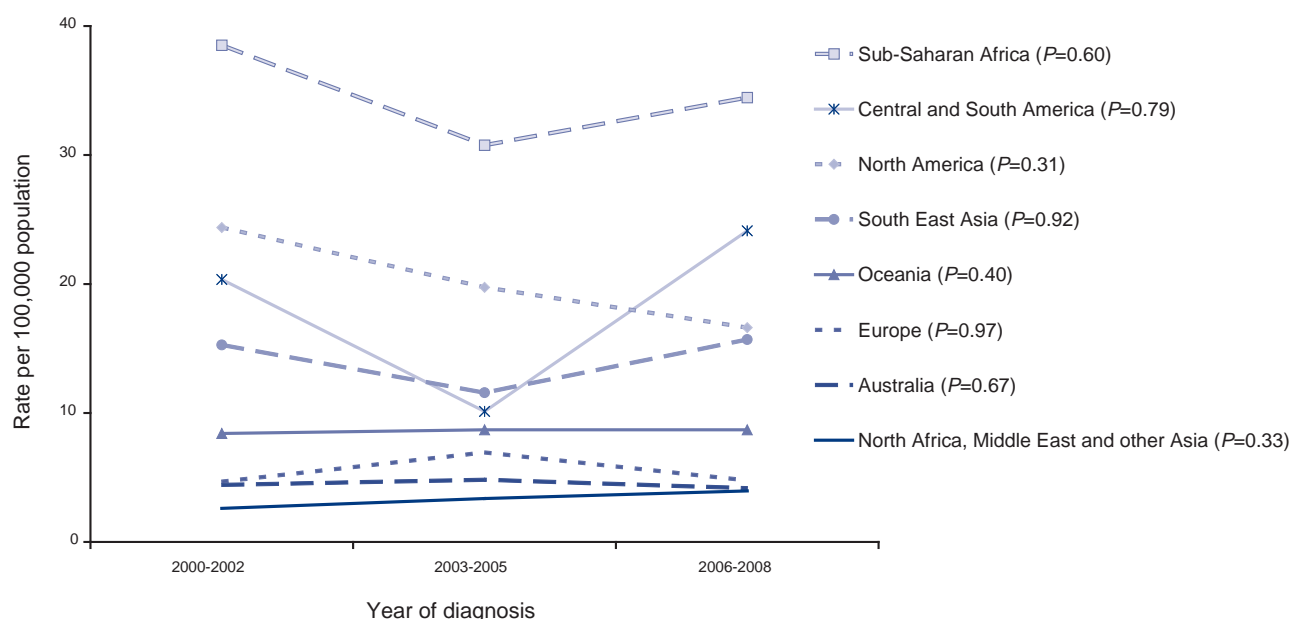
Countries of birth with more than 5 new HIV diagnoses in all three periods included Thailand, the United States of America (USA), New Zealand and the United Kingdom (UK). These rates remained stable for the USA and UK over the three periods at around 25 and 11 per 100,000 respectively. Rates for Thailand fluctuated over the three periods between 119.4, 57.0 and 95.0 per 100,000 respectively, and decreased for New Zealand from 6.2 per 100,000 during 2000–2002 to 4.8 per 100,000 in 2006–2008. During the last period Indonesia, Brazil and Zimbabwe had more than 5 cases per year at 27.4, 121.7 and 133.5 per 100,000 respectively, and South Africa had more than 5 cases in the earliest period at 16.3 per 100,000 population.

### Comparison of country of birth income groups

There were 479 (17%) newly diagnosed HIV cases born in high-income countries and 614 (21%) born in middle and low-income countries. The average annual rate of new HIV diagnoses was consistent for the three groups over the three periods ( $P = 0.67$ , 0.96 and 0.74 for Australian-born, high-income and middle and low-income, respectively). These rates ranged from 4.2 per 100,000 for Australia-born in 2006–2008 to 11.0 per 100,000 for middle and low-income groups in the same period.

