

**Options for benchmarking ABS
population estimates for Indigenous
communities in Queensland**

J. Taylor and M. Bell

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John Taylor is Senior Fellow, Centre for Aboriginal Economic Policy Research, The Australian National University. Martin Bell is Director, Queensland Centre for Population Research and Senior Lecturer, School of Geography, Planning and Architecture, The University of Queensland.

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Abbreviations and acronyms

ABS	Australian Bureau of Statistics
AC	Aboriginal Council
AIHW	Australian Institute of Health and Welfare
ANU	The Australian National University
ASGC	Australian Standard Geographic Classification
CAEPR	Centre for Aboriginal Economic Policy Research
CD	Collection District
CDEP	Community Development Employment Projects
CHINS	Community Housing and Infrastructure Needs Survey
CRN	Customer Reference Number
CYPLUS	Cape York Peninsula Land Use Strategy
ERP	estimated resident population
HIC	Health Insurance Commission
IC	Island Council
LGA	Local Government Area
NARU	North Australia Research Unit
NPA	Northern Peninsula Area
PES	Post Enumeration Survey
PIN	Personal Identification Number
QCPR	Queensland Centre for Population Research
QHAPC	Queensland Hospital Admitted Patients Collection
SLA	Statistical Local Area
WPHC	Well Person's Health Check

Abstract

Concerns have been expressed for some time by Indigenous community leaders, analysts, government agencies, and local service providers about the accuracy of census counts for Aboriginal and Torres Strait Islander communities in Queensland. Recent reclassification of these communities as Local Government Areas has heightened these concerns in the context of financial distributions and the related need for the ABS to develop small area population estimates. This paper examines the ABS methodology for estimating these populations, and benchmarks these against demographic information available from a range of administrative data. Potential deficiencies in ABS methodology are highlighted and a case is made for the use of administrative data in developing estimates for small populations.

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Introduction

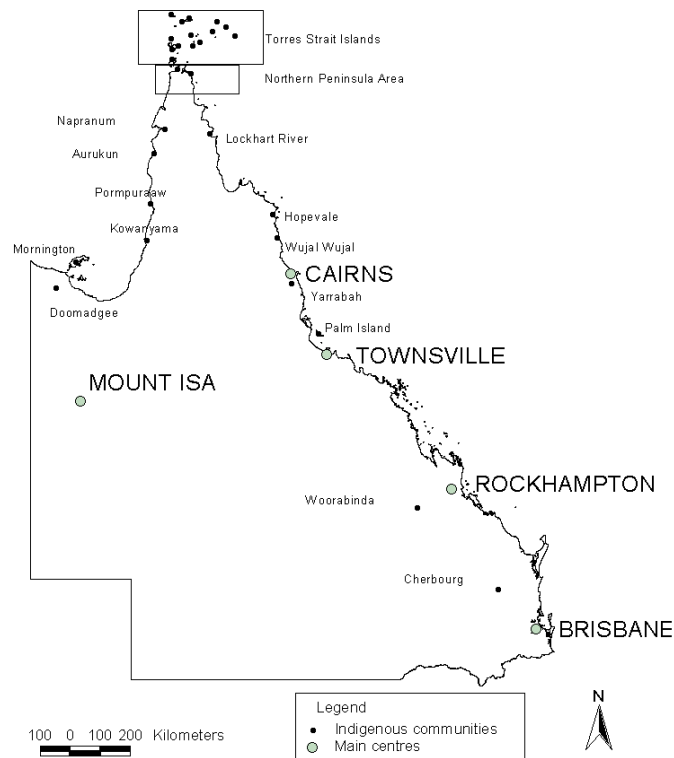
Concerns have been expressed for some time by Indigenous community leaders, government agencies, and local service providers about the accuracy of demographic data for those Aboriginal and Torres Strait Islander communities in Queensland depicted in Fig. 1 (overleaf). The main issue has been a claim of undercounting by the five-yearly national census.

One compelling example (given that it formed part of a Commonwealth and Queensland government-sponsored exercise) was presented in the Cape York Peninsula Land Use Strategy (CYPLUS) study (King 1994). More recently, the Cape York Justice Study chaired by Fitzgerald QC noted that poor quality demographic data hindered the establishment of meaningful rates of social change on the Cape (Fitzgerald 2001: 7–8). Using a wider frame of reference, the Commonwealth Grants Commission Indigenous Funding Inquiry noted that Australian Bureau of Statistics (ABS) experimental population estimates did not address cases where local knowledge and the records of service providers suggested to the Inquiry that ABS estimates were understated (Commonwealth of Australia 2001: 15). This view is supported by Taylor and Bell (2001), who have used a variety of administrative data to produce composite population figures for Cape York communities that are higher than ABS estimates. However, these claims of undercounting need to be balanced against observations that census counts in remote communities might at times be overstated (ABS 1993: 6).

Separating fact from fiction in this case is no easy task. Surprisingly, there is only one study (Martin & Taylor 1996) that can claim to test directly the validity of a census count for a remote Indigenous community, although recently published qualitative observations of the procedures for the 2001 count in remote communities (Martin et al. 2002) might also qualify. The census check reported by Martin and Taylor involved an ethnographically-based enumeration of Indigenous people in Aurukun that was concurrent with the 1986 ABS Census count. Comparison of the outcomes found that the ABS count fell short of the ethnographically-based enumeration by 17 per cent, with most of those omitted drawn from the population under 30 years of age. Similar discrepancies in the Aurukun count were estimated by Martin and Taylor for the 1991 Census.

One conclusion of this study was that the enumeration strategy adopted by the ABS for use in remote Indigenous communities was structured in such a way as to increase the likelihood of omitting young people, the more mobile and the more socially marginal. This was considered to be a by-product of the attempt to assign individuals to 'households' in situations where inter-household and inter-community mobility is the norm (Martin & Taylor 1996). At the same time, it should be noted that independent observation of the 2001 enumeration in Aurukun revealed that when sufficient and appropriate personnel are in place, and where a team commitment to counting all individuals is sustained, a satisfactory population count can be achieved (Martin 2002). The difficulty, it seems, is in ensuring that these preconditions are achieved at all places, and at each census (Martin et al. 2002).¹

Fig. 1. Location of Queensland Aboriginal and Torres Strait Islander communities and community groupings



Note: For methodological reasons, communities in the Northern Peninsula Area (NPA), and in Torres Strait have been grouped.

