

Articles

HOW RELIABLE ARE AUSTRALIAN CHILDHOOD IMMUNISATION REGISTER COVERAGE ESTIMATES FOR INDIGENOUS CHILDREN? AN ASSESSMENT OF DATA QUALITY AND COVERAGE

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Abstract

Low levels of reporting indigenous status to the Australian Childhood Immunisation Register (ACIR) in the past have resulted in reduced confidence in vaccination coverage data for Aboriginal and Torres Strait Islander children. This study shows that the reporting of indigenous status has improved from 42% of the estimated national cohort of Indigenous children aged 12 to 14 months in 2002 to 95% in 2005. Over that period diphtheria-tetanus-pertussis (DTP) vaccination coverage estimates for Indigenous children increased slightly from 86.0% to 86.9%. Data by state and territory or remoteness are also presented. ACIR vaccination coverage estimates for Indigenous children can now be used with confidence for program planning at the national and jurisdictional level. *Commun Dis Intell* 2007;31:283–287.

Keywords: vaccination coverage, Oceanic ancestry group, immunisation

Introduction

Accurate estimates of vaccination coverage are critical to determining the reasons for higher rates of some vaccine preventable diseases in Aboriginal and Torres Strait Islanders compared to non-Indigenous people.^{1,2} The Australian Childhood Immunisation Register (ACIR) has been used to a limited extent to compare vaccination coverage between Indigenous and non-Indigenous children, but concerns remain about low reporting rates of indigenous status and the resultant unreliability of coverage estimates for Indigenous children.² One potential source of bias is more complete reporting of indigenous status from remote areas, where vaccination coverage has consistently been higher in the past.^{3–7}

Several initiatives during 2003 and 2004 were expected to have resulted in an improvement in recording indigenous status; a promotion by the Health Insurance Commission in 2003 to encourage

Aboriginal and Torres Strait Islander individuals to report their indigenous status, the commencement of regular transfer of demographic data from Medicare to ACIR records in 2003, and the commencement of transfer of data on indigenous status from immunisation registers in the Northern Territory in 2003 and Queensland in 2004.

The aims of this study therefore, were to conduct an analysis of ACIR data to determine whether:

- the reporting of indigenous status on the ACIR has improved since 1999;
- vaccination coverage estimates for Indigenous children have changed in association with changes in reporting of indigenous status; or
- there is substantial variation by jurisdiction or remoteness, in either reporting of indigenous status or coverage in Indigenous children.

Methods

Vaccination coverage

Data from the ACIR were obtained from the Health Insurance Commission. Birth cohorts corresponding to children aged 12–14 months in four consecutive years were studied utilising ACIR data as at 31 December of each year. The years chosen for this analysis and respective dates of birth in each cohort were 2002 (date of birth 1/7/2001 – 30/9/2001), 2003 (date of birth 1/7/2002 – 30/9/2002), 2004 (date of birth 1/7/2003 – 30/9/2003) and 2005 (date of birth 1/7/2004 – 30/9/2004). Vaccination coverage for each birth cohort was assessed by including only immunisations given on or before a child's first birthday. The third dose assumption was applied in the calculation of immunisation status for diphtheria-tetanus-pertussis (DTP) vaccine.⁸ Therefore, children were considered fully immunised for DTP if a third dose of DTP vaccine was recorded on the ACIR by 12 months of age, irrespective of whether previous doses in the series had been recorded.

Remoteness

The Australian Standard Geographical Classification (ASGC) was used to analyse remoteness. This system was developed by the Australian Bureau of Statistics (ABS) and groups all areas in Australia into five classifications defined by their physical remoteness from goods and services.⁹ Remoteness categories for ACIR data were derived from postcode, using 2001 Census based postal area/ASGC remoteness concordances.¹⁰ Where a given postcode corresponded to more than one ASGC classification, the remoteness classification in which 50% or more of the postcode population resides was used.

Indigenous identification and population estimates

The completeness of reporting of indigenous status on the ACIR was assessed by comparing the number of children identified as Aboriginal or Torres Strait Islander on the ACIR with the low series Experimental Indigenous Population Projections at 30 June for the corresponding year, by age, derived from 2001 ABS Census data. Estimates by ASGC remoteness classification were available for 2001 only. Children for whom indigenous status was recorded as unknown or missing on the ACIR were analysed as non-Indigenous. Due to low Indigenous population estimates in the Australian Capital Territory relative to other states and territories, completeness and coverage data for the Australian Capital Territory and New South Wales were combined.

Statistical analysis

Vaccination coverage and completeness were calculated using SASv9.1.3.¹¹ The Kendall's Tau rank correlation coefficient¹² was used to test for correlation between annual estimates of vaccination status and completeness, by jurisdiction and remoteness category, using StatXact 4 for Windows.¹³

Results

The number of Indigenous and non-Indigenous children recorded on the ACIR in the four birth cohorts studied ranged from 1,269–2,970 and 62,544–62,739 respectively.

