4. Vaccination coverage

Australian Standard Vaccination Schedule 1998 to 2003

The Australian Standard Vaccination Schedule (ASVS) for children aged 0–6 years changed in the second half of 1998 with the second dose of measles-mumps-rubella (MMR) vaccine (previously given at 12–13 years) moved to four years. More changes were made in May 2000 with the introduction of a new ASVS with two distinct paths for children born on or after 1 May 2000.[49] For the immunisations at 2, 4, 6 and 12 months, two options for the use of combination vaccines are recommended. The full schedule and changes to it are outlined in Table 22. Pathway 1 uses hepatitis B (Hep B) vaccine in combination with diphtheria-tetanus-acellular pertussis (DTPa) vaccine, while Pathway 2 uses it in combination with *Haemophilus influenzae* type b (Hib) vaccine. From May 2000, full vaccination at 12 months of age (first milestone) requires three doses of DTPa and oral poliomyelitis (OPV) vaccines, and immunisation against Hib and hepatitis B. Full Hib immunisation at 12 months now requires two doses of PRP-OMP (*Haemophilus influenzae* type b polysaccharide conjugated to the outer membrane protein of *Neisseria meningitidis*). Full hepatitis B immunisation at 12 months requires either three doses of combined DTPa-hepatitis B (Pathway 1) or two doses of combined Hib-hepatitis B vaccine (Pathway 2). The neonatal dose (scheduled for all newborns since May 2000) is not yet accounted for in ACIR coverage estimates.

In the second year of life, a dose of MMR vaccine is scheduled at 12 months of age as well as booster doses of DTPa (at 18 months) and Hib vaccine (at 12 months)—for Pathway 2 this Hib vaccine is given with hepatitis B vaccine. However, the DTPa booster dose at 18 months of age was dropped from the schedule in September 2003. In the sixth year of life, a second dose of MMR vaccine is scheduled as well as booster doses of DTPa and OPV. In September 2003, the schedule was changed to include universal 7-valent conjugate pneumococcal vaccine at 2, 4 and 6 months of age, varicella-zoster vaccine at 18 months, inactivated poliomyelitis vaccine in place of oral polio vaccine and meningococcal C conjugate vaccine at 12 months of age.

Table 22. Australian Standard Vaccination Schedule 1998 to 2003 for children (see footnotes for year of introduction on to schedule)

Age	Vaccine							
Birth	Hep B *							
2 months	Hep B † ‡	DTP † §	Hib ‡ ¶	OPV/IPV **			7vPCV §§	
4 months	Hep B † ‡	DTP † §	Hib ‡ ¶	OPV/IPV			7vPCV	
6 months	Hep B †	DTP † §		OPV/IPV			7vPCV	
12 months	Hep B ‡		Hib ‡ ¶		MMR ††			MenCCV ¶¶
18 months		DTP ‖				VZV ‡‡	23vPPV ‖‖	
4 years		DTP ‖		OPV/IPV	MMR			

* Monovalent hepatitis B vaccine from May 2000.

† Acellular diphtheria-tetanus-pertussis/hepatitis B vaccine from May 2000 (Pathway 1).

‡ Hib PRP-OMP/hep B from May 2000 (Pathway 2).

§ Acellular diphtheria-tetanus-pertussis vaccine from 1999.

‖ Acellular pertussis vaccines were generally used at 18 months and 4 years from 1998. The DTP booster dose at 18 months of age was dropped from the schedule in September 2003.

¶ Hib PRP-OMP (Pathway 1) from May 2000.

** Oral poliomyelitis vaccine, inactivated poliomyelitis vaccine (in combination) from September 2003.

†† Measles-mumps-rubella vaccine.

‡‡ Varicella-zoster vaccine from September 2003.

§§ 7-valent pneumococcal vaccine universal from September 2003 (national program for high-risk children 2001).

‖‖ 23-valent pneumococcal polysaccharide vaccine for Aboriginal and Torres Strait Islander children in high prevalence jurisdictions only, from September 2003.

¶¶ Meningococcal C conjugate vaccine national program announced and added to schedule 2003.

