

Finding the children for *GROWING UP IN AUSTRALIA*: the longitudinal study of Australian children

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Abstract

The *Growing Up in Australia* study, funded by the Department of Family and Community Services through the Commonwealth Government's *Stronger Families and Communities Strategy*, is being developed as Australia's first national longitudinal study of children. This paper outlines the proposed sample design for the *Growing Up in Australia* study, including details of the sampling frame, the sample selection process and expected sample size and sample loss.

A multiple cohort cross-sequential design has been proposed, with one cohort comprising children aged under 12 months, and the other, children aged 4 years. With facilitation by the Department of Family and Community Services, the Health Insurance Commission has agreed that the sample can be selected from the Medicare database, the most comprehensive database of Australia's population.

Every effort is being made to ensure that the sample chosen is as representative as possible of Australia's children. A clustered design, based on postcodes, has been chosen as it allows community level effects to be measured and analysed and also allows for reasonably cost effective face-to-face interviewing.

1 Introduction

Growing Up in Australia, also known as the Longitudinal Study of Australian Children or LSAC, is a broad, multi-disciplinary study that is being developed to examine the impact of Australia's unique social and cultural environment on the next generation, particularly in regard to topical issues of policy relevance. The study is being funded by the Department of Family and Community Services (FaCS), as part of the Commonwealth Government's *Stronger Families and Communities Strategy*.

Growing Up in Australia will identify the developmental pathways that Australian children follow and the factors (both risk and protective) that predict the course of these pathways. It is therefore important that the sample of children selected for the study is as representative as is possible of Australian children, so that the results can be used for all Australian children. The sample design has yet to be finalised with FaCS and therefore this paper should be considered as a discussion of the sampling issues for the study.

2 Overview of Design

The essential focus of the study design is on the early years of children's lives, and therefore defines 'the child' as the sampling unit of interest. It is intended that the sample will be representative of all Australian children in each of two selected age cohorts, allowing assessment of developmental outcomes from infancy until middle childhood. By following two cohorts whose ages will overlap as the study progresses, the design is cross-sequential in nature. Cross-sequential designs have a number of advantages over simple single-cohort designs (see Discussion Paper 1).

The design provides for an expected coverage of cohorts as follows:

- **Cohort 1 Aged less than 12 months:** a cohort with a minimum size of 5,000 Australian children aged less than 12 months, and followed at least every two years for six years;
- **Cohort 2 Aged 4 years:** a cohort with a minimum size of 5,000 4 year old Australian children, and also followed at least every two years for six years.

3 Sampling frame

Locating the *Growing Up in Australia* target populations of children aged less than 12 months and children aged 4 years is not a straightforward task. These populations are relatively rare in the Australian population – they each make up just over one per cent of the total Australian population. Based on recent Australian Bureau of Statistics Census of Population and Housing figures, about one in 16 Australian households at any one time has a child aged under 12 months or aged four years.¹

Locating rare populations can be more (cost) efficient using administrative sources, as opposed to locating the sample through methods such as area sampling or telephoning households (though the efficiency of the latter can be increased through over-

¹ ABS 2002, Census of Population and Housing: Selected Social and Housing Characteristics, Australia (catalogue no. 2015.0) plus unpublished Census data. There were about 7 million households in Australia and about 450,000 of these have children aged under 12 months or 4 years.

sampling from areas with likely higher concentrations of the target population). However, administrative sources also have limitations, principally with the extent of coverage of the target population and the currency of information.

A number of possibilities for the sampling frame were investigated in earlier stages of the development of this study. These included using reverse telephone directory CD-ROM or random digit dialling to help locate in-scope families, and making use of Birth Registry or Family Tax Benefits recipient listings. All of these methods had significant problems and/or costs associated with them.

With facilitation by FaCS and the cooperation of the Health Insurance Commission (HIC), it is now intended to extract the sampling frame from HIC's Medicare enrolment and activity databases. Medicare records contain data on date of birth and hence provide a direct way of locating the required target population. Medicare enrolments appear to be the only administrative source that can supply reasonably current information on both the *Growing Up in Australia* target populations.