When comparing the epidemiology of cases by country of birth income group, the Australian-born and cases from high-income countries were similar to each other, yet both were different to cases from middle and low-income countries (Table 1). In terms of both gender and acquisition, males and homo-sexually-acquired exposure accounted for most new HIV diagnoses in the Australian-born and for cases from high-income countries, whereas almost a third of cases from middle and low-income countries were female and almost half were heterosexually acquired. In middle and low-income countries, a third of cases reported heterosexual acquisition from high prevalence countries (34%), compared with 0.5% of the Australian and none of the high-income groups. Cases from middle and low-income countries were also younger than the other two groups, with 73.9% aged less than 39 years, compared with 64.2% and 64.7% of the Australian-born and cases from high-income countries respectively.

**Figure: Rate of newly diagnosed HIV, New South Wales, 2000 to 2008, by period of diagnosis and region of birth**



There were differences between all three groups with respect to residence at diagnosis. Although the highest proportion for each group resided in Inner Sydney at diagnosis, this proportion was higher for the Australian-born and high-income countries than for the middle and low-income countries (64.3% and 77.0% compared with 51.0%). Australian-born cases had the highest proportion residing in non-metropolitan New South Wales at diagnosis at 8.8%.

As expected, language spoken at home also differed amongst the three groups, with half of cases from middle and low-income countries, 14.8% of cases

from high-income countries and 0.2% of Australian-born cases reporting speaking a language other than English (LOTE) in the home (Table 1). The proportion reporting speaking a LOTE at home decreased from 20% in 2000–2002 to 11% in the two later periods and this was most marked in cases from middle and low-income countries, in which the proportion reporting speaking a LOTE at home decreased from 79% during 2000–2002 to 38% during 2006–2008.

The type of doctor diagnosing HIV also differed between the three groups, with a higher proportion

**Table 1: Characteristics of Australian and non-Australian-born persons with newly diagnosed HIV in New South Wales, 2000–2008**

Characteristic*	Income group		
	Australian-born	High-income	Middle and low-income
Total	1,813 (100.0)	479 (100.0)	614 (100.0)
<b>Sex</b>			
Female	107 (5.9)	22 (4.6)	169 (27.5)
Male	1,699 (93.7)	453 (94.6)	439 (71.5)
<b>Age group</b>			
< 30 years	455 (25.1)	112 (23.4)	229 (37.3)
30–39 years	708 (39.1)	198 (41.3)	225 (36.6)
40–49 years	443 (24.4)	105 (21.9)	115 (18.7)
> 50 years	207 (11.4)	64 (13.4)	45 (7.3)
<b>Exposure</b>			
Heterosexually	188 (10.4)	49 (10.2)	291 (47.4)
High prevalence†	9 (0.5)	0 (0.0)	207 (33.7)
Homosexually	1,479 (81.6)	387 (80.8)	261 (42.5)
Intravenous drug users	73 (4.0)	10 (2.1)	23 (3.7)
Other	8 (0.4)	0 (0.0)	4 (0.7)
<b>Stage at diagnosis</b>			
Late	236 (13.0)	62 (12.9)	127 (20.7)
CD4 > 200	539 (29.7)	161 (33.6)	214 (34.9)
Early	699 (38.6)	168 (35.1)	104 (16.9)
<b>Residence at diagnosis</b>			
Inner Sydney	1,165 (64.3)	369 (77.0)	313 (51.0)
Metropolitan	447 (24.7)	86 (18.0)	254 (41.4)
Non-metropolitan	159 (8.8)	15 (3.1)	26 (4.2)
<b>Language spoken at home</b>			
English	1,779 (98.1)	399 (83.3)	230 (37.5)
LOTE	3 (0.2)	71 (14.8)	334 (54.4)
<b>Diagnosing doctor</b>			
General practitioner	1,131 (62.4)	220 (45.9)	256 (41.7)
Publicly funded clinic	606 (33.4)	214 (44.7)	261 (42.5)
Immigration /occupational	1 (0.1)	25 (5.2)	71 (11.6)
Other	47 (2.6)	10 (2.1)	20 (3.3)

LOTE Language other than English

\* May not add to total due to missing responses.