Vaccination coverage estimates from the ACIR 1996 to 2003

The methodology for calculating cohort-based vaccination coverage from the Australian Childhood Immunisation Register (ACIR) was published with the first coverage estimates in 1998.[4] Using this method, a cohort of children is defined by date of birth in three-month groups, the first cohort being born between 1 January 1996 and 31 March 1996.[11] The vaccination status of each cohort is assessed at the three key milestones of 12 months, 24 months and six years of age. Coverage is measured several months after the due date for completion of each milestone, to allow for delayed notification to the ACIR. To minimise duplicate records, the cohort includes only children enrolled with Medicare.[4] It is assumed that notification of receipt of a later vaccine dose implies receipt of earlier doses, even if no earlier vaccination is recorded (third dose assumption).[11]

A child is now defined as 'fully vaccinated' at 12 months of age if he or she has received a third dose of DTPa and poliomyelitis vaccine (oral or inactivated), a second or third dose of Hib vaccine (PRP-OMP), and either a second or third dose of Hep B vaccine, depending on the pathway taken on the new schedule. ACIR coverage estimates (using the third dose assumption) for the first vaccination milestone (the first three scheduled doses of DTPa, OPV, Hib and, recently, two or three doses of Hep B and only two or three doses of Hib) have been reported in *Communicable Diseases Intelligence* since 1998.[173] The coverage for MMR has been reported in *Communicable Diseases Intelligence* since 1998.[173] Coverage for the third vaccination milestone at six years of age has been reported in *Communicable Diseases Intelligence* since 2002.[174]

Trends in vaccination coverage estimates from the ACIR

Vaccines scheduled in the first year of life

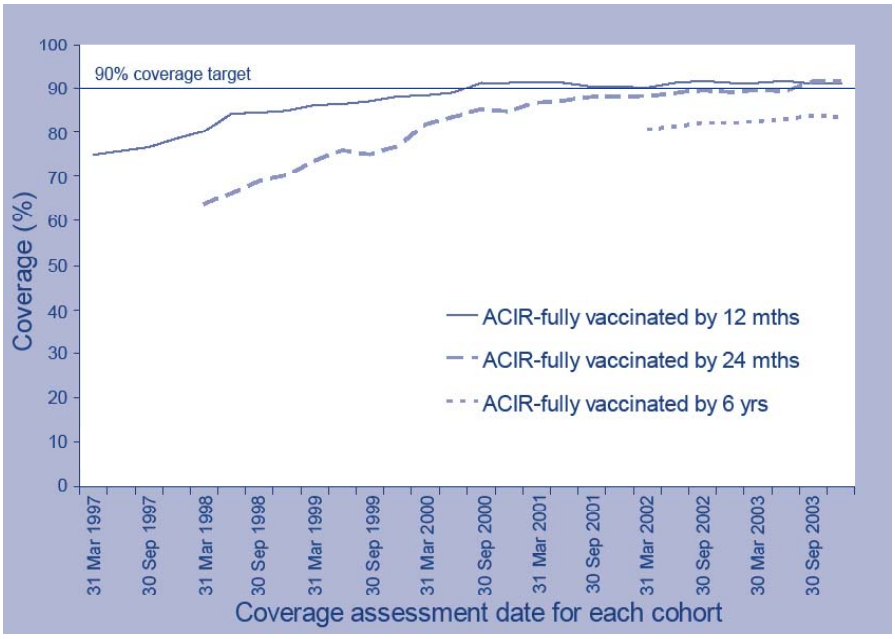
The trends in childhood vaccination coverage in Australia for three doses of DTPa and OPV, and two or three doses of Hib and Hep B assessed at one year, and for three or four doses of DTPa, two or three doses of Hib and Hep B, three doses of OPV, and one dose of MMR assessed at two years of age, and for two doses of MMR, five doses of DTPa, and four doses of OPV assessed at 6 years of age are shown in Figure 39. Coverage was calculated for 28 consecutive three-month cohorts born from 1 January 1996 to 31 December 2002. For all vaccines due by one year of age, coverage estimates increased steadily from 75 per cent for the first cohort, to 9 per cent by the 28th cohort, assessed on 31 December 2003. For all vaccines due by two years of age, coverage estimates also increased steadily from 64 per cent for the first cohort to 91.5 per cent by December 2003. Coverage estimates for all vaccines due by six years of age were first reported in *Communicable Diseases Intelligence* in 2002, and have also increased steadily from 80.6 per cent in early 2002 to 83.5 per cent in late 2003.

Coverage estimates for the 12-month age group have, however, remained steady over the past two years, fluctuating around the 90 per cent level. With up to 3 per cent of Australian parents not immunising their children because they object to, disagree with, or are concerned about immunisation,[175] it will be difficult for coverage estimates to exceed 95 per cent, especially as the reporting of immunisation encounters is still not totally complete.