To support the *Growing Up in Australia* study, HIC will provide the following services:

- provision of confidentialised statistical snapshots of the Medicare enrolment databases to allow the *Growing Up in Australia* Project Operations Team to select the areas for the Dress Rehearsal (DR) and Wave 1 samples;
- selection of the sample for the DR and the Wave 1 samples, using instructions provided by AIFS;
- mail-out of an "invitation to participate" letter and *Growing Up in Australia* information brochure to the families of selected children. Families can opt out of the survey by phoning a 1800 number, staffed by HIC, or by returning a reply-paid slip;
- provision of a list of contact details for selected families, excluding those who have opted out and any return to senders that cannot be located; and
- provision of aggregate statistical information on those who have opted out or cannot be located, to allow for non-response analysis.

The HIC and Medicare are well regarded by the Australian community and an "invitation to participate" letter sent by HIC is therefore likely to be well received by selected families. HIC, FaCS and AIFS are all very mindful, however, of privacy issues related to the selection of the sample in this way, and every effort will be made to respect people's privacy and allow people the opportunity to opt out of the survey before any contact information is released from HIC to AIFS.

4 Medicare enrolments as the source of the sampling frame

The major advantage of the Medicare enrolment database over any other sampling frame available is that both cohorts of children can be directly identified from this source. This is a cost efficient search method for finding the *Growing Up in Australia* target population and it means that selected families can be contacted using a personal pre-approach letter, rather than cold-calling. The use of such a letter is expected to have a positive affect on the response rates. It is also likely that the information for most children will be reasonably current (as opposed to Births Registry information, for example, which may be quite out-of-date for 4 year olds), though there will be some under-coverage of children recently born.

The following aspects associated with the use of Medicare enrolments as the source for the sampling frame are addressed below:

- Scope
- Coverage
- Currency of address information
- Geographic indicator
- Post Office boxes as address information
- Activity indicator
- Confidentiality requirement
- Children on more than one Medicare enrolment

4.1 Scope

Theoretically, Medicare includes all Australian residents. In practice, it can exclude some Australian residents who have access to alternative health services such as some defence force personnel, prisoners, and persons eligible for Department of Veteran's Affairs' Health Services. This should not affect the *Growing Up in Australia* target population, as any dependent children of these persons still need to be enrolled for Medicare.

Conversely, Medicare's population base is expected to exceed the ideal population base (ie all Australian residents) with regard to registration relating to international visitors and former Australian residents who have died or are now permanently resident overseas but have not yet been deleted from the Register.

Children with an end-date (this either means that the child has died or has been cancelled from that enrolment for some reason) can be excluded.

4.2 Coverage

HIC believes that coverage of children by the Medicare register, especially the recently born and toddlers, has been enhanced by the introduction of the Australian Childhood Immunisation Register (ACIR) – a subset of the Medicare enrolment file that contains information on all children aged 7 years and under. Information from the last evaluation report of the ACIR indicates that approximately 98% of children are enrolled with Medicare by 12 months of age.²

Coverage for 4 year old children appears to be very good when compared with ABS estimated resident population figures but coverage for children aged less than 12 months is incomplete due to the lag in registering babies.³ Information from the "Immunisation Coverage report" indicates (if missing data are excluded) that about

² Brynley Hull, Glenda Lawrence, C Raina MacIntyre and Peter MacIntyre (2001). "Immunisation Coverage: Australia 2001" National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, University of Sydney, p5.

³ Correspondence with ABS indicated that at December 2001, the number of Medicare enrolments of children aged 4 years was 101.5% of ABS estimated resident population figures, and the proportion for children aged under 12 months was 88.5%.

80% of children are registered by 2 months, just over 90% by 4 months and almost all by 6 months.⁴

There were in the past, and still are, some Aboriginal and Torres Strait Islanders who do not receive Medicare benefits because they access medical services funded by State or other Commonwealth bodies. Over the last few years, there has been a move to enrol Indigenous people with Medicare and it is understood that HIC now record an Indigenous indicator for new enrolments.