Estimated resident populations: what are the issues?

The ABS attempts to overcome some of the inadequacies of census counts through its development of post-censal estimated resident populations (ERPs). As the term implies, these purport to represent the population that resides in a locality most of the time (more than 6 months of the year, according to the ABS definition). From a public policy perspective, the purpose of ERPs is to ensure that public resources are distributed on an equitable basis. It is important to differentiate ERPs from the emerging concept of 'service populations' which are receiving increasing attention and debate (ABS 1996, 1999; Bell 2001; Taylor 1998). Although no firm definition has yet emerged, service populations are generally seen to extend beyond usual residents to encompass visitors and temporary populations who also impose demands on local services and facilities.

ERPs are produced by age and sex at the Statistical Local Area (SLA) level and involve an integrated approach to estimating the Indigenous and non-Indigenous population components. In simple terms, ERPs in census years are developed by:

- establishing the census count of SLA usual residents, and backdating these to 30 June in the census year;
- pro rata distribution of non-responses to the census question on Aboriginal or Torres Strait Islander origin, according to stated Indigenous-status proportions in each SLA;
- correction for net undercount of the population by applying an age and sex-specific undercount distribution for the Indigenous/non-Indigenous populations relative to their proportions in the SLA; and
- other demographic adjustments.

These procedures for population estimation, and the numbers that they generate, are presently a matter of considerable interest for Indigenous communities in Queensland, as well as for those charged with the task of servicing their needs. This is because the ABS has accepted a requirement to collect and publish the same level of data for these communities as for other local government entities, following the creation of 15 new Local Government Areas (LGAs) to accommodate the Aboriginal Community Councils in Queensland, and 17 new LGAs to accommodate the Torres Strait Island Councils. These groups of LGAs were created under the Queensland Legislation *Community Services (Aborigines) Act 1994* and the Queensland Legislation *Community Services (Torres Strait) Act 1994*, and declared under the *Community Services (Aborigines) Regulation 1998* and *Community Services (Torres Strait) Regulation 1998*, with the most recent amendments gazetted in the *Community Services Legislation Amendment Regulation (No. 1) 2002 No. 85*. This effectively creates new LGA-type categories within the Australian Standard Geographic Classification (ASGC) of Aboriginal Councils and Island Councils. These are listed in Table 1.

A number of these communities (Aurukun, Mornington Island and Palm Island) already had LGA status within the ASGC, but for the remainder ERPs have been prepared for the first time. At the time of writing these remain preliminary and subject to finalisation early in 2003.² From a policy and planning point of view, it is these ERPs that will now represent the population size and demographic composition of each community for the purposes of local government financial distributions, and in the calculation of population weightings by the Commonwealth Grants Commission. Given the reservations expressed generally about the accuracy of population counts in these communities, it is not surprising to find that the calculation of ERPs has assumed added importance to community councils and to the Queensland government. A significant point to note is that one reason why ERPs have not previously been prepared is because many of these communities were too small to form an LGA within the ASGC, and if it were not for the legislative change referred to above, this would have remained the case. In effect, then, the ABS is now required to develop small area ERPs at a scale hitherto not contemplated, and for very good reason since the

quality of population estimates stands in inverse proportion to population size, and standard errors from the application of standard ERP methodology are bound to be high.

Table 1. ASGC designation of Queensland Aboriginal and Island Councils, 2002

Aboriginal Council (AC)	Statistical Division	Island Council (IC)	Statistical Division
Cherbourg	Wide Bay-Burnett	Badu	Far North
Woorabinda	Fitzroy	Bamaga	Far North
Palm Island	Northern	Boigu	Far North
Hope Vale	Far North	Dauan	Far North
Injinoo	Far North	Erub	Far North
Kowanyama	Far North	Hammond	Far North
Lockhart River	Far North	Iama	Far North
Mapoon	Far North	Kubin	Far North
Napranum	Far North	Mabuiag	Far North
New Mapoon	Far North	Mer	Far North
Umagico	Far North	Poruma	Far North
Wujal Wujal	Far North	Saibai	Far North
Yarrabah	Far North	St Pauls	Far North
Doomadgee	North West	Seisia	Far North
		Ugar	Far North
		Warraber	Far North
		Yorke	Far North

Source: ABS (2002a).

This cautionary note aside, there is no doubt that ERPs have the potential to enhance the reliability and utility of community population figures, when compared to raw census counts. However, a number of misgivings remain. One issue is the reliability of 'usual residence' counts for these remote communities. This is partly because of the volatility of place of enumeration counts over sequential censuses, but it also reflects possible ambiguity in the interpretation of 'usual residence' by highly mobile Indigenous respondents to the census.

The volatility of census counts is illustrated in Table 2, which shows place of enumeration counts for each community and grouping of communities (inclusive of outstations) at each census from 1991 to 2001. It should be noted that the figures shown here, and in the subsequent analysis, refer to the total population of each community and not just the Indigenous component. There are two reasons for this. First, although in each place Indigenous people constitute by far the majority of the population, the measurement of need for local government

functions is based on the requirements of the total population. Second, Indigenous identification in administrative data remains poor, and so reliable data from this source can only be obtained for total persons.

Very few of these communities display stable population counts over the last three censuses. Indeed, the chief characteristic is best described as unpredictability. Thus, the population at Doomadgee first fell by 25 per cent, and then rose by 49 per cent; Mornington Island experienced a 57 per cent rise in population, and then a 13 per cent decline; Wujal Wujal and Kowanyama appear to be in progressive decline; while Aurukun has surged ahead after negative growth.