Differences between estimates of the proportion of children classified as fully vaccinated by State/Territory are shown in Figure 40. Fully vaccinated coverage remained reasonably stable over the three-year assessment period for all jurisdictions with almost all of them reaching the Immunise Australia Program target of 90 per cent coverage for the first milestone vaccines. Coverage in the Northern Territory and the Australian Capital Territory fluctuated noticeably over the whole period. Significant changes in coverage in jurisdictions like the Northern Territory and the Australian Capital Territory, which have relatively small populations, are likely to be the result of small numbers of unimmunised children having large impacts on the coverage percentages.

The trends in childhood vaccination coverage in Australia for individual vaccines (DTPa, OPV, Hib and Hep B assessed at one year) are shown in Figure 41, calculated for 12 consecutive three-month cohorts born from 1 January 2000 to 31 December 2002. Coverage estimates for all vaccines remained stable throughout the 2001 to 2003 period, hovering around the 9 per cent to 95 per cent mark. Coverage for the Hib and Hep B vaccines is greater than for DTPa and OPV due to the change in the immunisation schedule in mid-2000, and the subsequent change in the algorithm used to calculate coverage at 12 months of age, where a record of two or three doses of Hib and Hep B on the ACIR is enough for a child to be considered fully immunised.

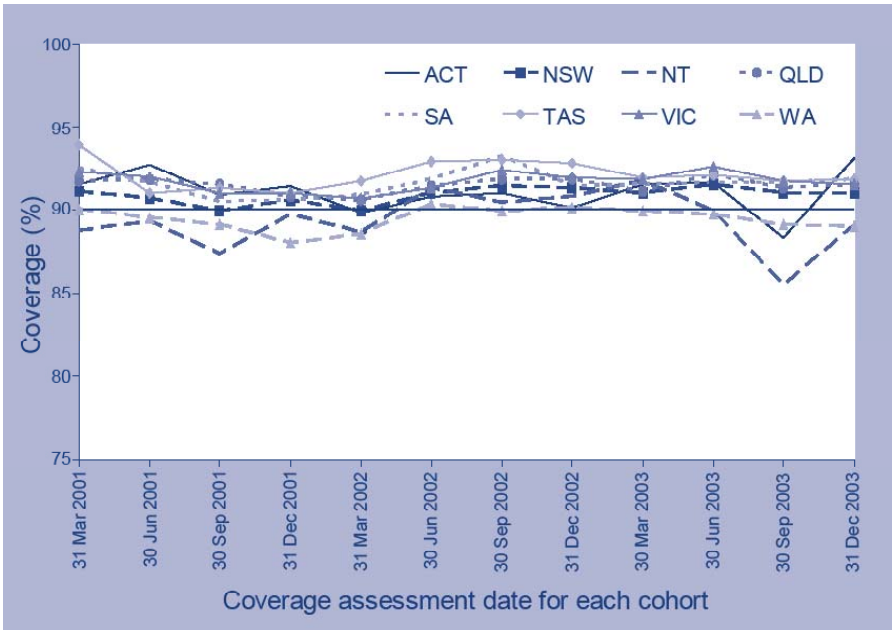
Figure 39. Trends in vaccination coverage estimates from the Australian Childhood Immunisation Register for 1, 2 and 6 year olds*



Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 1996 and 31 December 2002. Coverage assessment date was 12 months, 24 months or 6 years after the last birth date of each cohort.