Completeness of Indigenous identification

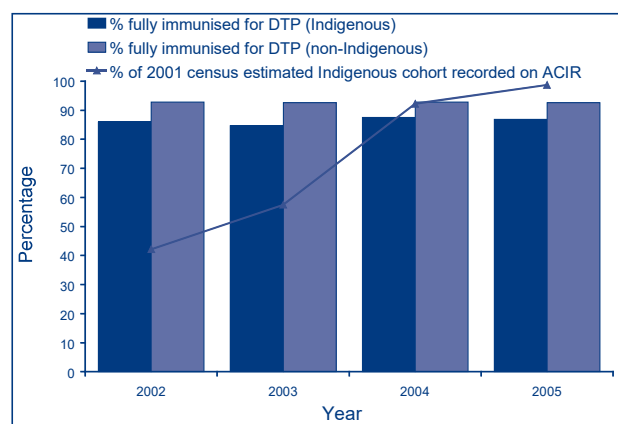
The percentage of the ABS estimated Indigenous population of infants identified as Indigenous by the ACIR (indigenous identification completeness) steadily increased at the national level, from 42% of the ABS estimated Indigenous cohort in 2002 to 95% by 2005 (Table 1). Indigenous identification completeness increased substantially between 2002 and 2005 in all states and territories except South

Australia and Western Australia, where it remained stable. By 2005, indigenous identification was over 90% complete in all jurisdictions except South Australia. In Victoria, Tasmania, Queensland and New South Wales/Australian Capital Territory completeness rose most notably between 2003 and 2004. The greatest increase was observed for Queensland, from 2% in 2002 to above 107% in 2005, due to the commencement of the electronic transfer of the indigenous status field from the state register (VIVAS) to the ACIR.

Vaccination coverage in Indigenous and non-Indigenous children

A comparison of DTP coverage at 12–14 months of age for Indigenous and non-Indigenous children in Australia is shown in the Figure. While immunisation coverage in non-Indigenous children has consistently remained at 93% in all years studied, coverage estimates for Indigenous children ranged from 85% to 88%.

Australian Childhood Immunisation Register data completeness of indigenous status reporting, and DTP coverage, for Indigenous and non-Indigenous children aged 12–14 months, Australia, 2002 to 2005



Data are analysed as at 31 December of each year.

Indigenous vaccination coverage estimates by state or territory

The percentage of Indigenous children fully immunised with DTP vaccine at 12–14 months of age varied between jurisdictions (Table 2). Gradual increases over time were evident in the Northern Territory and Tasmania. In South Australia, coverage estimates decreased steadily since 2002, falling to the lowest figure (76%) observed in all years by 2005. Tasmania exhibited the highest Indigenous DTP coverage from 2003 to 2005, and by 2005 all jurisdictions but Western Australia and South Australia had achieved coverage of 87% or higher.

Table 1. Increases in reporting of indigenous status to the ACIR,* for children aged 12–14 months,† 2002 to 2005, by state or territory

State or territory	% of ABS estimated Indigenous cohort recorded as Indigenous on ACIR		Correlation with coverage‡	
	2005	Annual increase 2002–2005	Correlation coefficient	P value
NSW/ACT	90	8.3	0.33	0.75
NT	98	29.1	0.33	0.75
Qld	108	35.1	–0.33	0.75
SA	72	–1.6	0.33	0.75
Tas	89	20.5	0.33	0.75
Vic	111	18.0	–0.33	0.75
WA	85	0.6	–1.0	0.08
All combined	95	17.7	0.04	0.80

* Australian Childhood Immunisation Register.

† July to September birth cohorts.

‡ Kendall's Tau coefficients of correlation between completeness of indigenous status and indigenous coverage, and P value for testing hypothesis that there was no correlation. Perfect positive correlation is indicated by an estimate of 1, no correlation by 0.

Table 2. DTP coverage for Indigenous children aged 12–14 months, 2002 to 2005, by state or territory

State or territory	2002	2003	2004	2005
NSW/ACT*	88.1	87.4	87.8	88.7
Northern Territory	79.0	82.9	85.4	87.6
Queensland	90.0	79.8	88.3	88.0
South Australia	89.4	84.3	81.1	76.0
Tasmania	86.7	92.3	96.1	93.2
Victoria	90.9	89.2	91.8	88.4
Western Australia	80.2	80.6	84.9	80.0
Australia	86.0	84.7	87.6	86.9

Data are analysed as at 31 December of each year.

* New South Wales and the Australian Capital Territory combined.

Completeness of indigenous identification by remoteness

The number of Indigenous infants in the birth cohorts studied ranged from 459–935 in major cities, 277–673 in inner regional, 279–742 in outer regional, 127–243 in remote and 124–392 in very remote areas. In comparison, there were on average 43,010, 12,429, 5,842, 929 and 391 non-Indigenous children recorded on the ACIR in these areas respectively.