Table 2. Change in census population counts for Queensland Indigenous communities and community groupings, 1991–2001

Community	1991	1996	2001	% change 1991–96	% change 1996–2001
Aurukun	788	778	1011	-1.3	29.9
Cherbourg	1053	1100	1141	4.5	3.7
Doomadgee	1005	754	1124	-25.0	49.1
Hope Vale	823	706	763	-14.2	8.1
Kowanyama	1021	912	878	-10.7	-3.7
Lockhart River	532	504	466	-5.3	-7.5
Mornington	705	1108	964	57.2	-13.0
Napranum	696	777	740	11.6	-4.8
Palm Islands	1978	2073	2096	4.8	1.1
Pormpuraaw	480	553	647	15.2	17.0
Torres Strait	6587	6674	7254	1.3	8.7
NPA	1750	1855	1937	6.0	4.4
Woorabinda	1017	1119	965	10.0	-13.8
Wujal Wujal	294	293	233	-0.3	-20.5
Yarrabah	1828	1978	2125	8.2	7.4
Total	20,557	21,184	22,344	3.1	5.5

When interpreting these data, it should be recalled that they are intended to constitute a full count of the population present at each community on census night. In truth, given the logistical difficulties encountered in enumerating remote Indigenous populations (Martin et al. 2002), this is unlikely to be achieved. In any case, it is to be expected that census counts of those present in such places at each census would vary from count to count because of high levels of intra- and inter-regional population mobility. At the same time, the level and direction of population change recorded for some communities is quite striking—certainly to the extent that one would expect contributory circumstances to be readily

apparent. Unfortunately, one problem in interpreting fluctuations in population counts is the lack of official reporting of such intelligence, although with some digging this can often be uncovered from key informants. For example, Martin and Taylor (1996) explained part of the relatively low count of the Aurukun population in 1991 by the fact that census collectors simply failed to count residents of Aurukun outstations.

While the accuracy of 'place of enumeration' counts is important in the development of post-censal estimates (since the majority of people are likely to be present in their usual place of residence at census time), it is 'usual residence' counts that are ultimately of interest here. These are shown in Table 3 for each community alongside the place of enumeration counts, and the ratio between the two pairs. In regard to the development of ERPs, it is significant to note that there tends to be very little difference between usual residence counts and place of enumeration counts. In fact, the former are lower than the latter in more than half of the locations.

It has been observed that the census question regarding usual place of residence presents interpretive problems for remote Indigenous populations (Martin 2002: 22; Morphy 2002: 44; Sanders 2002: 88–9). It has also been noted that census-derived Indigenous mobility and migration rates in remote areas are very low, and that this stands in stark contrast to the fact of very high and frequent mobility as depicted in ethnographic analyses (Taylor & Bell 1996). One theory advanced to account for this mismatch is that Indigenous people from remote communities may not respond to the census question on usual residence in the manner intended by the census, or at all. If that is the case, then questions might be asked about the quality of usual residence counts.

Many Indigenous residents of remote communities frequently visit urban centres for varying periods of time, in order to access services, or to accompany relatives doing the same (Taylor 1998, 2002). Because of this, ambiguity may arise around the notion of 'usual residence' as presented on census forms, with the prospect that it may be reported inaccurately or not at all. The ABS definition of 'usual address' (resident 6 months or more according the standard census form, or 'live at this place most of time' on the special Indigenous personal form) may be ignored. If usual residence is inadequately described by those away from home, such individuals will be excluded from the count of usual residents at the home community and are recorded instead as usual residents of their place of enumeration. The suggestion here, then, is that individuals from communities who are temporarily resident in urban centres may well indicate the latter as their usual place of residence (as in one sense it is), or be counted there as usual residents by default, leading to underestimation of the true population of their home community (Loveday & Lea 1985; Sanders 2002; Taylor 1990, 1998).

The second process which also raises concerns is the adjustment of usual resident counts to the ERP. Overall, the effect of this is to raise the collective population of the communities in question by 8 per cent. However, a large part of this average adjustment derives from communities in the Northern Peninsula

Area (NPA) and Torres Strait groupings where relatively large populations are found, and where the ERP adjustment is also relatively high. In many other places, the adjustment is below 8 per cent, and in Wujal Wujal the ERP is actually lower than the usual residents figure. Even allowing for the ABS ERP methodology, an adjustment of 8 per cent, or less, appears very low when benchmarked against the equivalent upward adjustment for the Indigenous population of Queensland as a whole, which was 13 per cent (ABS 2002c: 24–5).

Table 3. Census population counts and ERPs for Queensland Indigenous communities and community groupings, 2001

Community	Place of enumeration count (1)	Usual residence count (2)	ERP (3)	Ratio of (2)/(1)	Ratio of (3)/(2)
Aurukun	1011	1045	1084	1.03	1.04
Cherbourg	1141	1132	1209	0.99	1.07
Doomadgee	1124	1133	1198	1.01	1.06
Hope Vale	763	754	826	0.99	1.10
Kowanyama	878	918	991	1.05	1.08
Lockhart River	466	429	470	0.92	1.10
Mornington	964	946	1007	0.98	1.06
Napranum	740	723	789	0.98	1.09
Palm Island	2096	2166	2305	1.03	1.06
Pormpuraaw	647	582	628	0.90	1.08
Torres Strait	7254	7152	7821	0.98	1.09
NPA	1937	1908	2180	0.98	1.14
Woorabinda	965	963	1019	1.00	1.06
Wujal Wujal	233	268	263	1.15	0.98
Yarrabah	2125	2143	2280	1.01	1.06
Total	22,344	22,262	24,070	1.00	1.08

It is worth speculating on possible reasons for the below average ERP adjustment in these communities. A central point of concern arises from the ABS estimate of undercount. Adjustment for remote community ERPs is of necessity based on Balance-of-State estimates because the Post Enumeration Survey (PES) is not conducted in remote communities. Thus, the ABS has no direct basis for estimating census undercount in remote communities. Once again, while precise evidence is thin, the suspicion is that undercount rates in remote communities could be much higher than in the more settled areas covered by the PES. As noted earlier, Martin and Taylor (1996) estimated a 17 per cent undercount for Aurukun in 1986 and 1991. Also, Sanders (2002) describes a situation where the

two-form structure of the ABS remote Indigenous enumeration strategy hinders the achievement of a basic head count.

