Population Estimates for Indigenous Health Zones in the Northern Territory

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The project was jointly managed by DHCS and ABS, and the input of Robyn Elliott and Jim Drummond is very much appreciated. Finally, we express our thanks to Rosie Elliott, Ariel Couchman, Michelle Steves and their colleagues from the Aboriginal Medical Services Alliance of the NT who provided great assistance in checking that many smaller communities and outstations were allocated within the appropriate Health Zone.

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Disclaimer: This is a technical paper prepared to inform discussion. At the time of printing, the population estimates contained in this report do not have official status for use in the Primary Health Care Access Program.
# Table of contents

**List of tables**  
**List of figures**  
**List of abbreviations**  
**Summary**  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background</td>
<td>vii</td>
</tr>
<tr>
<td>Population estimates</td>
<td>viii</td>
</tr>
<tr>
<td>Discussion</td>
<td>xi</td>
</tr>
<tr>
<td><strong>1 Introduction</strong></td>
<td>1</td>
</tr>
<tr>
<td>Primary Health Care Access Program</td>
<td>1</td>
</tr>
<tr>
<td>Outline of the project</td>
<td>1</td>
</tr>
<tr>
<td><strong>2 Concepts of population</strong></td>
<td>4</td>
</tr>
<tr>
<td>Belonging population</td>
<td>4</td>
</tr>
<tr>
<td>Present at a particular time population</td>
<td>4</td>
</tr>
<tr>
<td>Resident and usually resident populations</td>
<td>5</td>
</tr>
<tr>
<td>Service populations</td>
<td>7</td>
</tr>
<tr>
<td>Definitions of service populations</td>
<td>7</td>
</tr>
<tr>
<td><strong>3 User needs for Health Zone population estimates</strong></td>
<td>10</td>
</tr>
<tr>
<td>PHCAP evaluation of health outcomes</td>
<td>10</td>
</tr>
<tr>
<td>PHCAP funding arrangement</td>
<td>11</td>
</tr>
<tr>
<td>Populations used by national health agencies in Canada and New Zealand for evaluation of indigenous health outcomes and funding arrangements</td>
<td>12</td>
</tr>
<tr>
<td>Canada</td>
<td>12</td>
</tr>
<tr>
<td>New Zealand</td>
<td>13</td>
</tr>
<tr>
<td><strong>4 Mapping and concordances</strong></td>
<td>15</td>
</tr>
<tr>
<td>Overview</td>
<td>15</td>
</tr>
<tr>
<td>Mapping</td>
<td>16</td>
</tr>
<tr>
<td>Data sources</td>
<td>16</td>
</tr>
<tr>
<td>Alignment of Health Zone boundaries</td>
<td>16</td>
</tr>
<tr>
<td>Assignment of unstated communities to Health Zones</td>
<td>17</td>
</tr>
<tr>
<td>Split CD to Health Zone concordance</td>
<td>17</td>
</tr>
<tr>
<td>Experimental migration estimates based on SLA and CD data</td>
<td>17</td>
</tr>
<tr>
<td>Data model production</td>
<td>17</td>
</tr>
<tr>
<td>Future maintenance and standardisation</td>
<td>19</td>
</tr>
</tbody>
</table>
5 Estimating primary health care service populations and data source assessment
   Actual service population 20
   Potential service population 21
   Data source assessment for service population estimates 22

6 Nature of the NT population
   General characteristics 25
   Mobility 26
   Tables 28

References 35

Appendix A - project management 38
Appendix B – data assessment criteria 39
Appendix C – data source assessment 43
Selected Health Gains Planning publications 64
List of tables

Table S.1  Estimated resident population of NT Health Zones: 30 June 2001 .......... x
Table 5.1  Primary Health Care: service population estimates – data source assessment summary................................................................. 24
Table 6.1  Estimated resident population, 30 June 2001 ........................................ 25
Table 6.2  Estimated resident population by Indigenous status by Northern Territory Health Zone: 30 June 2001 ................................................ 28
Table 6.3  Estimated resident Indigenous population by sex by Northern Territory Health Zone: 30 June 2001 ......................................................... 29
Table 6.4  Estimated resident Indigenous population by age by Northern Territory Health Zone: 30 June 2001 .................................................... 30
Table 6.5  Proportion of usual residents by place of enumeration, 7 August 2001, Census 2001 ......................................................................................... 31
Table 6.6  Proportion of usual residents who had the same proxy Health Zone one year ago and five years ago, Census 2001 ........................................ 32
Table 6.7  Proportion of usual residents for whom usual residence one-year ago and five years ago was not stated, Census 2001 ........................................ 33
Table 6.8  Location of usual residence one year ago and five years ago (%), Census 2001 ......................................................................................... 34

List of figures

Figure S.1  Data process for estimating NT Health Zone populations ....................... ix
Figure 1.1  Northern Territory Primary Health Care Access Program Health Zones (December 2002) ................................................................................. 2
Figure 4.1  Step by step guide to mapping and concordance .................................. 15
Figure 4.2  Data model for concordance database ................................................ 18
## List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ACIR</td>
<td>Australian Childhood Immunisation Register</td>
</tr>
<tr>
<td>AHW</td>
<td>Aboriginal Health Worker</td>
</tr>
<tr>
<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
</tr>
<tr>
<td>AMSANT</td>
<td>Aboriginal Medical Services Alliance of the Northern Territory</td>
</tr>
<tr>
<td>ASGC</td>
<td>Australian Standard Geographical Classification (ABS)</td>
</tr>
<tr>
<td>ATSIC</td>
<td>Aboriginal and Torres Strait Islander Commission</td>
</tr>
<tr>
<td>BTR</td>
<td>Bureau of Tourism Research, Australia</td>
</tr>
<tr>
<td>CARIHPC</td>
<td>Central Australian Regional Indigenous Health Planning Committee</td>
</tr>
<tr>
<td>CAS</td>
<td>Commercial Accommodation Survey</td>
</tr>
<tr>
<td>CCT</td>
<td>Coordinated Care Trial</td>
</tr>
<tr>
<td>CD</td>
<td>Census Collection District</td>
</tr>
<tr>
<td>CData</td>
<td>Census of Population and Housing data with digital maps using MapInfo Professional (ABS)</td>
</tr>
<tr>
<td>CHINS</td>
<td>Community Housing and Infrastructure Needs Survey (ATSIC)</td>
</tr>
<tr>
<td>CIAS</td>
<td>Community Information Access System</td>
</tr>
<tr>
<td>CMI</td>
<td>Client Master Index (DHCS)</td>
</tr>
<tr>
<td>CRCATH</td>
<td>Cooperative Research Centre for Aboriginal and Tropical Health</td>
</tr>
<tr>
<td>DCDS</td>
<td>Northern Territory Department of Community Development and Sport</td>
</tr>
<tr>
<td>DHA</td>
<td>Commonwealth Department of Health and Ageing</td>
</tr>
<tr>
<td>DHCS</td>
<td>Northern Territory Department of Health and Community Services</td>
</tr>
<tr>
<td>DIMIA</td>
<td>Commonwealth Department of Immigration and Multicultural and Indigenous Affairs</td>
</tr>
<tr>
<td>DIPE</td>
<td>Northern Territory Department of Infrastructure, Planning and Environment</td>
</tr>
<tr>
<td>ERP</td>
<td>Estimated Resident Population (ABS)</td>
</tr>
<tr>
<td>GAA</td>
<td>Growth Assessment and Action Program (DHCS)</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning Systems</td>
</tr>
<tr>
<td>HHS</td>
<td>Household Survey (NTTM)</td>
</tr>
<tr>
<td>HIC</td>
<td>Health Insurance Commission</td>
</tr>
<tr>
<td>HZ</td>
<td>Health Zone</td>
</tr>
<tr>
<td>ILOC</td>
<td>Indigenous Locations, Australian Indigenous Geographical Classification</td>
</tr>
<tr>
<td>IVS</td>
<td>International Visitor Survey (BTR)</td>
</tr>
<tr>
<td>LGA</td>
<td>Local Government Area (ABS)</td>
</tr>
<tr>
<td>MapInfo</td>
<td>A full-featured desktop GIS package</td>
</tr>
<tr>
<td>MBS</td>
<td>Medical Benefits Scheme</td>
</tr>
<tr>
<td>MS Access</td>
<td>Microsoft Access</td>
</tr>
<tr>
<td>NACCHO</td>
<td>National Aboriginal Community Controlled Health Organisation</td>
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<tr>
<td>NT</td>
<td>Northern Territory</td>
</tr>
<tr>
<td>NTAHF</td>
<td>Northern Territory Aboriginal Health Forum</td>
</tr>
<tr>
<td>NTTC</td>
<td>Northern Territory Tourist Commission</td>
</tr>
<tr>
<td>NTTM</td>
<td>Northern Territory Travel Monitor (NTTC)</td>
</tr>
<tr>
<td>OATSIH</td>
<td>Office for Aboriginal and Torres Strait Islander Health (DHA)</td>
</tr>
<tr>
<td>PHCAP</td>
<td>Primary Health Care Access Program</td>
</tr>
<tr>
<td>SAR</td>
<td>Service Activity Reporting (DHA)</td>
</tr>
<tr>
<td>SLA</td>
<td>Statistical Local Area (ASGC)</td>
</tr>
<tr>
<td>SQL</td>
<td>Structured Query Language</td>
</tr>
<tr>
<td>STA</td>
<td>Survey of Tourist Accommodation (ABS)</td>
</tr>
<tr>
<td>TERTIHP</td>
<td>Top End Regional Indigenous Health Planning Committee</td>
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</tbody>
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Summary

Background

The Primary Health Care Access Program (PHCAP) is a joint Commonwealth and State/Territory funded program to improve both access to and provision of, appropriate primary health care services for Aboriginal and Torres Strait Islander people. In the NT the implementation of PHCAP is the responsibility of the NT Aboriginal Health Forum. The forum is a partnership between the Commonwealth and Territory health departments, the Aboriginal controlled health sector represented through the Aboriginal Medical Services Alliance of the NT (AMSANT) and until 2004 included the Aboriginal and Torres Strait Islander Commission (ATSIC).

The PHCAP principles of regional planning, co-ordination and local governance for health service delivery have been advanced in the NT by two planning studies in Central Australia and the Top End which after extensive consultations proposed 21 Health Zones. These zones were selected to reflect language and cultural factors as well as logistic considerations.

The accurate estimation of Health Zone populations is a fundamental consideration for the planning, administration and assessment of the health benefit of PHCAP. The NT regional planning studies considered populations from a number of sources to provide broad population estimates. A subsequent project provided more accurate estimates utilising the 1996 ABS Census of Population and Housing, however while these revised figures have formed the basis for continued planning they have a number of limitations. Firstly the population estimates based on the 1996 Census can now be updated with estimates based on the 2001 Census. Secondly the existing estimates only include the Indigenous population, which is the group eligible for funding under PHCAP, however in a more general health planning context the non-Indigenous population also needs to be considered, especially in remote areas where both populations are served by a single service provider. Thirdly, there is a need for the population characteristics of age and sex. Fourthly some of the past mapping of the Health Zone boundaries is inaccurate. Finally, an important limitation is that the existing Health Zone estimates are based on “resident” populations, and not on Primary Health Care “service” populations. Service populations are a more appropriate basis on which to assess the service needs and outcomes in the population in a given geographic area.