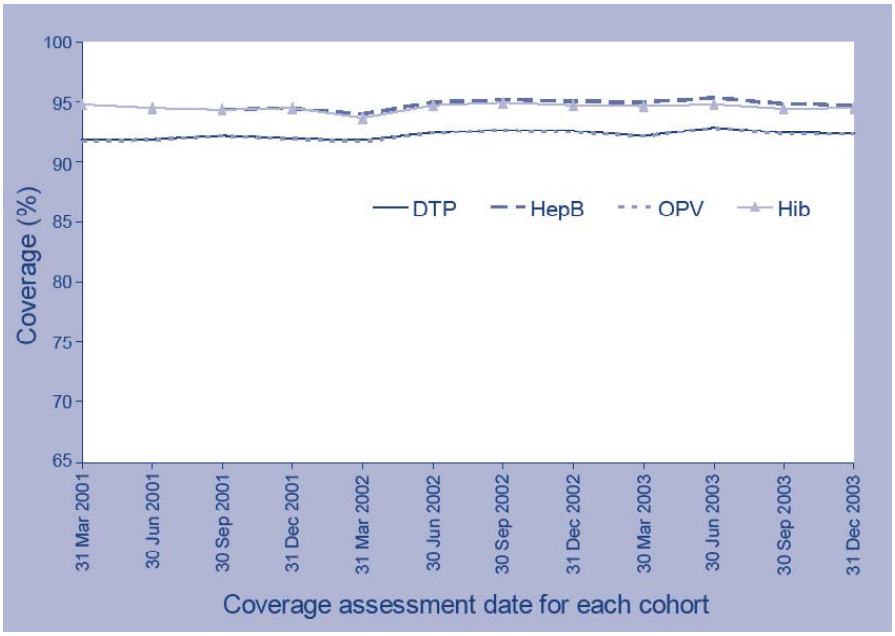
Figure 40. Trends in vaccination coverage estimates by jurisdiction: children 'fully vaccinated' at the age of 1 year*



Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 2000 and 31 December 2002. Coverage assessment date was 12 months after the last birth date of each cohort.

Figure 41. Trends in vaccination coverage estimates for individual vaccines: children vaccinated for 3 doses of DTP, OPV, Hib and Hep B at the age of 1 year*

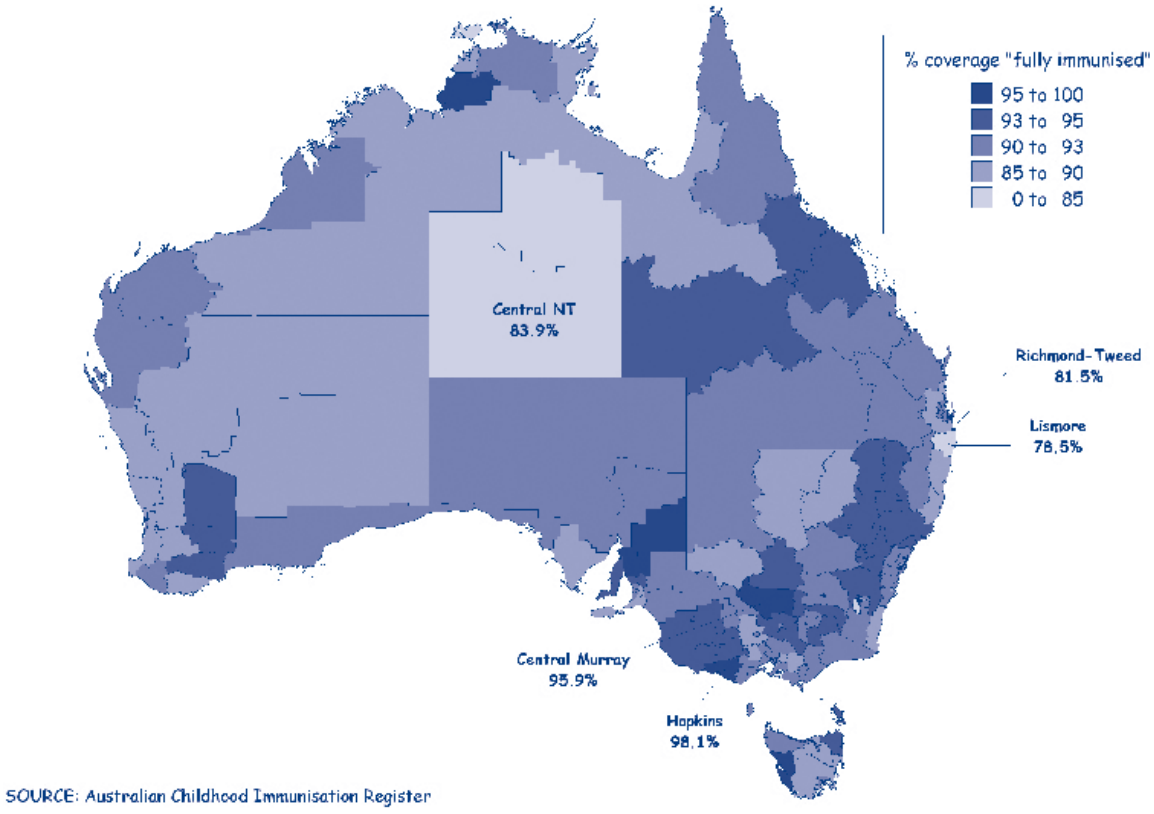


Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 2000 and 31 December 2002. Coverage assessment date was 12 months after the last birth date of each cohort.