Finally, it has been observed that ERPs can differ in terms of population level and composition from alternative estimates constructed from administrative data (Taylor & Bell 2001). To some degree, this is to be expected as these are the constructs of quite different methodologies. However, the existence of alternative population estimates provides some basis for the benchmarking of ERPs, and it is in this context that the present analysis is construed.

Alternative population estimates

An alternative set of 2001 population estimates can be derived for each community, based on individuals listed in administrative data sets who nominate a given community as their usual place of residence at a time as close to the census date as possible. The quality of these estimates depends on the integrity of these data sets in terms of their timing, population coverage, lack of duplication of individuals, and accurate depiction of usual residence. It was considered important, therefore, that data sets should satisfy a number of basic principles:

- they should be centralised, with common reporting rules;
- they should uniquely identify and record individuals;
- individual records should be as close to August 2001 as possible; and
- they should be readily accessible in the event that they provide an ongoing source of population estimation.

Against these criteria, a wide variety of administrative data sets containing demographic information were considered, but only a few were selected for inclusion in the estimation of community populations. These included school enrolments, clinic registers, hospital births data, Centrelink payments data, and Medicare data. Three issues became immediately apparent. First, they were insufficiently discrete to provide separate estimates for communities in Torres Strait and the NPA, and so community populations in these areas were aggregated. Second, it was apparent that, within administrative data sets, excessive use of Weipa as an address for residents of Napranum and Mapoon made the construction of alternative composite estimates meaningless for these communities. These two communities were therefore excluded from the analysis. Finally, no collection provided counts across all age groups, and one (clinic registers) referred only to certain communities. Thus, the attempt to build alternative population estimates based on administrative data was, of necessity, a composite exercise combining those data that best represented various components of the age distribution in each locality. The strengths and weaknesses of each data set are described below.

Queensland Hospital Admitted Patients Collection

The vast majority of births to women from the communities in question occur in hospital, and the Queensland Hospital Admitted Patients Collection (QHAPC) maintains records on all live births in hospital. Information from the Midwives Collection similarly indicates that the numbers of births to non-admitted patients and home births are very small. Detailed locality information for births in private hospitals are not readily available, nor are they as timely as public hospital information. However, very few Indigenous confinements occur in private hospitals. Three address fields are held in the QHAPC collection: address of usual residence, mailing address, and current address. Although the quality, accuracy and variation between these three was not investigated in any detail, the usual residence address was thought to be reasonably accurate given that questions on three addresses would highlight the conceptual differences between them. At the same time, the fact that expectant mothers are transferred to urban centres several weeks before they actually give birth, and often reside with relatives in town, may lead to an understating of 'real' usual residence addresses.

The QHAPC collection was considered a suitable source from which to construct an approximation of the 0–4 year-old age cohort for each community, net of mortality (although this adjustment could be made using a life table). One might question whether the usual community residence address of mothers giving birth in distant urban hospitals provides a reliable basis upon which to then attribute all of these births to a given community. In answer to this, it should be noted that the importance of proximity to family and kin is emphasised in studies of Indigenous child rearing, and there are strong pressures for mothers to return to communities after birth (Hamilton 1981; Smith 1980). Even if mothers subsequently move on it is highly likely that infants will remain with other kin, and so the usual address field for hospital registered births was considered to be a reliable indicator of the usual place of residence for those in the 0–4 age group. Accordingly, births data by usual residence and sex were obtained for the previous five years from 1 August 2001 to match as closely as possible the 0–4 age cohort in each community.

Births data from the Queensland Registrar General were not used as these suffer from significant under-registration of births in remote Indigenous communities, as well as considerable delays (sometimes years) in the registration of remote community births. The Queensland Health Perinatal/Midwives Collection also collects data on all births in Queensland, but a changeover from a paper-based system to electronic records at the time of writing precluded timely supply of data for many hospitals. With Community-Based Child Health Clinic data, the lack of a centralised data repository was likewise a constraint, although once the community health information system (Ferret) is established in all communities this may turn out to be a valuable source of population data.

Education Queensland and Catholic Schools Commission school enrolment census

All Queensland schools undertake a detailed census of their enrolled school population at the beginning of August each year. With the exception of Palm Island and Thursday Island communities, where there are Catholic education facilities to Year 7, all schools are Education Queensland facilities. The range of information collected by this census includes locality of usual residence, single year of age, sex, Indigenous status, year level, and a unique student identification number.

While it is reported anecdotally that schools tend to inflate their enrolment numbers in order to maintain funding levels, there is no means of directly testing for this, short of random audits at school census time. However, comparison of school enrolment levels with data from other administrative sources was carried out, providing some basis for cross-checking the validity of information.

In addition, data were obtained from Education Queensland for the August 2001 school census and for the previous four August censuses, as well as for the two Catholic Education Schools on Palm Island and Thursday Island (Table 4). This time series provided for an assessment of the stability of the 5–12 age group in each community as it is possible to track cohorts of enrolled students over a five-year period.

Table 4. Number of Indigenous school enrolments by age, Queensland Aboriginal and Torres Strait Islander communities, 1998–2001

Age (years)	1998	1999	2000	2001
5	670	663	657	695
6	679	684	708	656
7	707	682	669	685
8	702	723	696	677
9	658	692	738	665
10	529	659	683	707
11	519	527	675	662
12	451	480	456	594

Analysis of birth cohorts across sequential years and age groups showed very little variation in numbers. For example, the number of 6-year-olds in 1997 was similar to the number of 7-year-olds in 1998. This suggests that the population of primary school-age children in the communities as a whole is very stable—certainly much more stable than suggested by 1996 and 2001 ABS Census counts.

Health clinic registers

Another source of population data is available from the administration of health services. In theory, patient records (which include demographic information) are available for the whole population, on the assumption that all people ultimately access health services. However, before these are used for demographic analysis careful sifting is required to avoid double-counting across overlapping clinic catchment areas, and to account for additions and deletions due to births, deaths and migration in each area. One approach that has been successfully applied in Indigenous communities elsewhere (Taylor 2001; Taylor, Bern & Senior 2000) is to assemble lists of those who indicate particular communities as their usual residence, and then to update the lists using the local knowledge of health workers and other key informants.