This report records the results of a NT Department of Health and Community Services project, supported by ABS, which updates and enhances existing population estimates for Health Zones. The methodology utilised in this project has been developed in consultations with representatives from NT Aboriginal Health Forum partners, however at the stage of printing, the methods and population estimates in this project have not been formally approved for use by the NT Aboriginal Health Forum.

In summary, the aims of the project are:

- document the major user needs for population estimates, including consideration of the conceptual issues of primary health care population estimates,
- identify and assess potential data sources including ABS collections, data from Aboriginal communities, DHCS service population list and population data from previous studies, and
- produce resident and service population estimates by age, sex and Indigenous status by Health Zones.
Population estimates

There is no accepted definition for service population, and the various definitions proposed argue across five issues. These are whether service populations should be based on demand or need, the variation in the population depending on the specific service involved, the implicit issue of time, the importance of area, and finally whether actual or potential service populations are more relevant. In considering these varied aspects in the context of primary health care, the generic and specific definitions agreed for use within this project are:

- **A service population is the population that demands specified good(s) and/or service(s) in a specified area at or over a specified time.**
- **The average daily population that potentially could demand primary health care in each of the NT’s 21 health zones, during 2001.**

Twenty potential data sources of service populations were identified including Census for Population and Housing, Community Housing and Infrastructure Needs Survey, DHCS Client Master Index and Medicare. These were assessed against a list of 9 data source assessment criteria developed by ABS (Lee 1999) as well as a tenth criteria of basic person characteristics (age, sex, Indigenous status residential area and service area). Among twenty data sources assessed, no single source meets all assessment criteria. Of the potential sources, the ABS 2001 Census of Population and Housing was considered the best data source available for calculating NT wide Health Zone service populations.

To calculate Health Zone populations it is necessary to relate the location of Health Zones to Australian Standard Geographical Classification (ASGC) and then relate that location data to a series of other datasets. This process is outlined in Figure E1.
This diagram summarises the matching of the three input datasets of ASGC 2001 Collection District (CD) boundaries for 481 CDs, Health Zone map for 21 Health Zones and location data for 623 communities from the 2001 Community Housing Infrastructure Needs Survey (CHINS) to form a composite geographic dataset. A complexity of this process is that Health Zone boundaries do not match directly with CD boundaries and therefore a method was developed to split CD population estimates between a number of Health Zones.

Of the 481 CDs in the NT, 19 CDs overlapped more than one zone. The method developed in this project utilised population data available from CHINS to apportion the split CD populations between Health Zones. The revised location dataset was then matched with the ABS June 2001 Estimated Resident Population (ERP) at CD level to provide Health Zone population information. Table E1 provides the estimated resident Indigenous and non-Indigenous populations for the 21 Health Zones.

The obvious limitation of the method is that the derived estimates rely on the accuracy of the underlying data sources, particularly the ABS ERP data on which the ERP is based. There has been concern expressed about the accuracy of the 2001 Census enumeration of the Indigenous population in remote areas of the Northern Territory. The accuracy was to have been tested in a joint Northern Territory Government and ABS enumeration project planned for early 2004, however a decision has now been taken that remote area enumeration will be carefully reviewed as part of the 2006 Census.
### Table S.1 Estimated resident population of NT Health Zones: 30 June 2001

<table>
<thead>
<tr>
<th>Health Zone</th>
<th>Indigenous population</th>
<th>Non-Indigenous population</th>
<th>Total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiwi</td>
<td>2287</td>
<td>168</td>
<td>2455</td>
</tr>
<tr>
<td>Darwin</td>
<td>11407</td>
<td>97545</td>
<td>108952</td>
</tr>
<tr>
<td>Top End West</td>
<td>2894</td>
<td>874</td>
<td>3768</td>
</tr>
<tr>
<td>West Arnhem</td>
<td>2289</td>
<td>1368</td>
<td>3657</td>
</tr>
<tr>
<td>Maningrida</td>
<td>2126</td>
<td>198</td>
<td>2324</td>
</tr>
<tr>
<td>North East Arnhem</td>
<td>6392</td>
<td>4108</td>
<td>10500</td>
</tr>
<tr>
<td>South East Arnhem</td>
<td>2444</td>
<td>1000</td>
<td>3444</td>
</tr>
<tr>
<td>Katherine East</td>
<td>5360</td>
<td>7772</td>
<td>13132</td>
</tr>
<tr>
<td>Katherine West</td>
<td>2233</td>
<td>635</td>
<td>2868</td>
</tr>
<tr>
<td>South East Top End</td>
<td>1300</td>
<td>491</td>
<td>1791</td>
</tr>
<tr>
<td>Northern Barkly</td>
<td>521</td>
<td>317</td>
<td>838</td>
</tr>
<tr>
<td>Central Barkly</td>
<td>1686</td>
<td>1780</td>
<td>3466</td>
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<tr>
<td>Southern Barkly</td>
<td>995</td>
<td>88</td>
<td>1083</td>
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<tr>
<td>Warlpiri</td>
<td>1624</td>
<td>380</td>
<td>2004</td>
</tr>
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<td>Anmatjere</td>
<td>972</td>
<td>107</td>
<td>1079</td>
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<td>Alyawarra – Anmatjere</td>
<td>1219</td>
<td>103</td>
<td>1322</td>
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<tr>
<td>Eastern Arrernte – Alyawa</td>
<td>744</td>
<td>169</td>
<td>913</td>
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<tr>
<td>Luritja-Pintupi</td>
<td>1458</td>
<td>116</td>
<td>1574</td>
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<td>Western Arrernte</td>
<td>1284</td>
<td>92</td>
<td>1376</td>
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<tr>
<td>Alice Springs</td>
<td>6205</td>
<td>21938</td>
<td>28143</td>
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<tr>
<td>Pitjantjatjara</td>
<td>1435</td>
<td>1644</td>
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<td><strong>Northern Territory</strong></td>
<td><strong>56875</strong></td>
<td><strong>140893</strong></td>
<td><strong>197768</strong></td>
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</tbody>
</table>

Source: ABS ERP data, available on request, according to DHCS Health Zone concordance.

As a related exercise, the Health Zones’ geography was approximated to SLAs allowing the analysis of a limited range of 2001 Census migration data which is only available at SLA level to be estimated for most Health Zones. This method only allows for a general approximation, nonetheless the estimated annual inter zonal usual resident movement for the NT Indigenous population is 6.2% which is much less than the published reports on community mobility, and supports an argument that appropriate Health Zone boundaries will capture a substantial amount of the local population movement.
Discussion

The project has investigated the available sources for Northern Territory population estimates, which can be used for Health Zones. While there were twenty sources identified no single source met all of the assessment criteria. A composite dataset was considered, however the assumptions necessary in creating such estimates for service populations, would compromise both the accuracy and acceptability of that method. There are some data sources where local population estimates including service populations are available. However, these estimates cannot be extrapolated to broader geography, firstly because of the restricted geographic applicability of the particular data, secondly because of the uncertain extent of multiple counting of any one individual, and thirdly because of the varying but uncertain demand on services by an individual who is counted in more than one service area.

In this context it is important to highlight the difference between a service population and a resident population. In a Primary Health Care setting an individual who utilises services in two locations may generate a total service demand that is greater than if that person used a single service location. For example a client with a complex chronic disease using two services would need to be thoroughly assessed by health staff at both locations even if there was a continuous record available of that person’s condition. In practice, in most cases, the sharing of information between services is very limited, in which case the client may generate a total service, which is nearly twice that of a person using a single service location. The implication is that for any given Health Zone, the total Primary Health Care service population will be legitimately greater than the total resident population.

Despite this limitation, the key outcome of the project is that the estimated resident population derived from the Census remains the most complete data source for primary care planning purposes. The ERP data provides an independent and comprehensive estimate of the number and distribution of populations across the Northern Territory, and can provide both a basis for the equitable allocation of available resources and a denominator for key health performance measures. The accuracy of the ERP as a proxy for a service population can be enhanced with a more accurate estimation of mobility. However at this time the Census data on mobility is not available at a CD level, and there are also separate concerns at the applicability of the Censal mobility questions for many Indigenous people.

In the future, the complexity in establishing Territory wide estimates for Health Zone service populations can be resolved. Several NT health service providers have accurate electronic patient record systems, which operate across multiple centres. These systems have a major benefit in improving clinical management particularly for those clients utilising several service locations. At present these systems operate within single Health Zones, however work is underway to allow sharing of summary data between different providers such as between Health Zones. A valuable by-product of these arrangements is the potential for aggregation of service population across Health Zones so that service populations can be calculated even in a highly mobile population. However, the data can only be shared if either, a single system is used across the NT or data systems are compatible.

There is currently no requirement for Health Zone service providers to use common data platforms. The authors strongly recommend that a policy on electronic patient data be developed, so that with appropriate approvals, patient data can be utilised both for improving patient care across Zone boundaries, as well as allowing for the aggregation of data to inform both resource allocation and outcome measurement.
1 Introduction

Primary Health Care Access Program

In the Northern Territory there is major change in the delivery and management of Primary Health Care services for the Aboriginal population. The Primary Health Care Access Program (PHCAP) is a joint Commonwealth and State/Territory funded program to improve access to, and the provision of appropriate primary health care services for Aboriginal and Torres Strait Islander people at the local level. It establishes a framework in which there will be an expansion of comprehensive primary health care services in areas identified as having both the highest relative need and the capacity to use funding. Implementation in the NT is a partnership between the:

- Commonwealth Government through the Department of Health and Ageing (DHA),
- Northern Territory Government through the Department of Health and Community Services (DHCS),
- Indigenous controlled health sector through the Aboriginal Medical Services Alliance of the Northern Territory (AMSANT), and
- Aboriginal and Torres Strait Islander Commission (ATSIC).

In the NT, 21 Health Zones have been proposed to support the underlying principle of regional planning, co-ordination and local governance for health service delivery (Figure 1.1). The proposed zones were developed after extensive consultation “based on language, cultural and relationship factors as well as logistic consideration” (Bartlett and Duncan 2000). As of October 2002, seven local areas (Health Zones) had been approved for implementation of PHCAP, five in Central Australia (Round 1) and two in the Top End (Round 2).

Outline of the project

Central to the planning and development of the Health Zones is the need for population estimates for the zones. These are required for two purposes:

- fundamental to monitoring health changes in a population are accurate denominators to underpin health outcome measures, and
- funding is provided for Health Zones under a number of formulae, including localised zone funding on a per capita basis.