Indigenous identification completeness improved substantially in all remoteness categories from 2002 to 2005 (Table 3). From a low of 25% for very remote areas in 2002, by 2005 completeness was over 80% in all areas, and around 100% in major cities, inner

regional and outer regional areas. Indigenous identification completeness was lowest in very remote areas in all years except 2003.

Indigenous vaccination coverage by remoteness

Vaccination coverage in very remote areas increased from 83.9% in 2002 to 88.8% in 2005 (Table 4). For other regions there was variation between years but no evident increasing or decreasing trend. Coverage was consistently lowest in remote areas. In comparison, non-Indigenous coverage estimates remained stable (92.3%–94.8%) in every area across all years except for the very remote classification, where a drop to 90.0% was observed in 2003 (not shown).

Correlation between data completeness and indigenous coverage

Kendall's Tau coefficients of correlation between indigenous status completeness and indigenous coverage are presented in Tables 1 and 3. No statistically significant correlation, or consistent pattern of negative or positive correlation, was found for jurisdictions or remoteness categories.

Discussion

This analysis has shown that the reporting of indigenous status to the ACIR has improved markedly from 42% of the estimated cohort of Indigenous infants in 2002 to 95% in 2005. By 2005 indigenous status reporting rates were more than 80% in all remoteness categories and more than 70% in all jurisdictions. During this period national vaccination coverage estimates for Aboriginal and Torres Strait

Table 3. Increases in reporting of indigenous status to the ACIR* for children aged 12–14 months,† 2002 to 2005, by ASGC remoteness category

Remoteness category	% of ABS estimated Indigenous cohort recorded as Indigenous on ACIR		Correlation with coverage‡	
	2005	Annual increase 2002–2005	Correlation coefficient	P value
Major cities	103	17.5	0.00	1.0
Inner regional	104	20.4	0.33	0.75
Outer regional	105	21.9	0.67	0.33
Remote	84	12.2	0.33	0.75
Very remote	81	18.4	0.67	0.33
All categories	95	17.7	0.22	0.18

* Australian Childhood Immunisation Register.

† July to September birth cohorts.

‡ Kendall's Tau coefficients of correlation between completeness of indigenous status and indigenous coverage, and P value for testing hypothesis that there was no correlation. Perfect positive correlation is indicated by an estimate of 1, no correlation by 0.

Table 4. DTP coverage reported to ACIR for Indigenous children aged 12–15 months, 2002 to 2005, by ASGC remoteness classification

Region	2002	2003	2004	2005
Major cities	88.0	85.0	88.9	86.5
Inner regional	85.6	84.1	88.4	87.5
Outer regional	85.3	82.5	85.9	86.1
Remote	81.9	80.1	83.1	80.9
Very remote	83.9	87.7	89.0	88.8

Data are analysed as at 31 December of each year.

Islander infants changed little, although coverage for the third dose of DTP was consistently 6%–8% lower in Indigenous compared to non-Indigenous children at 12 months of age. When analysed by jurisdiction or ASGC remoteness category, coverage estimates appeared to become more stable as indigenous status completeness increased, but there was no statistically significant trend of coverage increasing or decreasing as indigenous identification improved. Perhaps unexpectedly, the reporting of indigenous status was lower in the ASGC classified 'remote' and 'very remote' areas compared to other areas, and coverage estimates for Indigenous infants were lower in 'remote' areas compared to regional, urban and very remote areas.

A clear trend in coverage for Indigenous children by remoteness was not evident, as areas classified as 'very remote' generally had the highest coverage, and 'remote' areas consistently the lowest, with more urbanised areas in between. Coverage estimates for non-Indigenous children were consistently higher, with no apparent trend by remoteness. Previous estimates for Indigenous children have

generally been higher in remote areas and lower in non-remote areas,^{3–7,14,15} although there have been some exceptions.^{16,17} Previous studies were limited to local areas, obtaining data from surveys or local registers, conducted between 10 and 25 years ago, when coverage estimates in general were much lower than currently. The definitions of remoteness used in previous studies varied, and fewer categories were used than the five ASGC categories used here. This analysis suggests that, if there was a relatively consistent trend in the past towards higher coverage in Indigenous children in remote areas and lower coverage in urban areas, this is no longer the case. The possibility of inaccurate data masking a real trend by remoteness cannot be excluded, but these data do not support the hypothesis that the ACIR coverage estimates for Indigenous children are biased by higher indigenous reporting rates in remote areas with higher coverage.

The use of ACIR coverage estimates for Indigenous children relies on the assumption that, in addition to the completeness of recording, the recorded indigenous status data are valid. While the validity of the data have not been formally assessed, previous analyses have found that children reported as indigenous on the ACIR were more likely to have been reported as receiving vaccines recommended only for Aboriginal and Torres Strait Islander children,² and that the ACIR coverage estimates were similar to those of a face-to-face survey.¹⁸ This analysis has shown that the reporting of indigenous status has improved dramatically in recent years and is now high in all jurisdictions, and in remote as well as urban areas. The ACIR should now be used with more confidence by vaccination program managers and public health practitioners to estimate coverage in Indigenous children at the jurisdictional level.

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