† Exposure reported from countries or regions are those where the prevalence of HIV in the population is more than 1%

of Australian-born cases being diagnosed by general practitioners (62.4%) compared with less than half of cases from high-income and middle and low-income countries (45.9% and 41.7% respectively). Cases from high-income and middle and low-income countries had higher proportions being diagnosed at publicly funded clinics or immigration and occupational services (Table 1).

The multivariate models confirmed these observations. In model 1, where Australian-born cases were compared with cases from high-income countries, there were only two differences. Australian-born cases were more likely to have resided in non-metropolitan areas at diagnosis and report exposure through injecting drug use (Table 2).

In the comparison of Australian-born cases with cases from middle and low-income countries (Model 2), there were several differences. Australian-born cases were more likely to be aged more than 50 years, reside in non-metropolitan areas at diagnosis, and report exposure as either homosexually acquired or acquired through IDU. Results from the comparison between cases from high-income and cases from middle and low-income countries (Model 3) were similar to that of Model 2, as cases from high-income

countries were also more likely be aged more than 50 years, reside in non-metropolitan areas at diagnosis, and have either homosexually or IDU acquired exposure compared with cases from middle and low-income countries. The odds ratios were higher in Model 2 compared with Model 3, suggesting that the difference between Australian-born cases and cases from middle and low-income countries was more marked than the differences between cases from high-income countries and cases from middle and low-income countries (Table 2).

## Discussion

Almost two-thirds of cases newly diagnosed with HIV in New South Wales between 2000 and 2008 were Australian-born, with the remainder being born in one of 101 other countries. Cases from sub-Saharan Africa had the highest rates in New South Wales over the study period, followed by North America, Central and South America and South East Asia.

Cases born in other high-income countries were similar to Australian-born cases, predominantly men reporting homosexual-acquisition of their HIV infection. These two groups were different

**Table 2: Multivariate analyses comparing Australian-born with those born in high-income countries, Australian-born with those born in middle and low-income countries and those born in high-income countries with those born in middle and low-income countries**

Characteristic	Model 1: Australian-born vs high-income	Model 2: Australian-born vs middle and low-income	Model 3: High vs middle and low-income
<b>Period</b>			
2000–2002	–	1.0	1.0
2003–2005	–	1 (0.8–1.4)	1.3 (0.8–1.9)
2006–2008	–	0.6 (0.4–0.8)	0.7 (0.5–1.1)
<b>Age group</b>			
<30 years	–	0.7 (0.5–1)	0.7 (0.5–1.1)
30–39 years	–	1.0	
40–49 years	–	1.3 (1–1.9)	1 (0.7–1.6)
>50 years	–	2.5 (1.5–4.1)	2.7 (1.5–5)
<b>Residence at diagnosis</b>			
Metropolitan	1.0	1.0	–
Inner Sydney	0.6 (0.4–0.8)	0.8 (0.6–1.1)	–
Non-metropolitan	1.9 (1–3.5)	3.7 (2.1–6.8)	–
<b>Exposure</b>			
Heterosexually	1.0	1.0	1.0
Homosexually	1.5 (1.0–2.2)	7.9 (5.8–10.7)	6.1 (4.1–9.2)
Intravenous drug users	2.8 (1.1–7.1)	9.7 (4.5–20.9)	3.5 (1.1–10.9)
<b>Stage at diagnosis</b>			
Late	–	1.0	1.0
CD4 >200	–	1.4 (1–1.9)	1.5 (1–2.4)
Early	–	3.0 (2.1–4.3)	2.6 (1.6–4.2)

to cases born in middle and low-income countries as they were younger, more commonly female and reported heterosexual acquisition of their HIV infection. This reflects the global pattern of HIV epidemics in their source countries. In the high-income countries of North America and Western and Central Europe, national epidemics are concentrated among key populations including men who have sex with men, injecting drug users and immigrants.<sup>1</sup> In contrast, in sub-Saharan Africa, the region most heavily affected by HIV worldwide, HIV affects all social and economic groups, women and children disproportionately, with transmission predominantly through heterosexual contact. In Asia, the epidemic has long been concentrated in specific populations, namely injecting drug users, sex workers and their clients, and men who have sex with men. However, more recently, the epidemic in many parts of Asia is steadily expanding into low-risk populations through transmission to sexual partners of those most at risk. In some countries, like China, heterosexual contact is now the most predominant mode of transmission.<sup>1</sup>