The population estimates used in the original consultancies (Bartlett et al 1997, Bartlett and Duncan 2000) utilised multiple sources and provided a general guide to the Health Zone populations to inform general planning. Subsequently there was a collaborative effort to develop more accurate estimates for resident populations based on the 1996 ABS Census at Collection District (CD) level.
Figure 1.1 Northern Territory Primary Health Care Access Program Health Zones (December 2002)

The estimates based on the 1996 Census continue to be used as the formally agreed basis for determining funding allocations, however the estimates have a number of limitations. The first limitation is that the estimates are based on 1996 data, which can now be updated with data from the 2001 Census. Secondly, the estimates only include the Indigenous population, which is the group eligible for funding under PHCAP. However in the more general planning context, the non-Indigenous population is also relevant, particularly in remote areas where health services for the total population are only available from a single service provider. Thirdly the currently used estimates do not include population characteristics of age and sex. Fourthly, in some cases there was only an approximated correlation between the boundaries of the Health Zones and ABS Collection Districts. Finally the existing Health Zone population estimates are resident populations, when for some purposes a “service population” is preferable. More comprehensive estimates are needed.
Against this background, the Health Gains Planning Branch of the NT Department of Health and Community Services (DHCS) sought and received the assistance of the Australian Bureau of Statistics (ABS), to undertake a project to provide updated and more complete Health Zone population estimates. The aims of the project were to:

1. document the major user needs for population estimates, including consideration of the conceptual issues of Primary Health Care population estimates;
2. develop concordance between PHCAP Health Zones and,
   a) Australian Standard Geographic Classification (ASGC) 2001, ATSIC regions, Indigenous Areas and Indigenous Locations (as defined by ABS),
   b) ABS CDs, and
   c) DHCS NT locality Code sets;
3. identify and assess potential data sources including ABS collections, data from Aboriginal communities, DHCS service population lists and population data from previous studies;
4. estimate resident and service population by age, sex and Indigenous status by Health Zones;
5. produce a DHCS report on NT Health Zone resident and service populations. (ABS may produce an associated paper on methodological issues and/or replicate the DHCS paper with appropriate acknowledgment as a working paper.); and
6. recommend ways of updating primary health care service population estimates in the future.

The following Chapters relate to these aims. Chapter 2 outlines concepts of population. Chapter 3 summarises the experience of Indigenous population estimates in New Zealand and Canada, as well as the stakeholder needs from this project. Chapter 4 is a methodological chapter on the alignment of the various datasets necessary for this project. Chapter 5 documents the assessment of potential service population data sources. Finally Chapter 6 utilises the outcomes of the concordance of datasets to provide estimated resident populations including assessment of mobility of the Health Zone populations.
2 Concepts of population

What people mean by 'population' can vary. Population concepts can include the population of a particular area that
- has lived in that area at some time in the past;
- was born in the area;
- has an attachment to the area, possibly by marriage or identification;
- belongs in the area;
- was present in the area at a particular time;
- was a resident in the area;
- was a usual resident of the area; and
- was serviced in that area.

The potential for confusion caused by different understandings of what is meant by 'population' is compounded by the name of an area also having different meanings to different people. In the following five sources, markedly different numbers of communities/locations exist. The Australian Indigenous Geographical Classification 2001 recognises 155 Indigenous Locations in the NT. The 2001 Community Housing and Infrastructure Needs Survey recognised 632 Indigenous communities in the NT. The NT Department of Infrastructure, Planning and Environment at June 2002 recorded 2401 Indigenous community names, 972 being unique with 1429 alternate/alias names. The NT Department of Community Development, Sport and Cultural Affairs’ Community Access Information System database records 1000 unique communities that go under a total of 2299 names. DHCS has 2901 names of Northern Territory communities in its locality code dataset.

Belonging population

The concept of 'belonging' can have a very wide embrace of people. One study recorded that 'belonging' was interpreted by key informants in the selected communities as anybody who either was originally from the community or who had family and relations who were considered to be from the community, regardless of whether particular individuals were presently or regularly resident in the community (Paradies et al, 2001:2).

Present at a particular time population

The concept of being present at a particular time is used as the standard counting rule in the ABS's Census of Population and Housing. Because of the high mobility of the population, in particular the Indigenous population, this means that a count of people on one day can vary markedly from that on another. This volatility means that 'place of enumeration' census counts could have restricted value for people with an interest in the Indigenous population at a small area level.

However, in discrete Indigenous communities in the NT, this volatility was reduced because the standard counting rule was modified, so that information was gathered on “usual residents” rather than “persons present”. This methodological effect is more pronounced in the NT, because a majority (68%) of the Indigenous population lives in discrete Indigenous communities.
Resident and usually resident populations

ABS is in the process of reviewing its concept of usual residence and recognises two possible approaches. The first is based on the place where a person spends most of their time and the second on the place a person considers being their home.

After noting that “family structures and living arrangements for many Indigenous Australians differ significantly from those which prevail for the remainder of the population”, ABS went on to make the following comments (ABS 2002e).

The vast majority of people live in dwellings. These dwellings are considered a person's place of residence. Most people live in only one dwelling, ie they have a single place of residence. However, it is possible for a person to have multiple residences.

The collection of statistics from private dwellings requires that the usual residents of each dwelling are identified, so that information is collected for all people and so that it is only collected once in regard to each person.

The usual residents of private dwellings are used to calculate the population of geographic locations and to form key counting units in social statistics such as households, families and income units.

Usual Residence of private dwellings therefore underpins many ABS collections including most household surveys and the Census of Population and Housing. While it is possible for a person to have multiple residences, it is necessary for the production of accurate statistics to identify their single place of usual residence. In most cases this will be straightforward, in that their usual residence will be their only residence. However, in cases where persons reside in more than one place their usual residence is regarded as the one in which they spend most of their time.

It is important at this point to draw the distinction between usual residence and home. Home is a term, which has numerous connotations. In most cases people will regard their home as their usual residence. But home can also be a term used to describe any or all residences a person has and residences they once had. Further, the term home does not necessarily equate with a dwelling. It may be used to describe a variety of places including geographical locations as large as countries. For example, a person could work and live alone in one city for several months (long enough to make them a usual resident of that city), but return periodically to a ‘family home’ (ie a dwelling which their partner and children occupy) in another city. For these reasons it is considered the use of the term home can become problematic when attempting to identify usual residents. The criteria then, for identifying usual residents should involve the time spent in a given dwelling during a given period.

While for most people, implementation of the concept of residency is not problematic, it can be for people who are continually on the move and those with multiple residences.

People with multiple residences include people who work away from their home (including fly in/fly out workers in mining areas), children whose parents don't live together, and people who have regular major health treatments away from their home and dual residency in Indigenous communities.

In one study in Central Australia, 6% of residents of a remote community were regarded as dual residents, having a place in another community that they also regard as home (Warchivker et al 2000).
This brings out the point that a resident is not necessarily a usual resident. Despite this complexity, the Aboriginal Medical Services operated by Central Australian Aboriginal Congress is able to readily allocate people to their primary place of residence in health records (Boffa 2002).

ABS Census counts on a usual residence basis (as opposed to census counts on a place of enumeration basis) ‘minimise the effect of seasonal fluctuations in holiday/resort areas and, in remote areas, the effect of visitation and mobility issues and events such as festivals, funerals, hunting or other cultural activities’ (ABS 2002b). The study by Warchivker et al also found an average of 14% of the residents of a remote community were absent (Warchivker et al 2000). ABS has defined usual residence to mean the address where the person has lived or intends to live for a total of six months or more in a reference year. For those with no usual residence, where they were counted in the Census is treated as their usual residence.

Usual residence counts have been available at the Statistical Local Area level from the 1986 Census onwards and the Local Government Area level from the 1976 Census onwards. The 2001 Census, provides usual residence counts at the CD level.

While ABS has adopted a six months rule, other rules can be adopted. In a study of remote Aboriginal communities exploring the association of health with the environment, resident children were defined as ‘those living in the community, for at least 80% of any year of data collection’. Regular visitors ‘were those children with health records but who were in the community from 50 to 80% of the time’ (Guthridge et al, 2000: 25). The reference for “residence” in this study is to the community rather than the ABS Census reference to an address.

ABS produces the estimated resident population series. It refers to all people, regardless of nationality or citizenship, who usually live in Australia, with the exception of foreign diplomatic personnel and their families. It includes usual residents who are overseas for less than twelve months. It excludes overseas visitors who are in Australia for less than twelve months. People who are usual residents of Australia are then allocated a usual residence within Australia based on the six months rule referred to above (ABS 2002a:58).

In calculating Census year resident population estimates, allowance is made for net census undercount and the number of residents temporarily overseas at the census date. Overseas visitors in Australia for less than 12 months are excluded from this calculation (ABS 2002d:102). For the resident Indigenous population estimates allowance is also made for non-response to the Census Indigenous status question (2002c: 77).

For small area estimates, account is also taken of known local Census enumeration problems and local knowledge, including that advised by local governments.
Service populations
Service populations are needed to help assess the actual or potential demand for a good or service. In many cases other population concepts are used as a proxy for the population to be serviced. These may not always be appropriate. For example the resident population of a central city area will be a poor proxy for the population to be serviced during the daytime hours because of the large daytime population of people who commute in from other areas.

In a second example, Darwin and Alice Springs have many Indigenous people visiting from other areas, and the resident Indigenous population is therefore much lower than the Indigenous population being provided with services in these locations.

The difference between resident and service population is frequently confused. For example the Service Activity Reporting by Commonwealth Government funded Indigenous primary health care services refers to a “service population” which requires estimation of the resident population for service areas rather than an estimate of the service population. The question on the 2000-2001 form is “What is the total Aboriginal and Torres Strait Islander resident population of your health service area?” (NACCHO and DHAC 2001).

Definitions of service populations
There is no standard accepted definition of service populations and various definitions have been canvassed in the recent past. These include:

Those persons who demand goods or services from providers of such products. Such persons may be permanent or temporary residents of the area from which the service is sought, or they may be daytime visitors (including commuters), overnight or short-term visitors (Cook 1996: 3).

The population which actually creates the effective demand for services and facilities (Bell and Ward, 1998).

All persons who access services and facilities generally provided by the (area). Such persons may be permanent or temporary residents of the area from which the service is sought, or they may be daytime visitors (including commuters), overnight or short-term visitors to the area (Lee 1999:1).

Actual service population includes all the people that were in the (remote Indigenous) community. Potential service population includes the residents out of the community but excludes visitors to the community (Warchivker 2000: 445).

The number of people to whom the council provides local government services on a regular basis. This includes residents of outstations who receive services as well as tourists (Northern Territory Grants Commission 2001:39).

Five issues arise from the definitions of service population.

First, demand is referred to in the first definition rather than need. In economics there is a concept of demand and supply. Using the term in this context, a distinction can be made with need. A need may exist and yet no demand may occur. On the other hand, a need may not exist yet a demand takes place. It takes action by or on behalf of a potential client for demand to occur. The supply or availability of a good or service affects demand. If there is no or limited supply of a good or service then that will affect expectations and no or limited demand may be expressed. Supply can also generate
demand, even to the extent where overservicing can exist. Overservicing would occur in a situation where a need did not exist but a service was supplied anyway.