Such an exercise formed a vital component of Queensland Health's Well Person's Health Check (WPHC). This was a community-based screening program offered to Indigenous teenagers and adults, and implemented as a collaborative initiative between Apunipima Cape York Health Council, Queensland Health (Tropical Public Health Unit), and local community organisations. More than 3,000 Indigenous people over the age of 13 years from 26 communities across Queensland's Northern Health Zone participated in the WPHC between March 1998 and December 2000, yielding age and sex data for the usual resident population aged 13 and over in each participating community. Several of the communities of interest here were included in the WPHC—Mornington Island, Pormpuraaw, Aurukun, and some of the NPA communities—and for these places the data provide a useful independent estimate of population numbers.

Centrelink data

In administering the disbursement of welfare payments, Centrelink records the age and sex of each payment beneficiary (including children) and allocates them a unique Customer Reference Number (CRN). Also indicated is an address for each individual indicating where the payment is to be made and where the beneficiary can be contacted if necessary.

As payments are made on a regular, usually fortnightly basis, a download of current CRNs by age, sex and locality provides an up-to-date proxy count of community populations. These payments data include all Community Development Employment Projects (CDEP) participants as these are captured by Newstart coding in their records. While anecdotal evidence suggests that some individuals in the database may have more than one CRN, and therefore present a problem of duplication, Centrelink is well aware of this risk and has instituted a sophisticated cross-referencing capacity with the result that it is very difficult for duplicates to occur within the system. There was also the possibility that individuals' records might be retained in the database long after they should have been deleted. Activity management records that were still in the system and flagged as provisionally deleted, or deleted, were not selected.

Confidentiality guidelines for the release of Centrelink data preclude the release of any counts where the cell size is less than 20. As a result it is necessary to aggregate some age groups in most communities, especially at older ages and in smaller communities. Another issue is that individuals might record their address as a particular community but no longer be resident in that community. However, according to information provided by Centrelink field staff at the Central and North Queensland office in Townsville, the system is designed to ensure that address fields are accurate for the purposes of client follow-up, and these are therefore corrected at every opportunity. It was also pointed out that such address fields provide an indication of continued attachment to a community involving at least some periodic residence. This is obviously significant in terms of defining usual residence.

With these quality assurances in place, data were obtained indicating the number of CRNs by age, sex and locality for the fortnightly payment rounds ending 17 August 2001, and 28 June 2002. The latter were obtained for the purpose of cross-checking the stability of the 2001 data over time, and the two data sets were found to correspond closely. Obviously, these data refer only to individuals who are recipients of benefits. As a result, those who are fully employed, on a high income, and with no dependents would not be included. In the communities under consideration here, these individuals would be mostly non-Indigenous personnel working in health, education, police and local government, whose numbers are small.

Medicare data

The Indigenous populations of the communities under consideration have only recently begun to be registered with Medicare—a reflection of their institutional history and marginalised status. Each person registered is allocated a unique Medicare Personal Identification Number (PIN) which is linked to personal details including age and sex. The Health Insurance Commission (HIC) is currently encouraging enrolment by remote Indigenous populations but while extensive coverage is evident in some communities, this is by no means universal.

Aside from this coverage issue, there are other limitations to the use of Medicare data for population estimation. First, the data are only recorded when contact is made for payment purposes. It is therefore necessary to define a period of time before the required date to enable an accumulation of payments sufficient in size to approach full population coverage. Of course, determination of this period and associated numbers is arbitrary. It also carries risks—a longer timeframe increases the chance of picking up infrequent users of services, but it also increases the chance of including individuals who may have moved subsequently from the community. In any event, with stock data that are subject to registration delay, omissions are inherent. Unlike the WPHC data, and to some extent the Centrelink data, there is no opportunity to ground-truth Medicare listings. Another problem is that the HIC does not systematically remove inactive people from the database—for example, persons who have left Australia permanently or deceased persons. However, cross-reference with the Australian Institute of

Health and Welfare (AIHW) national deaths index has now commenced and so this problem should abate. Therefore, the longer the period over which payments data are accumulated the more likely it is that invalid persons may be included. This may account for the fact that the Medicare PIN numbers counted in those communities for which data were obtained are relatively high in older age cohorts.

Medicare numbers were nevertheless obtained for all the Queensland Aboriginal and Torres Strait Islander communities for the three years up to 2001. However, for all the cautionary reasons noted, these data were used judiciously and generally in the form of a cross-check for cohort population levels derived from other sources. Interestingly, they were often found to be in broad agreement with Centrelink and school enrolment data for younger age groups under 25 years.

Composite population estimates

The approach to constructing composite population numbers was to consider each community in isolation and to build the population profile age group by age group, using a combination of ERP and administrative data. For each age group, the method was to apply whichever population count was found to be highest—from the ERP or from an administrative source. As it turned out, it was a count from one of the various administrative sources that was invariably the highest, with the largest and most consistent variation being at younger ages. The intent behind this methodology was to maximise the capacity to compensate for the lack of a direct estimate of undercounting in these communities. The resultant population level and composition was then compared to the ERP to establish and assess any difference between the two.

To the extent that numbers derived from administrative data adequately represent unique individuals at a point in time whose usual residence (most of the time) is one of the communities in question, then any difference in outcome between the ERP and composite numbers was considered worthy of consideration. The claim here is not that the composite population figures are necessarily more accurate or valid, rather that the existence of an alternative set of usual resident numbers undermines any notion that the ERP methodology provides the only legitimate basis for a population estimate. Furthermore, it is suggested that the final calculation of ERPs should take into account alternative data sources where appropriate. For example, if the composite estimate identifies substantial numbers in particular age groups that appear to be absent from the ERP when compared to previous ABS counts (for example school-age cohorts that were present in the 1996 Census count but absent from the 2001 ERP), then a case might be made that the higher composite figure is more reliable.