Although most cases from each of the three groups resided in inner and metropolitan Sydney at diagnosis, Australian-born cases were more likely to reside in non-metropolitan New South Wales. This also reflects migration patterns as cases from middle and low-income countries typically settle in more affordable suburbs whereas those from high-income countries are able to settle in inner Sydney.

Cases from middle/low-income countries were also more likely to be diagnosed late in their infection in New South Wales. This is consistent with national data, which indicates people born in Asia and sub-Saharan Africa had the highest rates of late HIV diagnosis in Australia from 2003–2008.<sup>2</sup> Local social research in New South Wales supports this. Asian gay men in Sydney had much lower rates of prior testing for HIV compared with Anglo-Celtic gay men<sup>27,28</sup> and surveys among wider Asian and sub-Saharan Africa communities in New South Wales have indicated high levels of HIV knowledge and awareness but limited use of health services for HIV despite being eligible for Medicare.<sup>13</sup> Immigrants living with HIV in New South Wales have reported experiencing their diagnosis as a ‘death sentence’.<sup>14</sup> These barriers have been reported in other high-income countries with multiple disincentives for immigrants to present earlier for HIV testing and treatment<sup>29</sup> and should be considered in any public health action aimed at reducing the proportion of late diagnoses in these groups.

The variety in countries of birth reported in this study reflects how multicultural New South Wales is and the nature of temporary and permanent migration flows in a globalised world. With increasing

numbers of permanent and temporary immigrants to Australia,<sup>18</sup> HIV infections among non-Australian-born populations will continue. Using income of home countries as a predictor for risk factors for new HIV diagnoses in these groups was useful as it showed that immigrants from high-income countries are similar to Australian-born cases and that immigrants from middle and low-income countries are different in terms of risk factors. This suggests that this simple methodology could be used as a proxy measure to identify high priority groups for health promotion efforts where information on HIV prevalence in the home countries is unavailable.

Using surveillance data to describe HIV in New South Wales has limitations. It counts the first positive test in New South Wales and therefore cannot report on the total number of people infected with HIV. Cases need to be tested and diagnosed for HIV before they are included in surveillance data. Also, as HIV is a chronic infection with a long latent period, many persons who are newly infected in a given year may not be diagnosed until years later. Cases were excluded from this analysis if they have been previously diagnosed outside New South Wales and this includes immigrants that tested positive before their arrival in Australia. This group would potentially require the same services as those newly diagnosed in New South Wales, but are left out of any analysis using surveillance data that is aimed at tracking new infection. The number of new HIV infections reported in this study is therefore likely to be an underestimation of the total number of overseas-born people living with HIV in New South Wales.

## Conclusion

Permanent and temporary migration and mobility to and from Australia is likely to continue to have an effect on the HIV situation in New South Wales in the years ahead. HIV health promotion and access to testing, treatment, care and support will need to continue to adapt to the emerging epidemic of HIV among overseas-born populations. The use of high, middle and low-income countries as a model to understand and target responses to HIV in non-Australian-born populations in New South Wales facilitates prioritisation to ensure that the most affected communities are reached. This study suggests that the public health response in New South Wales should focus on communities drawn from low- and middle-income countries from South East Asia and sub-Saharan Africa. The study also shows that the income of the country of birth is predictive of the dominant pattern of HIV transmission among these communities, as it largely mirrors the HIV patterns in their home country and/or region of birth. Similarly, income of country of birth is predictive of stage of presentation with HIV infection.

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