Services need to be supplied in a manner that will facilitate client access otherwise no demand will occur. If barriers exist, effectively supply for many people will not have taken place. Barriers to client access include cultural, financial, distance, service quality and personal incompatibility reasons. Given a need, demand will be generated if barriers are removed or minimised. Barriers can be minimised by what is referred to in marketing as market segmentation. With market segmentation, an individual provider may seek to primarily serve a particular segment or group of clients as a strategy to achieve goals that may include market share, profitability, efficiency and/or effectiveness.

Second, the population being serviced will vary according to the good(s) and/or service(s) involved. For example, everyone demands water while only some demand cigarettes. Similarly, most if not all people will demand primary health care in general but not all will demand treatment for an infectious disease. A combination of goods and/or services can be involved such as a motor vehicle sales outlet that also services motor vehicles.

Third, there is an implicit issue of time. A person may not demand a service in a limited time period but may demand a service when a longer time period is involved. For example, most people will not demand primary health care in a week but will demand such care in a year.

Associated with time, it may be important that services provide for peak populations or the population at specified times, while for other services average populations in a period may suffice. For example, water and sewage services need to be able to cope with peak populations while an average population may be satisfactory for non-critical primary health care. As another example, weekday populations may be more important for some services than weekend populations. Other options include average daytime and night time populations.

Fourth, there is a concept of area. The size of the area involved will affect the service population. In general, the mobility of people means that in a specified time period, the smaller the area the greater the chance of one person being in more than one area. This factor needs to be taken into account in service population estimation. A person who lives in or visits two small areas can demand a good or service from both areas. In this case, each area could count this person and in aggregate there would be two persons demanding the service. If the two areas were viewed as comprising one larger area then there would only be one person demanding a service, albeit twice. The design of NT Health Zones has taken into account cultural and linguistic considerations. Given that people are likely to associate with those sharing the same culture and language, much short term mobility is likely to be within the Health Zone in which a person usually lives.

For some services, such as those based on use of the Internet, telephone or mail orders, the concept of area may have reduced or even no relevance as the service can be accessed across political and other boundaries.

Fifth, there is an issue of whether the service population is “actual” or “potential”.

Actual service populations are often referred to as consumers, customers or clients. An actual service population may be equal to or lower than the potential service population. It would equal potential service population where there are no barriers for potential demand to be expressed as demand. Examples of situations in which actual
and potential service populations can equate include the service populations for water and sewage. A lower actual than the potential service population is generally the case as barriers generally exist. Providers and other parties (including governments and private non-profit organisations) may take action to reduce barriers so that potential demand can be translated into actual demand. Actual service populations can be measured by drawing on records of clients and their demands where the records are satisfactory. It may be appropriate to identify particular groups of clients. For example, airlines identify frequent fliers. As another example, a health service may distinguish between resident and visitor clients for evaluation and funding purposes.

Estimating a potential service population is a major focus of market research, particularly where a new good or service is involved. It requires more than an estimate of the total population. There is also a need to assess the per capita demand for specified good(s) and/or service(s). The per capita demand will vary by area. It is likely that the characteristics of people, both usual residents and visitors, will vary from area to area and in turn this will result in a different level of per capita demand for goods and services. For example, the age, sex, Indigenous and socioeconomic status of persons visiting a major tourist resort compared to those visiting a remote community are likely to be different and, associated with this, the per capita demands for goods and services are also likely to be different. The total population can include many people who will never make use of a good or service in a specified time period. Once the potential service population for specified good(s) and/or service(s) has been estimated, a provider will then need to assess what proportion of the potential service population it will be able to capture (its market penetration).

While this is particularly the case in a situation in which multiple providers exist, even a sole provider may not be able to translate potential demand into actual demand.

A definition taking account of these considerations is as follows:

A service population is a population that demands specified good(s) and/or service(s) in a specified area at or over a specified time.

The term facility, used in two of the five original definitions, is not used in the above definition. A facility is a means of supplying a good or service and as such is taken into account.
3 User needs for Health Zone population estimates

The introduction to this report highlights the two principal factors that generate the need for accurate population estimates for the PHCAP Health Zones:

- to provide accurate denominators for performance measurement and the evaluation of health outcomes; and
- Health Zone funding is provided under a number of formulae, including localised zone funding on a per capita basis.

Chapter 2 expands on the concepts and complexity of population estimates including populations present at a particular time, resident populations and service populations. This chapter documents the needs of the users of NT Health Zone population data as well as reporting the experience and use of Indigenous population estimates in Canada and New Zealand.

**PHCAP evaluation of health outcomes**

PHCAP is a program of health system reform to improve access to, and provision of appropriate primary health care services for Aboriginal and Torres Strait Islander people at the local level. PHCAP provides for increased comprehensive primary health care services in areas identified as having the highest relative need and capacity to utilise funding through a completed regional planning. The key objectives of PHCAP are:

- to reform the local health system so that it better meets the needs of Aboriginal and Torres Strait Islander people;
- to increase the availability of appropriate primary health care services where they are currently inadequate; and
- to empower individuals and communities to take greater responsibility for their own health.

Associated with these objectives, there is a commitment to systematic assessment of outcomes.

- OATSIH has stated that one of its broad objectives to help achieve sustainable gains in the health status of Indigenous people is to improve ‘the evidence base through effective data systems and evaluation’ (DHA 2002: 5).
- Reporting on performance assists in the determination of further service options and funding increases as well as ensuring accountability requirements are met (DHA 2002: 20).
- An increased focus on better health service practices is being sought, including information systems that will accommodate the Commonwealth’s requirements for data on service population, enrolment in Medicare and measuring and reporting on financial and output indicators (DHA 2001: 13).

The first five of the NT Health Zones are progressing through a number of development stages before full implementation. In preparation for the implementation, DHCS has commissioned the Cooperative Research Centre for Aboriginal and Tropical Health (CRCATH) to work with the PHCAP partners to develop performance measures for the Health Zones.

In discussion on the proposed performance measures it was apparent that both resident and client population estimates will be needed. The resident population of Health Zones are necessary to provide denominators for population health programs such as those involving immunisation, sexually transmitted diseases, nutrition and
men's health. Client populations, in particular those who are residents registered with the health services involved, would be used to assess the effectiveness of health care of those residents actually having contact with the health centres funded under PHCAP. A complication of the assessment of the effectiveness of health care, will be that in some Health Zones there are alternative providers for the Indigenous population, other than those funded by PHCAP.

Client information systems will also need to avoid reporting the same person twice. This could potentially happen if a Health Zone had more than one health centre/clinic or if a person received treatment in more than one Health Zone. This highlights the importance of a single system being used to record clients, or if multiple systems are used, of having a system that can record details from other systems for uniquely identified clients. One system for NT is preferable given that it reduces the overhead costs associated with matching. In the long term, the ideal situation would be to have the same system throughout Australia to take account of cross State/Territory border movements.

An issue related to population estimates is that while the focus of PHCAP is the Indigenous population, non-Indigenous people will also access primary health care facilities funded under PHCAP. In 1999-2000, 10% (4% in the NT) of all episodes of health care in Commonwealth funded Aboriginal primary health care services were for non-Indigenous people (DHA 2003). This is particularly an issue in remote and very remote areas where there is only a single primary health care service provider. Because of this, and also the value of comparative information in assessing health outcomes, there is value for administrative systems associated with PHCAP to be designed to produce data by Indigenous status (ie to enable information to be produced on both Indigenous and non-Indigenous people).

**PHCAP funding arrangement**

The PHCAP funding model involves both Commonwealth and State/Territory funds applied within a designated local area. This is in line with the joint responsibility between the Commonwealth and the States and Territories for Aboriginal and Torres Strait Islander health and the commitments made through the Framework Agreements on Aboriginal and Torres Strait Islander health to increase resources in line with need. Commonwealth contributions are across mainstream and Indigenous specific programs with, funding being for core activities based on per capita funding benchmarks. The level of per capita funding to be “based on an authoritative estimate of the Indigenous population of a zone (DHA 2001: 9).”

Increases in funding through PHCAP will be stepped up over time in a way that takes account of capacity, relative need and availability of funds. The maximum Commonwealth contribution for core services is based on a per capita benchmark of two times the average use of MBS, taking into account existing Commonwealth contributions. This morbidity loading recognises the substantial service needs of the Indigenous population. In addition there is a remoteness loading to accommodate the higher costs of service delivery in remote areas.

The intent is outlined in relevant DHA documents:

The actual level of funding received will take into account relative need based on an assessment against the benchmark, the existing level of Commonwealth primary health care funds provided to a zone (including Medical Benefits Scheme and grant funding) and additional funding available under the PHCAP. (DHA 2001: 10)

Funding through PHCAP will allow for an increase in the number of, or access to, health professionals for a local area, including doctors. The extra doctors should
lead to an increase in the number of claims through Medicare. The amounts for the use of the Medical Benefits Scheme (MBS) are an estimation of the current and potential increased use of Medicare (including pathology and specialist services) (DHA 2002: 18).

**Populations used by national health agencies in Canada and New Zealand for evaluation of indigenous health outcomes and funding arrangements**

**Canada**

In Canada, a resident population concept is used in the evaluation of health outcomes and funding arrangements for its indigenous population. However, evaluation generally takes place at the national level and while some provincial governments seek to evaluate health outcomes at the provincial level, the ability to accurately identify indigenous people is a major constraint.

The indigenous population in Canada is generally referred as the Aboriginal population. The term ‘Aboriginal’ is an inclusive term covering:
- First Nations (sometimes referred to as ‘Native peoples’ or Indians);
- Inuit (previously referred to as Eskimo); and
- Metis (whose ancestry can be traced to the intermarriage of early European settlers and First Nations people) (Smylie et al 2000).

The majority of First Nations people are registered as ‘status Indians’ according to the federal Indian Act and those who are not registered are sometimes referred to as ‘non-status Indians’.

In the 15 May 1996 Census, about 61% of the count of nearly 800 000 Aboriginal persons self-identified as “status Indians”. In the 1996 Census there were a number of coverage problems including incomplete enumeration within a number of reserves involving about 43 000 persons. If corrected the likely proportion of status Indians would slightly increase (Statistics Canada 2002).

Health Information and Analysis Division, First Nations and Inuit Health Branch, Health Canada and Corporate Information Management Directorate, Department of Indian Affairs and Northern Development have reported that “status Indians” are recorded on the Indian Register.

The Indian Register at 31 December 1996 recorded 610 874 status Indians of whom 354 369 were reported as living ‘on reserve’ and 256 505 ‘off reserve’. The Indian Register captures both the names of individuals as well as associated vital events such as births, deaths and marriages.