Figure 42 presents a map of immunisation coverage at 12 months of age in Australia by Australian Bureau of Statistics (ABS) Statistical Subdivision. The map demonstrates that, whilst coverage is greater than 90 per cent in almost all jurisdictions, there exist a significant number of areas within jurisdictions that have low levels of coverage, below 90 per cent, and even below 85 per cent in a few areas such as the Northern Rivers area of New South Wales.

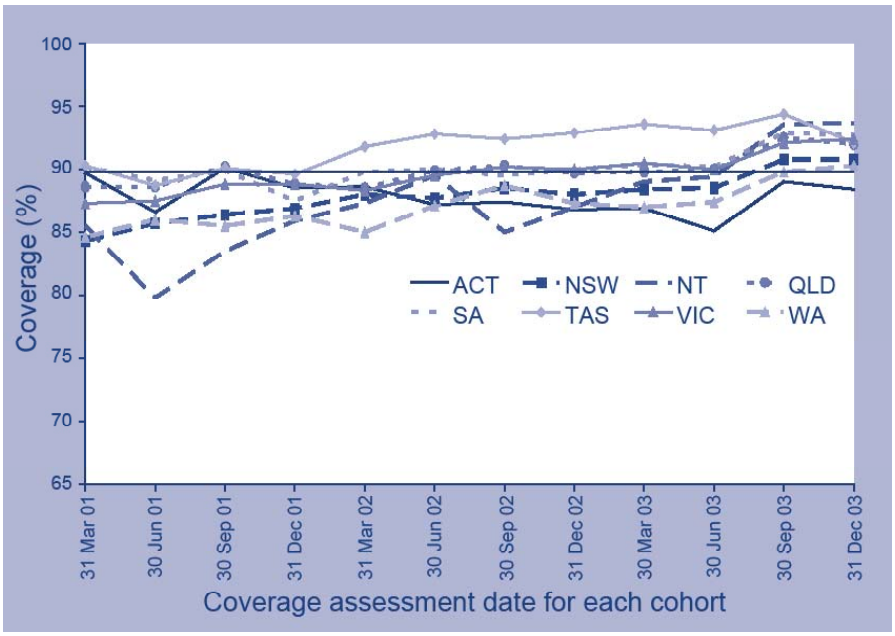
Figure 42. Immunisation coverage for 'fully immunised' at 12 months of age, Australia, December 2003



Vaccines scheduled in the second year of life

Differences between estimates of the proportion of children classified as fully vaccinated at two years of age by State/Territory are shown in Figure 43. Fully vaccinated coverage at two years of age for consecutive cohorts increased steadily over the three-year assessment period for all jurisdictions without significant variation between the jurisdictions. In early 2001, only one jurisdiction had reached the 90 per cent coverage target—Tasmania with 90.3 per cent coverage. But by the end of 2003, coverage at two years of age was greater than 90 per cent in all jurisdictions except for the Australian Capital Territory (88.4%), and almost 94 per cent in the Northern Territory.

Figure 43. Trends in vaccination coverage estimates, by jurisdiction: children 'fully vaccinated' for 4 doses of DTPa and Hib, 3 doses of OPV and 1 dose of MMR at the age of 2 years*