4.3 *Currency of address information*

It is expected that address information for families with young children should be reasonably current, especially for those with babies who have recently been registered with Medicare. Information from the Women's Health Australia (WHA) project, which involved a mail-out survey from the Medicare database in 1996, is that about 6.1% of addresses were out of date for women aged 18-23 years, 3.8% for those aged 45-50 years and 2.8% for those aged 70-75 years.⁵

HIC is likely to be notified of a change of address through card-holder contact with a Medicare Branch through patient claims, replacement for a lost, stolen or expired card or through its card replacement program conducted about every seven years. For people who are bulkbilled, however, there is no opportunity for address details to be checked. In 1999-2000, 73% of claims were bulkbilled, so the flow through of change of address information to HIC via patient claims is not a standard practice. In recent times it is thought there has been a reduction in bulkbilling.⁶

Current facilities now give Medicare members the ability to update their address across a range of government services and make it easier for people to lodge address changes over the telephone or the internet.

4.4 *Geographic indicator*

A clustered (by area) sample design is desirable for two reasons: it provides the opportunity to gather multiple observations within a community, increasing the capacity of the study to analyse community level effects; and it offers the opportunity to cost-effectively conduct face-to-face interviews.

The geographic indicator available through Medicare is postcode. This has some challenges for sample design purposes when interviewing is to be conducted face-to-face at the child's home. Postcodes can cover wide geographic areas and can include urban, rural and remote areas in the one postcode. The possibility of coding addresses to Census Collector Districts (CDs) was investigated but does not appear to be an operationally feasible option. However, postcodes do still offer a degree of clustering that would not have been available through some telephone contact methods.

⁴ Brynley Hull, Glenda Lawrence, C Raina MacIntyre and Peter MacIntyre (2001). "Immunisation Coverage: Australia 2001" National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, University of Sydney, p46.

⁵ email correspondence from WHA staff

⁶ Badr Hanna (2002). 'An alternative way to estimate population in local areas: The second phase of the Medicare Project', paper presented to the APA conference, 2-4 October, 2002.

The initial *Growing Up in Australia* proposal indicated that children in remote areas would not be included due to the high cost of data collection. However, options for how to include children in more remote locations are being investigated. It should be noted that even if remote areas are not covered in Wave 1, there may be families that move to remote areas by later waves, and consideration will need to be given to how data are collected from them.

4.5 *Post Office boxes as address information*

About 8% of *Growing Up in Australia* target children are likely to have a post office (PO) box as the contact address (based on unpublished data provided by HIC). A higher proportion than average of families in the Northern Territory, South Australia, Queensland and Western Australia use PO box numbers as their contact address.

There are a number of postcodes (about 250) that are PO boxes only. Although less than 1% of the target children are associated with these postcodes, a few postcodes have relatively large numbers of the target population in them and the number in the Northern Territory is particularly high (over 20% of the population).

Further analysis is being undertaken to determine the best approach for PO box holders.

4.6 *Activity indicator*

Only children who have had either Medicare activity or immunisations recorded on the ACIR in a set period (the previous 12 months for children aged 4 years, and 6 months for the children aged under 12 months) will be included in the sample. This is due to concerns about privacy issues such as around the death of a child or change of parental care.

Statistical information from HIC shows that about 10% of children aged about 4 years have had no Medicare activity in the previous 12 months and, on average, 13% of children aged 3-14 months have had no activity in the previous 6 months (though the activity levels vary greatly with birth month for the latter age group). These per cents are far larger than the number of children from the same birth cohorts who have died (less than one percent of all births).

Information will be sought on how the activity rates are increased when immunisation activity from the ACIR is also taken into account. It is expected that once this happens, there will only be a reasonably small number of children aged less than 12 months excluded from the target population, but there may still be a considerable number of 4 years olds excluded, as not many children of this age will have had recent immunisations.

4.7 *Confidentiality requirement*

It is a HIC confidentiality requirement that statistical information is not provided if the number of target children in a postcode is less than 6. About 1-2% of children in each cohort will be in this situation. Although various options for still including these children are being investigated, it is likely that postcodes that have less than 6 target children in either cohort will be excluded from the sample selection. In many cases this exclusion may be necessary for operational reasons.

4.8 Children on multiple Medicare enrolments

Unpublished Medicare data provided to AIFS show that no child under 6 years old is on more than 2 enrolments. There were about 1.8% of children under 12 months and 8.2% of children aged 4 years on 2 enrolments. Children on multiple enrolments will only be given one chance of selection, most likely based on the card where there has been most activity in the last 6 (or 12) months.