This information base was developed for administrative purposes only and was not designed for statistical purposes. The information cannot be used at face value for the development of any type of outcome measurement because of late and never reported vital events. For example, births can be reported as late as 18 years after their occurrence although most are reported within the first five years. With deaths, there is a problem of never reported events, particularly for infants and the elderly. These limitations have a major affect on the reliability of population-based indicators.
Two further difficulties with the Indian Register are that the residency field is not mandatory and also is only updated upon receipt of a vital event. The Indian Register can provide a breakdown between status Indians living on or off reserve. For on reserve people, the specific reserve they are residing on cannot be determined especially for those living on multiple reserves. The location of off reserve people is not known and could be outside Canada.

Amendments to the Indian Act in 1985 created a situation where families could increasingly be composed of status Indians and those without legal Indian status depending on how the parents marry. This could, in the long run, affect the future demographic composition of reserve populations from a mostly status based population to one that is without legal Indian status. Simulations have shown that a decline in the status Indian population could start as soon as 60 to 75 years from now. The rate of change will depend on the level of out-marriage.

Adjustments are required to the population on the Indian Register in order to reduce the impacts of the limitations mentioned above. For example, the December 2000 status Indian population from the Indian Register was 675,497. After adjustments, it was estimated to be 690,000, a difference of approximately 2%.

For funding allocations, Health Canada uses this (adjusted) population figure, plus a remoteness factor of from 1 to 4, depending on the distance to physician services, road and telephone. For some of the larger communities (more than 5000 people) no remoteness factor is applied. In terms of health outcome data, figures are available at a national level and Health Canada is in the process of trying to collect information at a lower level.

**New Zealand**

New Zealand also currently uses a residential population concept for the evaluation of health outcomes and funding arrangements for its indigenous population. In the past, Maori ethnic group population estimates and projections and enumerated census populations (census counts) have been used.

Evaluation of Maori health outcomes by the Ministry of Health generally only takes place at the national level and not at sub-national levels. District health boards may do local analyses in their health needs assessments and planning processes for purchasing services in their districts.

Statistics New Zealand has indicated that there have been major reforms in the manner in which indigenous population estimates have been calculated. In October 1995 birth and death registrations adopted the 1996 Census style ethnic question and in July 1996 the Ministry of Health adopted the 1996 Census ethnic question. Prior to this birth and death, health and census questions were all quite different. Consequently, post-1996 Maori indices of fertility, mortality, etc are very different from pre-1996 indices (Statistics New Zealand 2001). A separate study by the University of Otago confirms the marked under-reporting of Maori mortality (University of Otago).

From 2001, Maori population estimates and projections incorporated an allowance for non-response to the ethnic group question in the Census of Population and Dwellings. The 2001 Census based Maori ethnic group estimated resident population at the census date will be approximately 11% larger than the Maori census count (+13% for Pacific and +14% for Asian). This 11% difference takes into account net census undercount, ethnic non-response and residents temporarily overseas.
The scale of the difference raises issues for pre-2001 Maori/non-Maori or Pacific/non-Pacific comparisons or for indices derived using census counts. The net census undercount is significantly higher among ethnic minorities, and this has had a differential impact on derived rates. Moreover, respondents who failed to specify ethnicity have been traditionally assigned to the "other" group (ie. non-Maori/non-Pacific, etc). Thus, there will be a significant bias in any analysis using pre-2001 Maori/non-Maori estimates or census counts as a denominator. Although there may be some compensating effect in the numerator data (ie. ethnic non-response in birth, death, morbidity data, etc), it is unlikely to be of a similar magnitude. For example, birth and death data has practically 100 percent coverage and non-response to the ethnic group question is 1 and 3 percent, respectively. Knowledge that Maori and Pacific births, deaths, hospital admissions, etc, were not always recorded as Maori or Pacific (at least historically) has resulted in some questions about statistical practices.

Comparability between ethnic group data collected in birth and death registrations and ethnic group data collected in the Census is critical to the derivation of Maori estimates and their consequential use in health measures. At least for fertility and mortality indices, Statistics New Zealand is looking to data matching between birth and death registration data and census data to ensure that future Maori estimates and the consequent indices are valid and defensible.
4 Mapping and concordances

Overview
To estimate Health Zone populations it has been necessary to relate the location of Health Zones to standard statistical geography and then relate that location data to a series of other datasets. This process is outlined in Figure 4.1. This diagram summarise the matching of the three input datasets of Australian Standard Geographic Classification (ASGC) 2001 CD boundaries, the existing Health Zone map and data from the CHINS Survey (2001) to form a draft composite geographic dataset. This dataset is used to refine the Health Zone boundaries and subsequently produce a revised composite geographic dataset with concordance between the geographic location of Health Zones and CDs. A complexity of this process is that Health Zone boundaries do not match directly with CD boundaries and therefore a method needs to be developed to split CD population estimates between a number of Health Zones. The method developed in this project utilised population data available from the CHINS Survey (2001).

The revised geographic composite dataset is then matched with CD population data to provide Health Zone population information. As a separate exercise the Health Zones geography was also used to provide a limited range of specified SLA level information on migration patterns.
Map Info 7, a computer-mapping product, was used to establish the geographic dataset. This dataset was then converted to an MS Access file to calculate population parameters.

**Mapping**

**Data sources**
The most time consuming part of the project was the validation of the physical location of communities by their longitude and latitude values. The CHINS 2001 longitude and latitude list was used as the base and a number of other datasets were used to validate community location. The validation datasets used were:
- Department of Community Development and Sport (DCDS), Community Information Access System (CIAS) localities list,
- Department of Infrastructure, and Planning (DIPE), localities list, and
- DHCS localities list.

A number of missing or inconsistent longitude and latitude values in each of the datasets were found. Issues also arose with respect to naming of communities. Indigenous communities can have a number of different names in part due to various pronunciations and spelling. As a result, NT Government agency community lists can hold several thousand names, although there are only about 1000 individual communities and of these 350 are generally not populated. At the time of the study there was no formal process to notify the NT Place Names Committee of changes, errors and alternate names. (The NT Place Names Committee is a statutory body established in 1994 by Act of NT Parliament, to manage the process of naming new streets, suburbs and towns. It is also responsible for any changes to those names or associated details.)

In the ABS CHINS 2001 dataset there are 632 discrete, populated Aboriginal communities. Of this total, ABS accurately located 607 communities using a Global Positioning System (GPS) during the data collection stage. Some CHINS communities were not visited during the collection and therefore had not been ‘geo-coded’. A check of the validation datasets provided another 16 community longitude and latitude values, producing 623 geo-coded communities. The outstanding nine CHINS communities were unable to be located.

**Alignment of Health Zone boundaries**
The creation of a new Health Zone map was essential for accurate location of communities within the appropriate Health Zone and to subsequent assignment of populations. The first process in this part of the project was to improve the way Health Zone boundaries matched CD boundaries. The original Health Zone map was based on the ASGC 1996 CDs, and was drawn at a relatively low resolution. When zooming to high magnification, the zone boundaries did not consistently align with the 2001 CD boundaries creating areas of the map that were not allocated to a Health Zone. This has the potential for communities to fall into undefined areas within the map and to distort the final population figures.

This was corrected by aligning Health Zone boundaries with the 2001 CD boundaries where boundary adjustments did not effect the communities within the Health Zone.

There were two further adjustments. The first was that some map features did not correspond to ASGC 2001 CD boundaries, as a result of updated mapping done by DIPE. Secondly, some of the Health Zone boundaries had open areas produced as a result of two separate lines being drawn to define the same boundary. This created
areas that were not in any Health Zone and is a common problem in GIS mapping. The areas are referred to as ‘slithers’.

**Assignment of unstated communities to Health Zones**

In the original preparation of the 21 Health Zones in the Northern Territory only the larger communities were ‘stated’ as being within a defined Health Zone. Many hundreds of small communities were not specified in the documentation. Following the mapping of the 623 communities and the Health Zones it was necessary to test that all communities had been assigned within the appropriate zone. This process required compilation of lists of communities for each Health Zones and then validation by members of the two planning committees, the Top End Regional Indigenous Health Planning Committee (TERIHPC) and the Central Australian Regional Indigenous Health Planning Committee (CARIHPC).

**Split CD to Health Zone concordance**

Once the alignment of Health Zone boundaries and CD boundaries was completed and the location of communities validated it was possible to create a list of the 21 Health Zones with the location of the 481 CDs. Of the 481 CDs in the NT, 19 CDs overlapped more than one zone. These overlapping CDs produced 47 areas, defined as intersection polygons. For the purpose of producing population estimates it was necessary to split the CDs populations between related Health Zones.

The population proportions for these divisions were achieved by estimating overall population of the CDs using the 2001 CHINS community population estimates for all communities within the CD. The 2001 CHINS population totals for each split section of the CD were then divided by the overall CHINS population of the CD to provide proportions for calculating the CD Census populations to be attributed to each Health Zone.

**Experimental migration estimates based on SLA and CD data**

To utilise migration data available from the 2001 Census it was necessary to establish a concordance between a whole SLA and Health Zones as these data items were not coded to the CD level. In addition, some analyses also required a concordance between whole CDs and Health Zones.

A whole SLA to Health Zone concordance was created based on ‘place of enumeration’ 2001 Census counts. The whole SLA to proxy Health Zone concordance was accepted if at least 50 percent of the SLA census population count was within a single Health Zone. This created a number of Health Zones without any SLAs allocated to them.

A whole CD was allocated to a Health Zone if at least 50 percent of the CD ‘place of enumeration’ census count was in the Health Zone. It was not considered appropriate to split CDs where a CD was in more than one Health Zone as it could not be assumed that the migration characteristics of people in a split CD were homogeneous.

**Data model production**

As part of the preliminary stages of the project a data model was constructed to map the structure of the information needed to produce the Health Zone population data (see Figure 4.2). The data model linked Health Zones to 2001 CHINS communities, 2001 CHINS communities to 2001 CDs and 2001 CDs to Health Zones. During the data model production and database establishment, data were normalised to reduce the number of duplicates.
Figure 4.2 Data model for concordance database
Future maintenance and standardisation

NTAHF is responsible for the boundary changes of Health Zones. This work is useful for validation and linkage of many locality lists covering CIAS, DIPE, CHINS and DHCS data. Currently hospital and community care information can be linked via locality codes in the data warehouse. In order for people to gain accurate and up to date Locality and Health Zone information, establishing a locality/ Health Zone management committee is recommended. Its role would be to manage any new or altered Health Zone boundaries and locality codes in the DHCS locality code set. This committee would be required to liaise with NTAHF, the NT Place Names Committee and ABS to ensure accurate data is maintained about a community in the DHCS locality code set. The committee should consist of members from the DHCS Corporate Data Warehouse, CMI and Epidemiology.

Geographic information may be further developed by involving new projects such as the Land Use Mapping Project that is being produced by DIPE in conjunction with national and state government lands departments. It includes an extremely detailed cadastral map combined with satellite images. Areas are identified by land use including Indigenous communities, traditional uses and pastoral properties.

