

Is low immunisation coverage in inner urban areas of Australia due to low uptake or poor notification?

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INTRODUCTION The Australian Childhood Immunisation Register (ACIR) consistently reveals pockets of lower immunisation coverage in inner urban areas. We investigated whether low uptake or poor notification of immunisation is the main reason for this difference.

METHODS We estimated under reporting by telephone surveying the parents of 640 children recorded as incompletely immunised on the ACIR at 12 months of age. Immunisation status was based on parental report of written records and/or date of receipt.

RESULTS Of the 97 children living in inner urban areas (defined by postcode and population density), 55 (57%) were shown to be 'definitely immunised'. One hundred and thirty-four (53%) of the 253 children in other urban areas were shown to be 'definitely immunised'. Both these groups were significantly more likely to be 'definitely immunised' than the 104 (36%) of 290 children in areas outside capital cities ($p < 0.0001$).

DISCUSSION Apparent lower immunisation uptake in inner urban areas of Australia may be attributable to reporting error.

Mapping of immunisation coverage estimates calculated from the Australian Childhood Immunisation Register (ACIR) has consistently revealed pockets of lower immunisation coverage in capital city inner urban areas.¹ But ACIR data underestimate coverage at 12 and 24 months of age by approximately 3–5%,^{2–4} and as many as 40–60% of children identified by the ACIR as being incompletely immunised for age at 12 or 24 months are in fact completely immunised, perhaps because of under reporting to the ACIR by immunisation providers.^{2–4}

Parental occupational status and education predict lower immunisation uptake.^{5,6} We investigated whether lower uptake of immunisation or poor provider notification to the ACIR of immunisation encounters was the main reason for lower coverage estimates. Since general practitioners give over 70% of immunisations to Australian children under the age of seven, they were the intervention targets.

Methods

We surveyed parents/care givers of 640 children who were part of another

study.² Children were eligible for inclusion if they had a valid Medicare registration, were born between 1 October and 31 December 1999 and were recorded on the ACIR at 4 May 2001 as incompletely immunised for doses used to assess coverage at 12 months of age, which totalled approximately 5660 children. A sample of 589 was required to detect a conservative proportion of 45% of the 12 month old study children who were completely immunised with a precision of 5% with 99% confidence. Based on a previous

study using similar methodology, we anticipated a response rate of approximately 40%.⁷ We sent information letters to the parents of a random sample of 1565 eligible children and then conducted 640 computer assisted telephone interviews between 22 May and 3 July 2001. During the interview parents were encouraged to read from a provider completed written record.

Residential status was determined by postcode. We created our own definition of inner urban status because there are no published or standardised definitions available. The five capital cities with the largest inner urban areas were included, with maps from MapInfo software used to identify Statistical Local Areas (SLAs) within 10 km of the general post office (GPO).⁸ From these SLAs, those with immunisation rates of less than 85% were then selected, a total of 67. Australian Bureau of Statistics (ABS) population density maps were used to ensure that none of the selected areas was atypical (such as airport hinterlands, national parks, or other areas of low population density).⁹

We identified inner urban children in the 67 SLAs by postcode, using ABS data.¹⁰ Other children were further categorised into other urban and a combined category of rural and other metropolitan. Other urban children were those who resided in one of the five capital cities but did not meet the criteria for inner urban. All other children were then defined as rural and other metropolitan, which included all rural and remote SLAs plus other metropolitan outside the five largest capital cities.

Children were classified using 'definitely immunised' (from a written record or with certain dates), 'possibly immunised' (unable to provide a certain date) and 'under immunised' (parent confirmed that the child had not received the specified vaccine doses). Children definitely immunised were further assessed for the type of immunisation provider.

Table 1. Demographic and immunisation status of children at 12 months of age

Characteristic	Inner urban	n (%) Other urban, and rural and other metropolitan		p value*
Born in other English speaking country	15 (16)	72 (13)		0.01
Born in the rest of the world	28 (29)	92 (16)		
Other language spoken at home	40 (41)	114 (21)		<0.0001
University degree	43 (44)	149 (27)		0.005
Single parent	6 (6)	75 (14)		0.06
One child in the household	44 (45)	137 (25)		0.0002
Annual household income >\$70 000	26 (26)	74 (14)		0.003
Health care card holder	35 (36)	268 (49)		0.016
Immunisation status				
		Other urban	Rural and other metropolitan	
Definitely immunised	55 (57)	134 (53)	104 (36)	<0.0001
Possibly immunised	11 (11)	28 (11)	28 (10)	
Under immunised	31 (32)	91 (36)	158 (55)	
Total	97 (15)	253 (40)	290 (45)	

* Uncorrected p values based on the chi-square test

Results

The 640 children who were surveyed and 925 who were not (not contactable, living overseas, or refused to be interviewed), did not differ significantly by gender, state/territory of residence, rurality, or the immunisation history recorded on the ACIR.²

The parents of inner urban children were significantly more likely to report being born overseas, speaking a language other than English at home, having an annual income above \$70 000, and be university educated (Table 1). Their children were significantly more likely to be an only child, but were less likely to have a parent who was single or a health care card recipient.

There were differences in the proportions of children in each of the three residential categories who were reported by parents to be definitely immunised. There was no significant difference

between the proportion of inner urban (55, 57%) and other urban children (134, 53%) found to be definitely immunised ($p>0.3$). However, significantly more children in inner urban and other urban areas were definitely immunised than those in rural and other metropolitan areas (104, 36%) ($p<0.0001$) (Table 1).

Immunisation providers were classified as either GPs or others (including council clinics, hospitals and community health centres). General practitioners had immunised 40 (73%) of the 55 definitely immunised inner urban children, compared with 158 (66%) of the 238 definitely immunised children residing in other areas (not significant, $p>0.05$).

Discussion

We found that children recorded on the ACIR as under immunised at 12 months of age in inner urban and other urban areas of Australia were significantly more

likely to be reported by parents as fully immunised compared with children in rural/other metropolitan areas.

The study had several limitations related to selection bias (representativeness of the study sample), validity of immunisation status by telephone interview, and the small number of children residing in inner urban areas.² They may have contributed to this result. However, the findings suggest that the lower immunisation coverage consistently found in inner urban areas of Australia may relate more to inadequate provider reporting of immunisation encounters than to lower immunisation rates.

We speculate that several factors may contribute to reduced provider reporting in inner urban areas including the greater rates of solo GPs (who are less likely to register for the General Practice Immunisation Incentives Scheme) in inner urban areas and lack of patient loyalty. Mechanisms are needed to improve notification of immunisations if the data are to be used to estimate immunisation rates.

Implications of this study for general practice

- ACIR data suggest that there are lower immunisation rates in inner urban areas.
- We found greater under reporting in inner urban areas than in rural and metropolitan areas outside capital cities.
- This suggests an imperfect system for tracking areas of need in immunisation.

Conflict of interest: none declared.

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