There is no way to identify children who are being fostered, or looked after by other carers, from Medicare enrolments. None of the children in the statistical extract of 0-6 year olds obtained from Medicare had their own enrolment. Anecdotal information from people involved with foster children indicates that not many foster families will add the child to their enrolment – use will just be made of the child’s Medicare number. Whether a child is added to a carer’s card is likely to be related to how permanent the care arrangement is. It is therefore likely that any children being fostered will be selected at the parent’s address, and this situation will have to be catered for in the survey processes. It is possible that parents of children selected in *Growing Up in Australia* who are being fostered or cared for elsewhere, may ring the 1800 number. In this case, permission would be sought to contact the foster/ carer family.

5 Sample composition

Two of the key sample design principles for *Growing Up in Australia* are:

- The sample should be representative of all Australian children, and
- All children in the target population should ideally have about the same chance of selection – hence there should be proportional coverage for each state and territory.

Some have suggested that the study should have a minimum sample size in each state and territory (for example, 1000 children per cohort for each state and territory), but this would add significantly to the costs of the study. There have also been suggestions that *Growing Up in Australia* should over-sample for children with particular characteristics (for example, children with disabilities of various sorts or children from Indigenous or culturally diverse families). However, a major strength of a study like *Growing Up in Australia* is the large and nationally representative nature of its sample, which can provide a benchmark for other studies. More intensive studies of particular subgroups are better conducted as separate studies, perhaps nested with or linked to *Growing Up in Australia*. It would also be difficult to over-sample for such children using the current frame, as no information is directly available from Medicare to identify subpopulations.

5.1 Birth months versus age at interview

If the sample is to be representative of Australian children of a given age, then ideally children who are born in all months of the year should be included in the sample. If the range of birth dates is restricted to less than a year, then the sample will not be representative. This may have important repercussions since there may be seasonal effects on a child’s development. For example, the season when a child is born may influence the child’s susceptibility to certain health conditions, and the age that a child starts school (associated with their month of birth) may be an important variable for examining a child’s adjustment to school.

However, while it is desirable for the cohort to cover all the birth months, it would also be useful to restrict the age of the child at interview, to allow for the use of more age appropriate measures. In practice, it is impossible to narrow the range of ages to less than 6 months while meeting the criterion of covering all birth months, unless almost a year is used for data collection. A 6-month variation in age at time of interview for selected children is thus more practical.

Even with a 6-month age span, the logistics of the sample design are quite complex. Because of the time between the selection of the sample and the interviews, it will be necessary to undertake at least 2 sample selections from the Medicare databases (as some children in the 0-year cohort will not have been born/ registered with Medicare at the time of the first extract). When the need to be able to meet the *Growing Up in Australia* data release deadlines and form practical workloads for interviews are added to this, then the selection of the sample becomes quite involved and further compromises may need to be made.

While further investigation is being undertaken into the above issues, the option below is being used for timetabling and sample design purposes. This design and the timing of the fieldwork will mean that some children in the 4 year old cohort will have started school at the time of their *Growing Up in Australia* interview. However, there will still be sufficient children selected who have not started school for transition to school issues to be examined, and it is felt that it is more important to have children covering all birth months in the study, and to have children who have started school both early and late, than to exclude children who have started school.

Table 3: Age (months) child turns during month of data collection

Birth month	Month of data collection: 2004				
	Mar	Apr	May	June	July
Mar	12	13			
Apr	11	12			
May	10	11			
Jun	9	10			
Jul	8	9			
Aug	7	8			
Sept			8	9	(10)
Oct			7	8	(9)
Nov			6	7	(8)
Dec			5	6	(7)
Jan			4	5	(6)
Feb			3	4	(5)

It is proposed that the 2 sub-cohorts be selected from the same area. This will ensure that a given area has children of all birth months represented as a control for possible bias if (for some reason) month of birth and region are in some way correlated. It will also mean that the same interviewers can be used – this is particularly beneficial for the non-metropolitan areas.

One advantage of staged sample selection is that it will help ensure the most up-to-date address information is used. Another advantage is that adjustments to the size of the

second sample selected may be able to be made once a better indication of sample loss is obtained from the first sample.