The method to relate Health Zones to standard statistical geography may be applied to other agency management areas. This would allow other government agencies to relate their areas and statistical data to management areas. Further work on Health Zone boundaries and appropriate change in CD boundaries in future census could reduce the number of intersection polygons and increase the accuracy of the population estimates. Such work needs the close cooperation of NTAHF, ABS and key NT Government agencies. It is recommended that a single entity be responsible for management of changes to Health Zone boundaries and that a formal process be put in place.

Increased understanding of mapping technologies will provide useful information to health professionals responsible for providing services to communities. Maps can be made available on the intranet. These maps can be zoomed in and out to allow for detailed inspection.

There is an opportunity for better alignment between Health Zone boundaries and CDs. On the one hand, ABS should be approached to seek the creation of CDs which align to Health Zone boundaries when ABS consider redesign of CDs prior to the 2006 Census. From a joint spatial and statistical perspective, it is desirable to have census data geocoded or mesh blocks introduced. On the other hand further refinement of Health Zone boundaries may also be possible so that they align with CD boundaries. This would have no impact on populations serviced by each zone. However, it would reduce the number of CDs split by Health Zone boundaries and therefore increase the accuracy of the population estimates. As an example, in some locations pastoral boundaries were used for 2001 Census CDs boundaries, while Health Zone boundaries in similar locations do not align with the pastoral boundaries.
5 Estimating primary health care service populations and data source assessment

Actual service population

In estimating the actual service population from primary health care service sources or the Medical Benefits Scheme, four issues need to be considered.

First, that significant underfunding of primary health care services in many areas of the NT is in the process of being addressed by PHCAP. Effectively the supply and availability of primary care services has limited demand and records do not accurately reflect the need for primary health care services. This may mean that some people are not clients of a health service but remain a potential client.

Second, complications exist where alternative providers are available. In Darwin, for example, in 2002, there were 80 general practitioners and two Aboriginal health services. As such, the records of the two Aboriginal health services do not reflect the total demand by Indigenous people for primary health care given that many would use general practitioners.

Third, where medical practitioners are self-employed in Indigenous health services, the Medical Benefits Scheme is likely to provide good data on the use of services provided by the medical practitioner. In the situation where medical practitioners are employed by Indigenous health services, the Medical Benefits Scheme is not likely to provide such good data, either for residents or visitors. This reflects the lack of a direct financial incentive for good quality records and a different model of service where all staff share the workload.

Fourth, care needs to be taken in devising counting rules of persons who are serviced. Some services can be provided either on an individual or collective basis such as education and school screening. To address this issue, reporting for Commonwealth funded Indigenous health services separately identifies individual and group contacts. For individual contacts, an ‘episode’ of health care is specified as contact between an individual client and a service:
- by one or more staff; and
- to provide health care eg for sickness, injury, counselling, health education, screening.

(NACCHO and Department of Health and Aged Care 2001)

In summary, available data required for an actual service population estimate is likely to paint a less than clear picture of the population currently being serviced. As PHCAP and associated resources and information systems are put in place, there is a golden opportunity to achieve an improvement in data, particularly for the many people who may receive primary health care in more than one zone.

This improvement would occur if one system was used to record client and clinical data or if a system existed that could draw these details from other systems for uniquely identified clients. The former is preferable as it increases the likelihood of comparable data as well as having the potential to reduce system development and maintenance.
costs. Ideally one system should be used in Australia to accommodate interstate movements.

For each uniquely identified client, there would also be a need to allocate them to a Health Zone of principal care to facilitate evaluation of outcomes by Health Zones. In recognition of this issue, Central Australian Aboriginal Congress estimates its residential client population by only including those clients who have received a service in the last three years, after exclusion of visitors.

Potential service population

Estimates of potential service population proved to be even more problematic. The key issue was whether the assumptions involved in covering the large data gaps that exist in available sources are likely to make the estimates unreliable.

The definition used to explore the issue of the NT’s primary health care service population was

*The average daily population that potentially could demand primary health care in each of the NT’s 21 health zones during 2001.*

For the 21 proposed Health Zones, estimates of the primary health care service populations were sought by age, sex and Indigenous status. Estimating the potential population involves two stages.

First, an estimate is needed of each of the component populations. These include residents who are present, residents who are absent, family visitors, tourists and business visitors, and can be expressed within a formula:

\[ S_{it} = P_{it} - A_{it} + O_{it} + D_{it} \]

where \( P_{it} \) is the total resident population, \( A_{it} \) is the number of absent residents, \( O_{it} \) is the number of overnight visitors, and \( D_{it} \) is the number of day visitors; in area \( i \) at time \( t \).

Second, the rate at which each of these component populations is likely to make use of these services also needs to be estimated and applied. This would be complicated if Health Zones provided differing levels of service. In this case, usage factors would need to take account of differences in service levels as well as the nature of the service populations.

Evaluation of available data sources, which follows, indicates that the assumptions involved are likely to make service population estimates unreliable. Among the data sources assessed, there are no sources of data that meet all 10 assessment criteria for a year average estimation of service population in 2001. While it is possible that service estimates could be produced from an amalgam of existing data sources, it would involve substantial assumptions, creating the risk that variation or lack of variation between Health Zones may reflect assumptions rather than data.

This risk is illustrated by the difficulties associated with the best data source, the Census of Population and Housing. Even though problems exist such as data frequency and net undercount, the Census population coverage, data quality and person characteristics highlight its superiority over other data sources.
If the Census was to be used as a basis for service population, the following assumptions would need to be made or alternative assumptions developed:

- The place of enumeration count on Census night (7 August 2001) represents the average for the whole year. Seasonal change makes this an unrealistic assumption although the impact is reduced with the NT Census practice of counting people at their usual residence, in discrete Indigenous communities;
- The number of day visitors is zero. The Census only collects information for employed persons through the coding of Journey to Work Destination Zone. This excludes school attendance and other persons not in the labour force. While an assumption of zero day visitors is unrealistic for a community, it would not necessarily be so for a Health Zone;
- There are zero residents temporarily overseas on census night. For Indigenous persons this is likely to be close to realistic because of their poor socio-economic status. ABS can provide an estimate of the total residents temporarily overseas on census night;
- Census usual resident data has no net undercount. Net undercount is taken into account in producing ERPs based on the ABS's Census Post-Enumeration Survey. However, because the Post-Enumeration Survey was not conducted in remote Indigenous communities in the NT, it may under or overcorrect for the net census undercount in a particular Health Zone.
- The proportion of Indigenous people with Indigenous status “not stated” is the same as in the stated categories. The accuracy of this assumption is unknown but may tend towards overestimation of the Indigenous population; and
- The concordance between Health Zones and Australian Standard Geographic Classification CDs is correct. This is probably realistic, given that checks have been made with major interested parties.

Fortunately, an option exists to develop primary health care service population estimates for both evaluation of health outcomes and funding purposes, through the development of linked electronic client information.

**Data source assessment for service population estimates**

This section contains a review of possible data sources for the estimation of NT primary health care service population. This project aims to estimate the primary health care resident and service populations of NT Health Zones by age, sex and Indigenous status. In the NT, 21 Health Zones have been proposed to enhance regional planning, co-ordination and local governance for health service delivery.

Ten data source assessment criteria for service population estimation are consistent with those of the ABS Service Population Pilot Study (Lee, 1999), with the addition of an eleventh criterion specified for this project. The assessment criteria are detailed in Appendix B), and in summary are:

- applicability of the indicator to a range of areas;
- geographic level of the data;
- data frequency;
- data accessibility;
- coverage of the data set;
- influence of locational/environmental factors on the data;
- extent of behavioural variation between resident and non-resident populations;
- variations in consumption patterns between different socio-demographic groups;
• availability of per capita consumption/production figures at the appropriate geographic level,
• whether the data can be obtained from a single data source; and
• basic person characteristics (age, sex and Indigenous status, residential area and service area).

The assessment of the potential data sources are summarised in Table 5.1. Among the data sources assessed, none meets all assessment criteria listed above. The Census of Population and Housing (the Census) is unsatisfactory for data frequency criterion. The Census is conducted on Census night every five years. The lowest geographic level of the Census is CD which sometimes does not fit well with Health Zone boundaries. Although the problem of undercount is taken into account by ERP, in terms of data frequency ERP for Indigenous people is also only available every five years. CHINS is also conducted once every five years, and covers the Indigenous communities, which is only a part of the total service population. Another major problem with CHINS is that it does not provide basic person characteristics (ie sex, age and Indigenous status). The same problem exists with CIAS and NT Grants Commission Population data, which are considered unsatisfactory for estimating the service population by age, sex and Indigenous status. CMI is a dynamic dataset for current DHCS clients. Although it does not currently cover the whole population, it is potentially useful for future development of an information system producing service population information. Medicare data is inadequate in geographic level of data (postcode). There are unresolved statistical issues such as duplicated registrations and timeliness of updating for events such as deaths, and in 2002 it does not have Indigenous status, and data access is currently difficult. Again, Medicare data is potentially useful for future actual service population information for primary health care. Hospital morbidity data, Immunisation register, School Enrolment and Attendance, Central Australia Population List, Coordinated Care Trial, Northern Territory Travel Monitor, and Service Activity Reporting cover only a subset of the population. After data source assessment, the Census of Population and Housing is considered to be the best available data source for estimating primary health service population.

The assessment of each data source is detailed in the Appendix C1-17.
Table 5.1 - Primary Health Care: service population estimates – data source assessment summary

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Applicability</th>
<th>Geography</th>
<th>Frequency</th>
<th>Accessibility</th>
<th>Coverage Local influence</th>
<th>Behavioural variation</th>
<th>Consumption variation</th>
<th>Single source</th>
<th>Person characteristics</th>
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<tr>
<td>Census of Population and Housing</td>
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<td>✔</td>
<td></td>
<td>x</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>✔</td>
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<td>✔</td>
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<tr>
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<td>Central Australia Population List</td>
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<td>Northern Territory Travel Monitor</td>
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<td>International Visitor Survey</td>
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<td>Survey of Tourist Accommodation</td>
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<td>Hospital Emergency and Outpatient</td>
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<tr>
<td>Chronic Disease Registry</td>
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<td>Perinatal Collection</td>
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<td>Growth Assessment and Action Program</td>
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</table>

Note: ✔ satisfactory, ✗ unsatisfactory, NA not applicable.
6 Nature of the NT population

General characteristics
The NT population is distinctive in many ways. It:

- is relatively small (the revised estimate of the resident population at June 2001 was 198 000, 1% of the Australian population);
- has a high proportion of Indigenous people. The estimated resident Indigenous population was 29% of the total estimated resident NT population at June 2001 compared with 2.4% for Australia;
- is a relatively young population with a median age of 29.6 years at June 2001 compared with the Australian median age of 35.7 years; and
- has the highest resident population turnover of any jurisdiction (19% in 1999-2000). Victoria and South Australia had the lowest turnover at 5% (ABS 2001a: 87, 2002a and 2002b).

In common with most other jurisdictions, the majority of the NT population is in the vicinity of the capital city, as shown in the following table (Table 6.1).