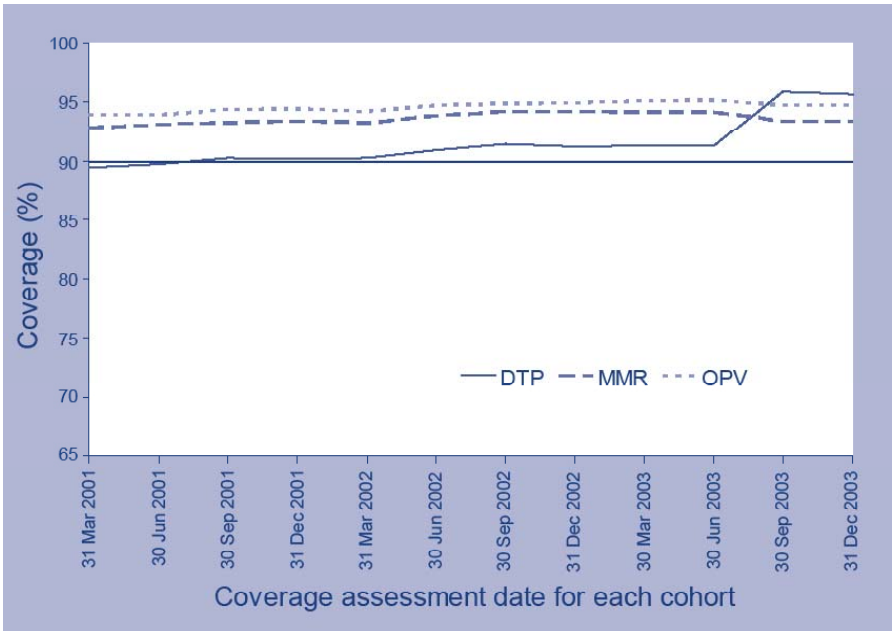


Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 1999 and 31 December 2001. Coverage assessment date was 24 months after the last birth date of each cohort.

The trends in childhood vaccination coverage in Australia for individual vaccines (DTPa, OPV and MMR assessed at two years) are shown in Figure 44, calculated for 12 consecutive three-month cohorts born from 1 January 1999 to 31 December 2001. Coverage for MMR and OPV was higher than coverage for DTPa and remained steady across the whole period, hovering around 93 per cent with very little change. However, coverage for DTPa at two years of age increased significantly in mid-2003 due to the removal of the fourth dose of DTPa (due at 18 months) from the immunisation schedule from the September 2003 quarter onwards. The coverage assessment for the 24-month cohort now excludes the requirement for the 18-month dose of DTPa. Coverage for this cohort now looks for a third or a fourth dose of diphtheria, tetanus and pertussis vaccine. Prior to the change, the 24-month cohort assessment looked for the fourth dose only.

Figure 44. Trends in vaccination coverage estimates for individual vaccines: children vaccinated for 4 doses of DTP, 3 doses of OPV and 1 dose of MMR at the age of 2 years*