5.2 Families with more than one target child

About 1.5% of families have two or more children in the target population of the same age (multiple births). Given that respondent load is going to be considerable for *Growing Up in Australia*, it has been decided to include only one selected child per family. It is felt that the scientific contribution resulting from this relatively small group is not sufficient to be worth the respondent burden and operational complexities of including more than one child.

Similarly, respondent burden would also be increased if families with 0 and 4 year olds have both children selected. Although it may be time-efficient for interviewers and provide information on siblings, it has been decided not to select both children in such families.

6 Sample design parameters

The sample design will involve a first stage selection of a number of geographic areas (referred to as primary sampling units or PSUs) then a random selection of a number of in-scope children within each selected area. As indicated earlier, PSUs will be (based on) postcodes.

This process is not straightforward where, as in this study, there is a widely disparate distribution of target children across postcodes (see Attachment A for some summary data). A number of options exist concerning the process for selecting these PSUs and the number to be selected. Decisions still need to be made with regard to the balance between cluster size and the number of PSUs selected, and how to deal with PSUs with either small or large numbers of the target populations.

6.1 Stratification of PSUs

PSUs will be stratified by state/ territory and by capital city statistical division/rest of state. Postcodes will be allocated to a stratum using the ABS Postal Area to Statistical Local Area concordance (or a postcode concordance if it is available). The possibility of also stratifying by size is being investigated, as one way of dealing with postcodes with very small or very large numbers of the target populations.

6.2 Number of PSUs versus cluster size

There are a number of options for determining the number of PSUs that will be selected, and the number of children then selected from each PSU. Various alternatives are being explored, making use of the statistical data obtained from HIC, in order to determine a 'fit for purpose' sample selection process for *Growing Up in Australia*. It is expected that postcodes will be selected on a probability proportional to size basis.

At this stage, the most likely design involves selecting 500 PSUs with an average of 10 final sample yield per cohort per PSU. The estimated distribution of the sample for each cohort is shown in the table below.

Table 4: Expected regional distribution for each cohort

State/region	Capital city	Rest of state	Total
New South Wales	1130	610	1740
Victoria	860	320	1180
Queensland	430	510	940
South Australia	260	100	360
Western Australia	350	150	500
Tasmania	50	70	120
Northern Territory	30	40	70
Australian Capital Territory	90	0	90
Total	3200	1800	5000

7 Sample size and sample loss

In order to determine the number of selections that need to be made from the Medicare database to give a final sample yield of at least 5,000 children per cohort, estimates need to be made of the likely sample loss at various stages of the process.

It is important to minimise the amount of sample loss as it is possible that the characteristics of children in the sample loss will be different to those included in the final sample. High sample loss means that the resulting sample is likely to be unrepresentative of the target population.

Areas of sample loss to be considered include PO boxes, return to senders (where the current address information is out-of-date), opt-outs, non-contacts, contact made but interview not obtained and refusals. These are dealt with in turn.

7.1 Post Office boxes

As stated earlier, about 8% of the *Growing Up in Australia* target families are likely to have a PO box as the contact address. It also appears that many of these families are likely to be in postcodes that have small numbers of the target populations – in many cases this is because the postcode is a PO box only.

A decision will be required on how much effort is made to contact PO box holders. As a minimum, the initial letter from HIC will ask PO box holders to make contact by phone or by return of a tear off slip with their residential address. Further attempts to obtain a residential address may be trialled at the Dress Rehearsal and a decision made after this about the most appropriate strategy to use.

7.2 Return to senders

On the basis of the WHA experience, it seems reasonable that *Growing Up in Australia* can expect a Return To Sender (RTS) rate of about 5-10%. The Dress Rehearsal will be the best source for estimating the RTS rate and deciding whether any attempt to locate RTS can or should be made.

7.3 Opt-outs

Information from other FaCS surveys suggests an opt-out rate of about 10% is to be expected. Again, the Dress Rehearsal will be the best source for estimating the opt-out rate.