Table 6.1 Estimated resident population, 30 June 2001

<table>
<thead>
<tr>
<th></th>
<th>Darwin statistical division</th>
<th>Balance of Northern Territory</th>
<th>Northern Territory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous(a)</td>
<td>10 687</td>
<td>46 188</td>
<td>56 875</td>
</tr>
<tr>
<td>Non-Indigenous(a)</td>
<td>96 155</td>
<td>44 738</td>
<td>140 893</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>106 842</td>
<td>90 926</td>
<td>197 768</td>
</tr>
</tbody>
</table>

Source: ABS 2002c
(a) Experimental

Estimates of the Indigenous population are considered by ABS to be experimental in that the standard approach to population estimation is not possible because satisfactory data on births, deaths and migration are not generally available, and because of the intercensal volatility of the Indigenous population (ABS 2002b: 77).

About 68% of the NT’s Indigenous population live in discrete Indigenous communities, some of which are in urban areas, including Darwin (ABS data available on request). Based on experience in other jurisdictions, this high proportion could decline as an increasing proportion of Indigenous people live in the general community, in part associated with greater intermarriage between Indigenous and non-Indigenous people.

Table 6.2 shows the estimated resident population (ERP) of the NT by Indigenous status for the 21 Health Zones. Darwin Health Zone has the highest share (20.1%) of resident Indigenous population in the NT, followed by North East Arnhem (11.2%) and Alice Springs (10.9%). Northern Barkly and Eastern Arrente-Alyawa Health Zones, both in Central Australia, have the lowest shares with each zone having a resident Indigenous population of less than 1000.

The number of males is approximately equal to females in the NT resident Indigenous population (Table 6.3). Eastern Arrente-Alyawa and South East Top End have the highest proportion of resident males while Anmatjere and Alyawarra-Anmatjere in Central Australia have the lowest.

More than one third (36%) of the NT’s resident Indigenous population is under 15 years of age, compared with 22% for the NT’s non-Indigenous population and a national
average of 21% (Table 6.4, ABS, 2002m). The Top End West Health Zone has relatively more 0-14 year olds than other Health Zones.

**Mobility**

Mobility has been identified as having specific impact on primary health care and the need to service a wider population than resident population. (Warchivker et al 2000: 447).

Indigenous people are more mobile than non-Indigenous people. Census 2001 shows 51% of Indigenous persons changed their place of usual residence between 1996 and 2001 compared to 42% for non-Indigenous persons (ABS, 2003a). Table 6.6 demonstrates the percentage of usual residents who have the same Health Zone as usual residence one year ago and five years ago. Indigenous people are more likely to remain in the same Health Zone than non-Indigenous people. 94% of Indigenous people remain in the same Health Zone as one year ago compared with only 85% of non-Indigenous people remaining in the same Health Zone. Indigenous people are more likely to move away from Central Barkly and West Arnhem health zones than other Health Zones. In Central Barkly and West Arnhem about 85% of the Indigenous population remain in the same Health Zone as a year ago, compared to the NT Indigenous average of 94%. A high proportion of ‘not stated’ for Indigenous people in Alice Springs, Katherine West and Darwin has produced less reliable information on usual residence a year ago and five years ago for those areas (Table 6.7).

Table 6.8 shows the proportions of the usual residents who remain in the same NT Health Zone, move to other NT Health Zone and move interstate. It is clear that Indigenous people have a greater tendency to move between NT Health Zones than non-Indigenous people, and non-Indigenous people have a greater tendency to move between States and Territories. Census 2001 shows that 5% of Indigenous people have changed their usual residence of one year ago to a different NT Health Zone, while the non-Indigenous equivalent figure is only 3%. 13% of the non-Indigenous population have moved interstate during the year before the Census, compared with 3% of the Indigenous population. In general, it appears that the Indigenous population is more mobile in terms of intra and inter- Health Zone mobility and non-Indigenous population is more mobile in terms of interstate travelling. It also appears that the design of Health Zones has captured most of Indigenous population mobility. Table 6.8 shows that 92% of Indigenous people remain in the same Health Zone as one year ago.

Apart from usual residence at one and five years ago, the Census also provides an indication of mobility from a comparison between where people were enumerated on Census Night and their usual residence. Unfortunately, this is a problematic measure for the NT, because the standard counting rule was modified from persons present during Census 2001, to usual residents in discrete Indigenous communities. As a consequence the information presented in Table 6.5 needs to be interpreted with caution. From this table it appears that the Northern Barkly Health Zone has the highest proportion (5%) of Indigenous people enumerated in other NT Health Zones.

While a clear picture of the Indigenous population’s short-term mobility is not available from the Census, other studies have recognised that the population is highly mobile but the mobility is generally within the surrounding region. Taylor points out that ‘numerous case studies attest to the importance of frequent mobility in the daily, periodic and seasonal round of activities associated with Indigenous social and economic life' (Taylor 1996:3). More recent studies continue this theme. A study at Maningrida pointed to ‘a high degree of seasonal mobility between the township and surrounding outstations’ (Burns et al 1998). Warchivker et al comment on ‘inter-community mobility
that is commonly observed as part of Aboriginal life in the NT’ and ‘frequent population movements such as between outstations and communities’ (Warchivker et al 2000: 445). Paradies et al comment that ‘the number of people present in a given community may vary significantly over the short term, often from day to day’ (Paradies et al 2001: 8).

Mobility for Indigenous people is a reflection of social and economic factors ‘such as conflict avoidance, deaths in a community, the location of kinfolk, traditional associations to land, recreation, employment opportunities, the need to access services and visit relatives in prisons and hospitals’ (Taylor, 1996: 3).

A relationship with more than one community will generate mobility. A feature of Indigenous (and non-Indigenous) life for some people is the concept of dual residency, whereby people who live in a community also have ‘another community which they also regard as home and live in for significant periods’ (Warchivker et al 2000: 445). In a survey conducted in November 1996, March 1997, June 1997 and November 1977 in a remote community in central Australia, out of a total average of 333 residents during the three week survey periods, an average 267 (80%) were present as residents, 19 persons (6%) present as dual residents and 47 (14%) absent. The average number of people present gives another view of the results. Of a total of 298 persons, 267 (90%) were residents, 19 (6%) dual residents and 13 (4%) visitors (Warchivker et al 2000: 445).

This high level of mobility has major implications for service delivery. Effectively some Health Zones will be providing health care for many visitors who may not be well known to health providers. In communities associated with Commonwealth funded Aboriginal primary health care services, 13% (11% in the NT) of all episodes of health care provided to clients during 1999-2000 were to visitors (DHA 2003).

Alice Springs and Darwin, as providers of centralised services, such as major hospitals and secondary educational facilities are examples of Health Zones that have a high net influx of people. As an example within the Darwin Health Zone, Batchelor is an educational centre in which the the Top End Regional Indigenous Health Planning Committee has advised that ‘…..the big influxes of students, many of whom have left their diabetes medication at home, causes significant stress, in contacting their home clinics’ (Top End Regional Indigenous Health Planning Committee 2002).

In terms of resource allocation, a Health Zone which consistently has a high proportion of visitors but with low rate of absence of residents, would have an increased need for resources compared to a situation where only residents received services.
### Table 6.2 Estimated resident population by Indigenous status by Northern Territory Health Zone: 30 June 2001

<table>
<thead>
<tr>
<th>HZ code</th>
<th>Health Zone</th>
<th>Indigenous(a) (no.)</th>
<th>Non-Indigenous(a) (no.)</th>
<th>Total (no.)</th>
<th>Proportion of total Indigenous population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tiwi</td>
<td>2 287</td>
<td>168</td>
<td>2 455</td>
<td>4.0</td>
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<tr>
<td>2</td>
<td>Darwin</td>
<td>11 407</td>
<td>97 545</td>
<td>108 952</td>
<td>20.1</td>
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<tr>
<td>3</td>
<td>Top End West</td>
<td>2 894</td>
<td>874</td>
<td>3 768</td>
<td>5.1</td>
</tr>
<tr>
<td>4</td>
<td>West Arnhem</td>
<td>2 289</td>
<td>1 368</td>
<td>3 657</td>
<td>4.0</td>
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<tr>
<td>5</td>
<td>Maningrida</td>
<td>2 126</td>
<td>198</td>
<td>2 324</td>
<td>3.7</td>
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<tr>
<td>6</td>
<td>North East Arnhem</td>
<td>6 392</td>
<td>4 108</td>
<td>10 500</td>
<td>11.2</td>
</tr>
<tr>
<td>7</td>
<td>South East Arnhem</td>
<td>2 444</td>
<td>1 000</td>
<td>3 444</td>
<td>4.3</td>
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<tr>
<td>8</td>
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<td>5 360</td>
<td>7 772</td>
<td>13 132</td>
<td>9.4</td>
</tr>
<tr>
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<td>635</td>
<td>2 868</td>
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<td>1 791</td>
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<td><strong>152 891</strong></td>
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Source: ABS data available on request according to DHCS Health Zone concordance.

(a) Experimental
Table 6.3 Estimated resident Indigenous population by sex by Northern Territory Health Zone: 30 June 2001

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<th>Female (a) (no.)</th>
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Source: ABS data available on request according to DHCS Health Zone concordance.

(a) Experimental
Table 6.4 Estimated resident Indigenous population by age by Northern Territory Health Zone: 30 June 2001

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Northern Territory 20 349 34 909 1 617 56 875 36

Source: ABS data available on request according to DHCS Health Zone concordance.

(a) Experimental
## Table 6.5 Proportion of usual residents by place of enumeration, 7 August 2001, Census 2001

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### Table 6.6 Proportion of usual residents who had the same proxy Health Zone one year ago and five years ago, Census 2001

<table>
<thead>
<tr>
<th>Proxy Health Zone</th>
<th>Indigenous (%)</th>
<th>Non-Indigenous (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 year ago</td>
<td>5 years ago</td>
<td>1 year ago</td>
</tr>
<tr>
<td>Tiwi</td>
<td>97</td>
<td>94</td>
<td>66</td>
</tr>
<tr>
<td>Darwin</td>
<td>92</td>
<td>81</td>
<td>89</td>
</tr>
<tr>
<td>Top End West</td>
<td>97</td>
<td>95</td>
<td>65</td>
</tr>
<tr>
<td>West Arnhem</td>
<td>85</td>
<td>79</td>
<td>71</td>
</tr>
<tr>
<td>North East Arnhem</td>
<td>98</td>
<td>96</td>
<td>83</td>
</tr>
<tr>
<td>South East Arnhem</td>
<td>97</td>
<td>95</td>
<td>81</td>
</tr>
<tr>
<td>Katherine East</td>
<td>90</td>
<td>81</td>
<td>77</td>
</tr>
<tr>
<td>Katherine West</td>
<td>95</td>
<td>91</td>
<td>69</td>
</tr>
<tr>
<td>South East Top End</td>
<td>95</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>Top End</td>
<td>94.7</td>
<td>89.4</td>
<td>86.7</td>
</tr>
<tr>
<td>Northern Barkly</td>
<td>93</td>
<td>81</td>
<td>71</td>
</tr>
<tr>
<td>Central Barkly</td>
<td>86</td>
<td>66</td>
<td>76</td>
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<td>Southern Barkly</td>
<td>94</td>
<td>88</td>
<td>68</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>88</td>
<td>74</td>
<td>87</td>
</tr>
<tr>
<td>Pitjantjatjara</td>
<td>95</td>
<td>94</td>
<td>63</td>
</tr>
<tr>
<td>Central Australia</td>
<td>93.0</td>
<td>86.0</td>
<td>83.9</td>
</tr>
<tr>
<td>Other HZs (a)</td>
<td>97</td>
<td>95</td>
<td>69</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>93.8</td>
<td>87.5</td>
<td>85.4</td>
</tr>
</tbody>
</table>
Table 6.7 Proportion of usual residents for whom usual residence one-year ago and five years ago was not stated, Census 2001