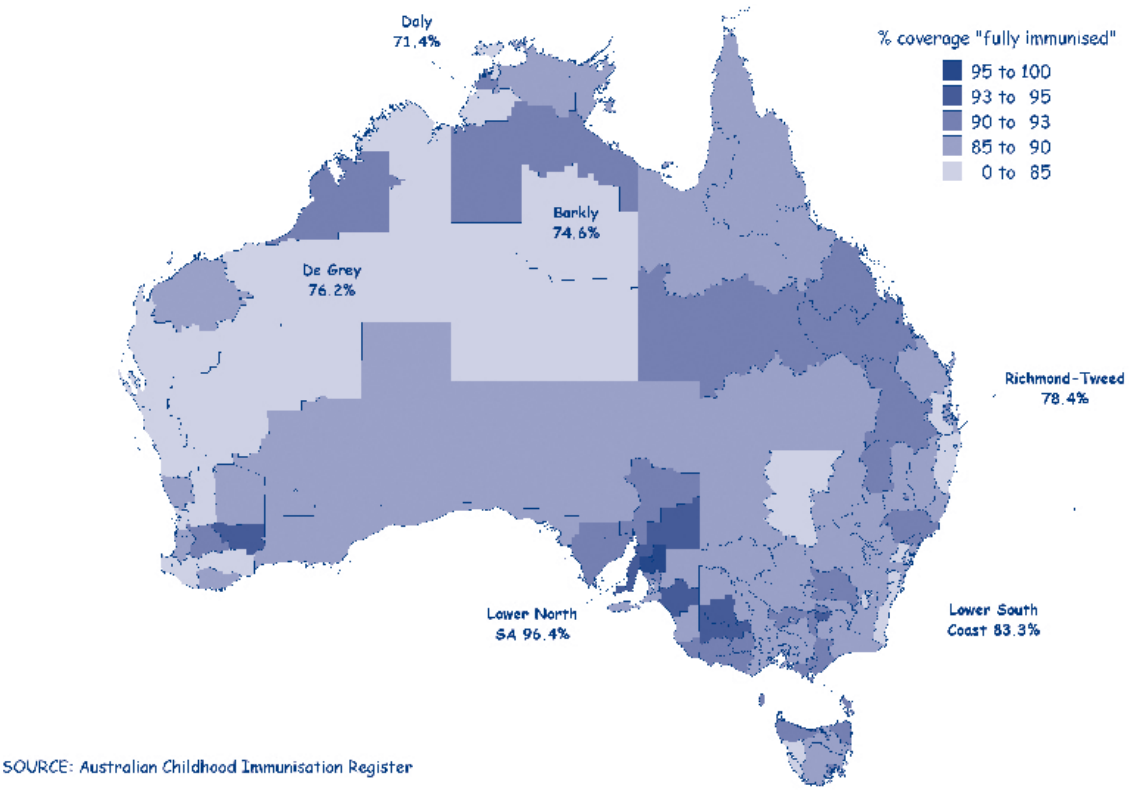


Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 1999 and 31 December 2001. Coverage assessment date was 24 months after the last birth date of each cohort.

Figure 45 presents a map of immunisation coverage at 24 months of age in Australia by Australian Bureau of Statistics (ABS) Statistical Subdivision. The map demonstrates (as did Figure 42) that, whilst coverage approaches 90 per cent in most jurisdictions, there exist a large number of smaller areas within jurisdictions that have low levels of coverage, some as low as 70 per cent to 75 per cent, such as regional areas in Western Australia and the Northern Territory.

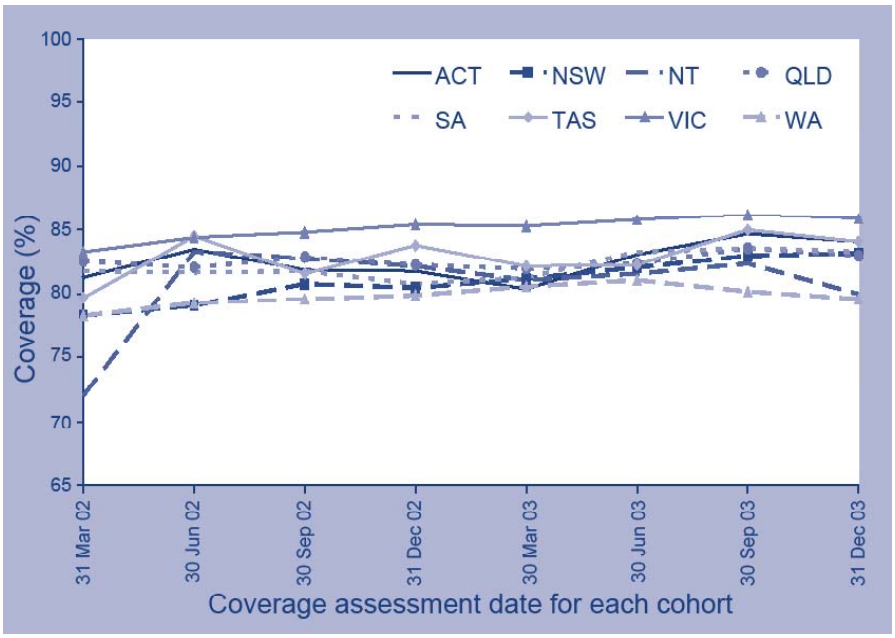
Figure 45. Immunisation coverage for 'fully immunised' at 24 months of age, Australia, December 2003



Vaccines given at 4–5 years of age

Coverage estimates for 4–5 year olds were not reported by the ACIR until early 2002, so there are only two years of coverage data for this age group. Differences between estimates of the proportion of children classified as fully vaccinated by six years of age by State/Territory are shown in Figure 46. Fully vaccinated coverage increased only slightly over the two year assessment period for all jurisdictions, with some jurisdictions experiencing a greater increase than others. However, coverage at six years of age remained below 85 per cent for all jurisdictions except Victoria across the whole time period.

Figure 46. Trends in vaccination coverage estimates, by jurisdiction: children 'fully vaccinated' for 5 doses of DTP, 4 doses of OPV and 2 doses of MMR at the age of 6 years*



Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 1996 and 31 December 1997. Coverage assessment date was 72 months after the last birth date of each cohort.