With these comparative principles in mind, composite population estimates by sex and five-year age group were constructed for each community and then compared with their equivalent 2001 ERPs. Overall composite and ERP populations for the 14 communities are presented in Table 5 for purposes of comparison. In aggregate, the composite population is 17 per cent higher than the

ERP, but considerable differences in variation from the ERP—both proportional and numerical—are apparent between communities.

Table 5. Absolute and proportional differences between composite populations and ERPs, 2001

Community	ERP	Composite estimate	Difference (no.)	Difference (%)
Aurukun	1084	1137	53	4.9
Cherbourg	1209	1431	222	18.4
Doomadgee	1198	1353	155	12.9
Hope Vale	826	1069	243	29.4
Kowanyama	991	1110	119	12.0
Lockhart River	470	652	182	38.7
Mornington Island	1007	1140	133	13.2
Palm Island	2305	3168	863	37.4
Pormpuraaw	628	660	32	5.1
Torres Strait	7821	8890	1069	13.7
NPA	2180	2226	46	2.1
Woorabinda	1019	1498	479	47.0
Wujal Wujal	263	399	136	51.7
Yarrabah	2280	2648	368	16.1
Total	23,281	27,381	4100	17.6

It is difficult to gain a sense of the likely validity of the composite population levels shown in Table 5 without reference to a third set of population estimates for each community. The only other consistent source of data is that available from the ABS Community Housing and Infrastructure Needs Survey (CHINS) which was conducted in all discrete Indigenous communities first in 1992, then in 1999, and again just prior to the 2001 Census (ABS 2002b) (Table 6). CHINS reports estimates of the usual resident population of each community based on information provided to survey collectors by key informants in community housing organisations. These estimates are often based on historical series and population data drawn from administrative collections, but they are also augmented by local knowledge. In all likelihood, they should be construed as an estimate of service populations rather than one of usual residents.

In aggregate, the composite population is substantially below the CHINS estimate (by as much as 23 per cent). Only in two places (Woorabinda and Wujal Wujal) is the composite higher, although barely so in the latter case. While the Woorabinda example casts doubt on the integrity of that particular composite estimate, cross-reference with Table 5 indicates that in virtually every other place the composite estimate is located roughly half way between the ERP and the CHINS estimate. To

the extent that CHINS data might be more akin to service population estimates, the fact that the composite figures are much lower in almost all cases strengthens their characterisation as usual residence estimates.

Table 6. Comparison of composite estimates for each community against the reported usual resident population from the 2001 CHINS

Community ^a	Composite estimate	CHINS estimate	Difference (no.)	Difference (%)
Aurukun	1137	1429	-292	-25.7
Cherbourg	1431	2000	-569	-39.8
Doomadgee	1353	2036	-683	-50.4
Hope Vale	1069	1300	-231	-21.6
Kowanyama	1143	1265	-122	-10.7
Lockhart River	652	700	-48	-7.4
Mornington Island	1140	1490	-350	-30.7
Palm Island	3168	3500	-332	-10.5
Pormpuraaw	660	728	-68	-10.3
NPA	2226	2643	-417	-18.7
Woorabinda	1498	1200	298	19.9
Wujal Wujal	399	385	14	3.5
Yarrabah	2648	3000	-352	-13.3
Total	18,564	22,876	-4312	-23.2

Note: a) The Torres Strait grouping is not included because the CHINS refers only to discrete Indigenous communities.

A typology of communities

A typology of community types may be established on the basis of these results involving three categories differentiated according to the degree and nature of match between the composite estimates and ERPs. The first category comprises those communities where available evidence suggests that the 2001 ERP may be deficient and where the higher composite figures produce a more plausible population level and age distribution—for example, by replacing children missing from the ERP. Included in this group are Wujal Wujal, Lockhart River, Mornington Island, Hopevale, and Kowanyama.

The second group of communities is made up of those that display reasonably close correspondence between their composite estimates and the ERP in 2001—both in terms of population levels and age structure. Included here are Aurukun, Pormpuraaw, Doomadgee, and communities in the NPA.

The final group of communities consists of those where composite and ERP age structures are broadly similar, but the population levels produced by the composite data are substantially higher than the ERP, raising questions about the validity of the former. Included here are Palm Island, Woorabinda, Cherbourg, Yarrabah, and the grouping of Torres Strait communities.

This typology appears to have an underlying logic. For example, all the communities in the first group are remote, relatively isolated settlements, although admittedly the same could be said of Aurukun, Pormpuraaw, Doomadgee, and the NPA communities. Indeed, it may be just fortuitous that these latter communities formed a separate grouping in 2001. For example, in the case of Aurukun, it is known that the 2001 census count was conducted satisfactorily (Martin 2002), whereas in previous years it was not (Martin & Taylor 1996). In Doomadgee too, the 1996 Census count appears to have missed many children and an ERP based on that count would no doubt have been relatively low compared to a composite population. On this evidence, Aurukun and Doomadgee would have been in the first grouping in previous years. As the former has been an SLA for some time it provides an opportunity to demonstrate the importance of achieving an accurate head count in the census from the point of view of establishing an adequate ERP level. In 1991, the Aurukun census count was 788, while the ERP was 800. In 1996, the census count was 778, and the ERP was 836. In 2001, the census count was much higher at 1,011, accordingly, the ERP was also up at 1,099.

The third grouping consists of somewhat larger communities that are relatively close to major towns and cities: Cherbourg to Brisbane, Woorabinda to Rockhampton, Palm Island to Townsville, and Yarrabah to Cairns. The proposition is that proximity to these centres, and consequent relative ease of access, produces a diaspora population whereby individuals associated with these communities are distributed between the community and the neighbouring urban centre. Thus, the composite estimates based on administrative data may reflect functional associations with each community, while not necessarily implying usual residence.

This possible 'diaspora' effect remains to be tested. Further research is required in regard to population movements in and out of these communities to determine the nature and level of interaction between them and neighbouring urban centres. For example, many Palm Island residents spend periods of time in Townsville, although the nature, purpose, and length of such residence is unknown.