7.4 *Non-contacts*

Every effort will be made to minimise the number of non-contacts. Interviewers will make at least 6 calls to dwellings at different times and days of the week. However, it is still expected that interviewers will not make contact with 4% of households.⁷ Other usual fieldwork practices will be used to try to minimise the number of non-contacts.

7.5 *Contact made but no interview obtained*

About 4% of cases in this situation are expected.⁸ These include cases where families are away and where there are language problems and illness. It will also include cases where the HIC letter was sent to an out-of-date or wrong address and the householder disposed of the letter rather than returning it, or where the family has moved since the HIC letter was received. In the latter cases, the family may have left contact details with the new residents. It may also be the correct address, but the child no longer lives there. The Dress Rehearsal will test procedures and a decision made on which to follow.

7.6 *Refusals*

Based on the experience from related surveys both overseas and in Australia and overseas a refusal rate of 20-30% can be expected once contact with the selected family is made. Again, every effort will be made to encourage families to participate, although given the longitudinal nature of the survey, it is important that the *Growing Up in Australia* families are happy to participate.

8 *Conclusion*

The sample design for *Growing Up in Australia*, though relatively simple at the macro level, has a considerable number of complexities at the micro level, in particular in ensuring a sample that is representative as well as operationally efficient. Over the development stage of the study, the challenges that these complexities pose are being resolved and we are confident that the children who are selected in this study will form a sufficiently representative cohort on which to base policies for the benefit of all Australian children.

⁷ Based on the rates found in the first wave of the HILDA survey “The Household, Income and Labour Dynamics in Australia (HILDA) Survey; Wave 1 Survey Methodology”, HILDA Project Technical Paper Series, No. 1/02, May 2002.

⁸ Ibid

Attachment A HIC enrolment data

For children born November 1997 – May 1998 who had Medicare activity in the 12 months prior to the extract of data in August 2002.

Number of children in postcode	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
	Number of postcodes (a)								
None	3	147	4	61	71	58	111	173	628
1<6	4	127	7	94	112	41	218	158	761
6<11	6	57	4	48	34	12	91	41	293
11<21		77	7	58	35	17	71	26	291
21<51	7	137	11	80	75	23	103	49	485
51<101	8	128	2	71	39	12	102	39	401
101<201	2	78	5	48	9	2	57	23	224
201+	2	24		17	2	1	19	7	72
Total	32	775	40	477	377	166	772	516	3155

(a) HIC data contains a number of postcodes that are not currently on the Australia Post list. Most of these have no target children in them.

Number of children in postcode	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
	Total number of children								
1<6 (a)	11	326	21	236	276	103	537	386	1896
6<11	39	445	28	385	253	97	730	330	2307
11<21	0	1233	114	874	488	253	1057	369	4388
21<51	221	4351	331	2822	2578	747	3640	1551	16241
51<101	661	9101	179	5208	2588	892	7578	2630	28837
101<201	278	10892	616	6738	1327	285	7641	3364	31141
201+	479	6677		4952	511	255	4791	1638	19303
Total	1689	33025	1289	21215	8021	2632	25974	10268	104113

(a) These numbers were imputed – the same value was given to all postcodes with <6 children. The actual state totals are slightly different.

Remoteness area (a)	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
	Total number of children (d)								
Major city	1669	22806		10808	5534		18704	6912	66433
Inner regional		7413		5588	1087	1734	5849	1275	22946
Outer regional		2476	551	4009	1054	843	1217	1113	11263
Remote		175	215	422	241	21	27	539	1641
Very remote		57	203	277	70	9		229	844
Migratory		0		0	0	0	2	0	2
PO box postcodes (b)	20	84	309	21	2	5	126	108	674
Unknown (c)	0	14	11	91	32	20	50	93	310
Total	1689	33025	1289	21215	8021	2632	25974	10268	104113

(a) Postcodes were considered equivalent to Postal Areas for the purposes of this table. Where a postcode includes more than one remoteness area, the postcode was assigned to the area that contained most the total population of the Postal Area at Census time.

(b) Mainly PO Box only postcodes, though contains a few residential postcodes not on the ABS Postal Area to Remoteness Area concordance.

(c) Postcodes that are not on the current Australian Post listing of postcodes.

(d) Postcodes with 1-5 target children had a value imputed. Hence all values in the table may have some error associated with them.