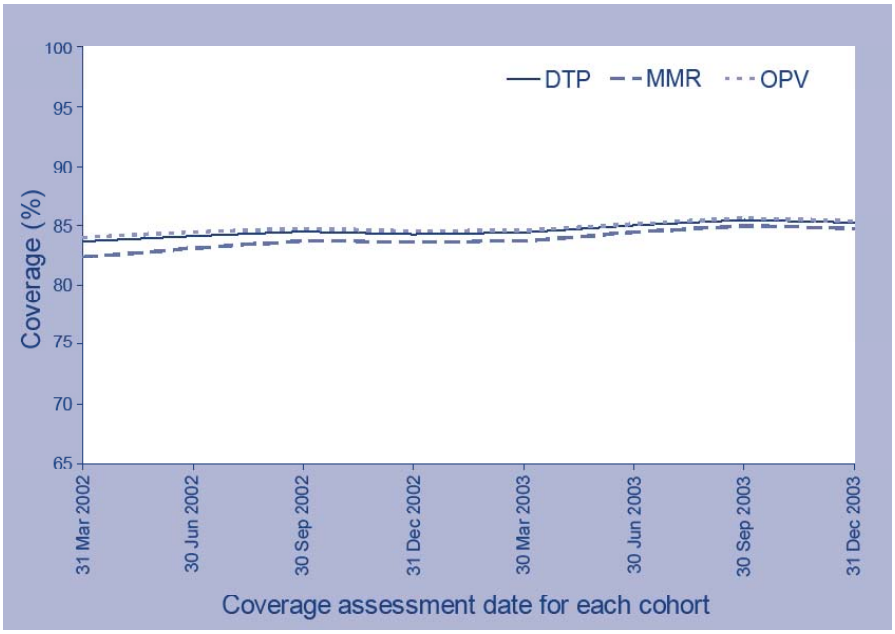
The trends in childhood vaccination coverage in Australia for individual vaccines (DTPa, OPV, and MMR assessed at six years) are shown in Figure 47, calculated for eight consecutive three-month cohorts born from 1 January 1996 to 31 December 1997. Coverage for DTPa and OPV was marginally higher than coverage for MMR, and coverage for all three vaccines remained steady across the whole period hovering around 82 per cent to 85 per cent with very little change.

Comment

Estimates of vaccination coverage in Australia for all jurisdictions have increased steadily since the ACIR commenced in 1996 but in recent years have reached a plateau. There have been increases in coverage for one year olds, two year olds and six year olds, with fully immunised coverage for one and two year olds reaching the Immunise Australia Program target of 90 per cent coverage for the first and second milestone vaccines.

The ACIR is now likely to be close to its maximal achievable performance following the impact of the General Practitioner Immunisation Incentive Scheme, parental incentives and data cleaning initiatives. Mechanisms aimed at further improving notification of immunisations to the ACIR by general practitioners and other providers need to be considered. The functionality of the Medicare database would be enhanced if greater currency of address details could be achieved.

Figure 47. Trends in vaccination coverage estimates for individual vaccines: children vaccinated for 5 doses of DTP, 4 doses of OPV and 2 doses of MMR at the age of 6 years*



Source: Australian Childhood Immunisation Register.

* By 3-month birth cohorts born between 1 January 1996 and 31 December 1997. Coverage assessment date was 72 months after the last birth date of each cohort.

Limitations of the ACIR database, related to reliance on provider notification and the currency of Medicare registration, mean that official estimates of coverage are unlikely to rise significantly above current levels, unless mechanisms are put in place to further improve notification to the ACIR. Increases in actual coverage will also be difficult to achieve from this point, as there are probably 2 per cent to 3 per cent of parents who are opposed to immunisation.

To maintain the current high levels and to achieve further increases in coverage, efforts need to be directed at improving reporting by providers (and subsequent data cleaning), and at immunisation of the small group of children now not up to date with their immunisations. The latter will require carefully targeted initiatives, which may include efforts to further improve access to services for disadvantaged groups as well as specific educational initiatives for those parents and providers concerned about contraindications to immunisation.

In addition, there are several national, publicly funded, targeted immunisation programs for which systematically collected data on vaccine coverage are not currently available. These include hepatitis B vaccine for adolescents, dTpa vaccine for adolescents, MMR vaccine for 18–30 year olds, influenza and pneumococcal vaccines for Aboriginal and Torres Strait Islander persons over 50 years of age, and influenza vaccine for persons over the age of 64 years. While data are available from surveys in local subpopulations[60] or national special purpose surveys[176] for three of these programs, lack of widely applicable data inhibits planning and evaluation at the regional and national levels. As the number and scope of immunisation programs increases, extension of the ACIR to collect data for some or all of the other age groups targeted by vaccines merits active consideration.