One option for exploring these movements and their possible impact on usual residence counts might be to cross-tabulate census data on place of usual residence by place of enumeration for individuals who indicated one of these communities as their usual residence. Another would be to examine how many, and which people, nominated one of these communities as their usual place of residence one year ago. A further possibility might be to examine the frequency of change of address in Centrelink records for individuals whose prior address field was one of these communities.

The ‘diaspora’ communities present a unique difficulty in the application of administrative data sets to population benchmarking. There are several reasons for this. First, the composite population levels are substantially above the ERP, especially at younger ages. Second, this invariably results from much higher figures from Centrelink records which tend not to be matched by any other administrative data (unlike the situation observed in the first category of communities). Third, there is no obvious deficiency in any of the age groups in the ERP data for these communities, and so a reasonable concordance is observed between the ERPs and the composite age distributions. Finally, there is a suspicion that proximity to larger urban centres may compromise the accuracy of community of residence address fields. As an aside, it is interesting to note that much smaller composite figures can be produced for these communities if judicious use of Medicare data is applied for age groups where Centrelink data appear untenable. For these communities, this produces a collective composite figure that is in the region of 10 per cent higher than the ERP, rather than the 18 per cent implied by the standard composite estimates in Table 5.

Detailed composite results are presented here for each community in the first category of the typology—those where contextual data suggest that the composite estimate might have greater validity than the ERP. We begin with Wujal Wujal.

Table 7. Composite estimates and ERPs by sex and five-year age groups, Wujal Wujal, 2001

Age group	ERP			Composite		
	Males	Females	Total	Males	Females	Total
0–4	2	3	5	12	16	28
5–9	3	7	10	23	26	49
10–14	4	2	6	26	21	47
15–19	14	11	25	14	23	37
20–24	7	10	17	9	10	19
25–29	20	25	45	20	25	45
30–34	21	21	42	21	21	42
35–39	12	11	23	12	11	23
40–44	14	12	26	14	12	26
45–49	9	8	17	9	8	17
50–54	10	8	18	10	8	18
55–59	8	5	13	8	5	13
60–64	3	3	6	3	3	6
65–69	0	1	1	1	3	4
70+	6	3	9	6	5	11
Total	133	130	263	188	197	385

A comparison of composite estimates and ERP for Wujal Wujal by five-year age groups is provided in Table 7. When interpreting these figures, it is important to bear in mind that the 2001 ERP of 263 was 30 per cent lower than the 1996 Census count. One clue to the reason for this apparent decline is provided by comparison of the 2001 ERP age distribution with equivalent figures from the 1996 Census. This reveals a substantial decline in the population under 15 years of age. By comparison, all the administrative data drawn from registered births, school enrolments, Centrelink payments and Medicare payments point to a 2001 population aged under 15 years that is more in line with the 1996 Census count. Overall, the 2001 composite population of 385 is consistent with a scenario of steady growth from the (unadjusted) census count of 294 in 1991, and this is a more expected result than a decline in the under 15 years age group.

Table 8. Composite estimates and ERPs by sex and five-year age groups, Mornington Island, 2001

Age group	ERP			Composite		
	Males	Females	Total	Males	Females	Total
0-4	69	67	136	74	72	146
5-9	40	52	92	52	76	128
10-14	34	31	65	58	39	97
15-19	58	50	108	73	76	149
20-24	50	53	103	60	54	114
25-29	53	39	92	53	39	92
30-34	44	43	87	44	43	87
35-39	35	39	74	35	39	74
40-44	32	28	60	32	28	60
45-49	35	27	62	35	27	62
50-54	31	13	44	31	13	44
55-59	14	17	31	14	17	31
60-64	15	8	23	15	9	24
65-69	5	3	8	5	5	10
70+	8	14	22	8	14	22
Total	523	484	1007	589	551	1140

Mornington Island has been classified as an SLA for a number of years and so it provides an opportunity to compare the 2001 ERP with previous ABS estimates. It is clear that the ERPs are heavily influenced by the census count: in 1991, the census count was 705 and the ERP was 729; in 1996, the census count was 1,108 and the ERP was 1,128; in 2001, the census count was 964 and the ERP was 1,007. This close association clearly suggests that if the census count is

deficient in any way, then so too will be the ERP. One clue as to the inadequacy of the 2001 census count is the fact that school enrolments over the 1996–2001 intercensal period were very stable, and yet the census count in 2001 suggested a decline in school-age population. It should also be noted that the 2001 composite estimate of 1,140 is also more in line with the 1996 ERP of 1,128, in the absence of compelling evidence for population decline. No such evidence is forthcoming from a comparison of CHINS population estimates for 1992 and 2001. Although caution must be exercised when comparing 1992 CHINS data with subsequent collections (ABS 2002b: 90), these nevertheless point to a rising population, from 1,120 to 1,490. As with Wujal Wujal, the age data in Table 8 suggest that the main variation from the ERP occurs at younger ages.

Table 9. Composite estimates and ERPs by sex and five-year age groups, Lockhart River, 2001

Age group	ERP			Composite		
	Males	Females	Total	Males	Females	Total
0-4	16	17	33	35	35	70
5-9	21	15	36	38	37	75
10-14	19	25	44	36	56	92
15-19	19	21	40	30	26	56
20-24	22	21	43	39	27	66
25-29	34	17	51	39	29	68
30-34	18	25	43	18	25	43
35-39	25	30	55	25	30	55
40-44	26	14	40	26	14	40
45-49	17	11	28	17	14	31
50-54	15	10	25	15	10	25
55-59	7	6	13	7	6	13
60-64	2	4	6	4	7	11
65-69	1	4	5	3	4	7
70+	3	5	8	5	6	11
Total	245	225	470	337	326	663

According to census counts, Lockhart River has experienced a steady decline in population since 1991, from 532 to 466. This represents a drop of 12 per cent. The 2001 ERP of 470 does little to alter this picture (Table 9). However, this is counter to the perceptions of population change based on input from local key informants captured in CHINS estimates of the usual population, which suggest an increase in community population from 500 in 1992 to 700 in 2001. By comparison, the composite estimate for 2001 was 663. This is much more in line

with a scenario of population growth over the 10-year period since 1991, when the unadjusted Census count was 532. Once again it is younger age groups that are boosted by the composite estimates (Table 9), and this is consistent with a relative shortfall in the 2001 count of population under 20 years of age compared to 1996.

Table 10. Composite estimates and ERPs by sex and five-year age groups, Kowanyama, 2001

Age group	ERP			Composite		
	Males	Females	Total	Males	Females	Total
0-4	52	41	93	60	50	110
5-9	48	58	106	54	58	112
10-14	54	61	115	59	76	135
15-19	34	36	70	45	55	100
20-24	33	43	76	50	55	105
25-29	39	58	97	40	58	98
30-34	47	55	102	47	55	102
35-39	37	44	81	37	44	81
40-44	33	19	52	33	20	53
45-49	25	29	54	25	29	54
50-54	26	27	53	26	27	53
55-59	12	14	26	12	14	26
60-64	10	10	20	11	10	21
65-69	6	7	13	6	9	15
70+	13	20	23	25	20	45
Total	469	522	991	530	580	1110

Kowanyama presents a picture similar to that described for Lockhart River. The census count declined steadily from 1,021 in 1991, to 912 in 1996, and 878 in 2001, although the usual residence count in 2001 was notably higher at 918. Once again, such a trend is not perceived locally as the CHINS estimates over the same period point to a population rising from 1,000 to 1,265. The composite estimate shown in Table 10 is only slightly higher than the ERP, with most adjustment in the 10-24 age group. Compared to the ERP of 991, which implies a population decline since 1991, the composite estimate of 1,110 is consistent with CHINS estimates, showing a modest growth trend over the same period.

Table 11. Composite estimates and ERPs by sex and five-year age group, Hope Vale, 2001

Age group	ERP			Composite		
	Males	Females	Total	Males	Females	Total
0-4	33	34	67	55	38	93
5-9	39	45	84	52	71	123
10-14	57	38	95	84	71	155
15-19	38	37	75	68	66	134
20-24	41	37	78	50	48	98
25-29	46	26	72	46	42	88
30-34	38	40	78	38	40	78
35-39	37	27	64	37	32	69
40-44	30	28	58	30	32	62
45-49	23	21	44	23	21	44
50-54	23	16	39	23	16	39
55-59	10	9	19	10	9	19
60-64	10	10	20	12	10	22
65-69	8	4	12	9	12	21
70+	16	5	21	16	8	24
Total	449	377	826	553	516	1069

According to ABS census counts, the population of Hope Vale has also been in decline, falling from 823 in 1991 to 763 in 2001. While the 2001 ERP adjustment increased this figure to 826 (Table 11), no doubt this would still have produced a declining trend had a comparative base been established by an ERP adjustment to the 1991 Census count. Against this apparent trend, population estimates from the CHINS for 1992 and 2001 (1,050 and 1,300 respectively) suggest that usual resident numbers have grown over the same period. In line with this, the composite estimate for 2001 was 1,069, which is substantially above the ERP. As in the other Cape York communities, this results from much greater numbers under 20 years in the composite population compared with the ERP.

Conclusion

For most remote Aboriginal and Torres Strait Islander communities in Queensland, composite population estimates can be created for August 2001 from administrative data. In many cases, these produce higher overall population

levels, and greater numbers of youth and children than indicated by preliminary ABS ERPs. In a few instances, the ERP and composite populations are in close agreement, while in other cases the situation is inconclusive as the composite estimates appear to generate excessive numbers.

Overall, the benchmarking of community ERPs against previous population counts and estimates, and against usual residence data from administrative sources, points to the possibility that ERPs are too low in many communities. It also suggests that their age profiles might be somewhat biased towards older ages. The essential background to these claims includes the lack of an official estimate of undercount for these communities, a series of methodological questions surrounding the quality of usual residence counts, and the lack of publicly available local intelligence to support often erratic census-based population trends. While there is no denying that *de facto* head counts in communities will vary, even on a daily basis, far less intercensal variation than that observed would reasonably be expected in respect of usual residence estimates, especially in communities where the majority of residents have long-term cultural attachment and associations.

The administrative data sources employed here to generate composite estimates also suffer a range of limitations, and they should in no way be taken to represent a direct replacement for the ERP. Indeed, there are fundamental differences in the conceptual foundation of the two sets of figures that ultimately prejudice their comparability, at least in strict theoretical terms. It might be argued, for example, that the composite data more closely represent a service population than they do a resident count, even though they lack the visitor contingent that forms an essential component of the service population concept.

At the same time, it is difficult to ignore the variation in population levels derived from these different methods of estimation. In modelling annual intercensal ERPs, the ABS routinely uses administrative data as proxy indicators of population impacts (Howe 1999). Because there can be variation between SLAs in the relationship between symptomatic indicators and population outcomes, the ABS also acknowledges a need to spatially stratify these applications (Howe 1999). With these precedents and practices in mind, in the absence of a direct estimate of undercount and in the knowledge that census enumeration in remote Indigenous communities is fraught with potential pitfalls (Martin et al. 2002), it may be prudent to consider the use of administrative data sources as an input to the final determination of ERPs for remote Aboriginal and Torres Strait Islander communities. These communities comprise a particular stratum within the ASGC where unique circumstances of legislated change to local government status have generated a requirement for small area population estimates that otherwise would not be necessary. In such a situation, it is worth considering whether blanket application of standard methods for estimation is appropriate, or whether a unique response is required.

Notes

1. The case studies reported in Martin et al. (2002) found that the count was satisfactory in an Arnhem Land outstation (Morphy 2002) and a Queensland community (Martin 2002), but in Alice Springs town camps considerable potential for undercounting was evidenced in the methods used (Sanders 2002).
2. At the time of the 2001 Census, these remaining communities were constituted as Collection Districts (CDs) within the ASGC, and not as SLAs. Therefore, their post-censal population estimates were derived as a proportional distribution of their constituent SLA estimates. This adds potential error to CD-level estimates and means that any deficiencies in the community census count are simply amplified in the final estimates. It also provides no scope for validation.

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