<table>
<thead>
<tr>
<th>Proxy Health Zone</th>
<th>Indigenous (%)</th>
<th>Non-Indigenous (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One year ago</td>
<td>Five years ago</td>
</tr>
<tr>
<td>Tiwi</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Darwin</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Top End West</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>West Arnhem</td>
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<td>7</td>
</tr>
<tr>
<td>North East Arnhem</td>
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<td>2</td>
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<tr>
<td>South East Arnhem</td>
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<td>1</td>
</tr>
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</tr>
<tr>
<td>Katherine West</td>
<td>9</td>
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</tr>
<tr>
<td>South East Top End</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Top End</td>
<td>5.1</td>
<td>5.8</td>
</tr>
<tr>
<td>Northern Barkly</td>
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<td>8</td>
</tr>
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<td>Central Barkly</td>
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<td>3</td>
</tr>
<tr>
<td>Southern Barkly</td>
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<td>3</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Pijantjatjara</td>
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<td>3</td>
</tr>
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<td>6.2</td>
</tr>
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<td>Queensland</td>
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</tr>
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<td>5.3</td>
</tr>
<tr>
<td>Western Australia</td>
<td>4.8</td>
<td>5.5</td>
</tr>
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<td>Tasmania</td>
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<td>Northern Territory</td>
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<td>6.3</td>
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<td>Australian Capital</td>
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<td>3.6</td>
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<tr>
<td>Other Territories</td>
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</tr>
<tr>
<td><strong>Australia</strong></td>
<td><strong>4.3</strong></td>
<td><strong>5.1</strong></td>
</tr>
</tbody>
</table>

Source: ABS data available on request according to DHCS Health Zone concordance. Note: Denominator is Census counts, usual residence.

(a) Other Health Zones include Maningrida, Anmatjere, Luritja-Pintupi, Eastern Arrernte-Alyawa, Western Arrernte, Warlpiri and Alyawarr-Annmatjere.
### Table 6.8 Location of usual residence one year ago and five years ago (%), Census 2001

<table>
<thead>
<tr>
<th>Proxy Health Zone</th>
<th>Indigenous (%)</th>
<th>Non-Indigenous (%)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<td>Other HZs</td>
<td>Interstate</td>
<td>Current HZ</td>
<td>Other HZs</td>
</tr>
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<td></td>
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<td></td>
<td></td>
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<td>87</td>
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<td>65</td>
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<td>74</td>
<td>13</td>
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</tr>
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<td><strong>Five years ago</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>32</td>
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<td>South East Top End</td>
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<td>2</td>
<td>46</td>
<td>25</td>
</tr>
<tr>
<td>Top End</td>
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<td>8.8</td>
<td>5.7</td>
<td>65.4</td>
<td>4.6</td>
</tr>
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<td>14</td>
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<td>16</td>
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<td>15</td>
<td>16</td>
<td>42</td>
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<td>89</td>
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<td>3</td>
<td>23</td>
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<td>Alice Springs</td>
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<td>15</td>
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<td>92</td>
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<td>4</td>
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<td>Central Australia</td>
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<td>5.6</td>
<td>5.9</td>
<td>56.3</td>
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<td>49</td>
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<td><strong>Northern Territory</strong></td>
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<td>7.8</td>
<td>5.8</td>
<td>63.6</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Source: ABS data available on request according to DHCS Health Zone concordance. Note: Denominator is usual residents a year ago or 5 years ago.

(a) Other Health Zones include Maningrida, Anmatjere, Luritja-Pintupi, Eastern Arrente-Alyawa, Western Arrente, Warlpiri and Alyawarra-Anmatjere.
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Appendix A - project management

Project team
Yuejen Zhao, DHCS
John Paice, ABS
David Murtagh, DHCS
Hock Lee, DHCS
Steve Guthridge, DHCS

Project board
Steve Guthridge (Project Director), DHCS
Yuejen Zhao (Project Coordinator), DHCS
Jim Drummond, ABS
John Paice, ABS

Project reference group
Ramakrishna Chondur, Commonwealth Department of Health and Ageing
Ariel Couchman, Aboriginal Medical Services Alliance of the NT
Rosie Elliott, Aboriginal Medical Services Alliance of the NT
Ken Harkin, Department of Community Development, Sport and Cultural Affairs
Rhonda Loades, Aboriginal and Torres Strait Islander Commission
Helen Perry, DHCS
Cherie Shepherd, DHCS
Michelle Steves, Aboriginal Medical Services Alliance of the NT
Noelene Swanson, DHCS
Appendix B – data assessment criteria

Six essential criteria and four desirable criteria for data source assessment are documented in the ABS Service Population Pilot Study (Lee, 1999). By using the criteria, the ABS pilot study assessed over thirty existing data sources ranging from personal consumption to waste production indicators to estimate service population indirectly for five Local Government Areas (LGAs) in Western Australia. The pilot study failed to find any indicators, which could be used successfully to estimate a total service population for all five LGAs.

The ABS description has been given against each criterion followed by comment on its relevance to this project. The intent is to estimate resident and service populations of Health Zones by age, sex and Indigenous status given that these characteristics have a major impact on the health status of Territorians.

1. Applicability of the indicator to a range of areas (urban/rural; coastal/inland etc.)

Lee: To produce nationally consistent estimates of service populations, the ideal indicator would be applicable to all LGAs in Australia. Owing to the diversity of LGAs, in terms of location, urban/rural character, remoteness, climate and basic infrastructure, it was clear from the outset that few, if any, indicators would meet this ideal. As a basic minimum, therefore, it was thought necessary that the indicator should be applicable to a wide range of LGAs. These are represented by the five study areas which vary considerably in relation to the above characteristics.

Comment: An ideal indicator is applicable to all areas of interest, regardless of the geographical location, remoteness and population density. In the criterion, ‘areas’ has been substituted for ‘LGAs’ to make it generic.

2. Geographic level of the data

Lee: To produce reliable LGA service population estimates, the indicator data must be available at the LGA level. Some indicators, such as telephone usage, electricity consumption and milk consumption, failed to meet this criterion. Telstra was not able to provide any data on telephone usage by LGA.

Comment: The areas in this project are geographically equivalent to or smaller than Health Zones (eg. CD or Indigenous Locations), in order to map the areas into Health Zones and estimate service population.

3. Data frequency

Lee: It was considered that the data should be available on a quarterly basis (at least) to allow measurement of seasonal fluctuations in the service population. This was especially relevant to tourist destinations such as the Shire of Busselton and the Shire of Gingin where the visitor population peaks significantly in the summer months. Several of the indicators investigated were able to meet this criterion.

Comment: Frequency of data collection is important to identify seasonal patterns of the service population. Primary health care activity is likely to be influenced by, for example, epidemics of infectious disease, even though activity does not equate to the service population. Ideally the data should either relate to a whole year or be available at frequent intervals such as monthly.
4. Data accessibility

Lee: It was considered necessary that the data should be readily accessible to those interested in producing service population estimates. Although a large amount of information is collected by various organisations, it was found that many government agencies, as well as private organisations, have systems which do not allow them to extract the required data quickly and easily.

Several organisations, including a number of leading supermarket chains, have indicated that information for small areas is difficult, costly or time consuming to extract while others, such as the Water Corporation, are additionally constrained by commercial-in-confidence considerations.

Comment: Standard protocols, such as approval through Information Privacy Committee or Human Research Ethics Committee, are to be followed in accessing primary care activity data.

5. Coverage of the data set

Lee: The indicator data should cover all units of consumption (or production) within the LGA. Several indicators failed to meet this criterion because some households or commercial establishments used different service providers or provided for themselves. For example, the widespread use of bores and rainwater tanks in some regions of the State means that water consumption data provided by the Water Corporation would be incomplete in many LGAs.

Comment: Agreed as applied to Health Zones.

6. Influence of locational/environmental factors on the data

Lee: The ideal indicator would not be subject to rises and falls due to factors other than change in the number of persons accessing the service in question. In practice, most generic indicators investigated appeared to be subject to some locational or environmental influences. For example, the amount of household refuse produced by the LGA, while relatively simple to collect, is likely to be affected by active recycling policies in some LGAs. Wastewater flows, on the other hand, may be less susceptible to environmental factors of this kind.

Comment: Particularly in the Territory, availability of a service will impact on its use. For example, if a certain type of primary health care service was unavailable in a certain Health Zone, this would be a locational influence. As another example, climate, disease patterns and associated primary health care service delivery do differ between Health Zones across the Territory.

7. Extent of behavioural variation between resident and non-resident populations

Lee: If the indicator hides significant differences in consumption patterns between the resident and non-resident populations, then a rise or fall in the latter will not be reflected by a corresponding rise or fall in consumption.

The difference in the newspaper-buying behaviour of residents and tourists provides a good example. Although newspaper sales show a marked increase in some tourist destinations during peak holiday periods, a large percentage of visitors, who normally purchase newspapers when at home, apparently fail to do so when on holiday.
For example, in 1998 and 1999, sales of the Saturday edition of the "West Australian" fell significantly in the Perth metropolitan region on certain public holiday weekends, when large numbers of residents travelled to tourist destinations in the surrounding areas. However, the total increase in sales in the ex-metropolitan regions of the State did not match the decrease experienced in Perth.

Comment: Agreed.

8. Variations in consumption patterns between different socio-demographic groups

Lee: For indicators measuring consumption by individuals (as opposed to households or commercial establishments), the ideal indicator is one which measures a variable that is evenly distributed throughout the population of Australia. Once again, indicators of this type are difficult to find although measures of milk and bread consumption would appear to come closer to meeting this criterion than measures of consumption which are specific to certain sectors of the population such as drivers, cigarette smokers, drinkers of alcohol or users of automatic telling machines. Persons in these categories are typically adult and may have other definitive socio-demographic characteristics.

Comment: Agreed. For example, Indigenous people experience lower levels of access to primary health care services than non-Indigenous people, even though they are more likely to be hospitalised for most of diseases and conditions (AIHW, 2002).

As another example, women use considerably more Medicare services than men (13.2 vs 9.0). Both examples demonstrate that frequency of access to primary health care services does not fully reflect the service population size between different socio-demographic groups.

9. Availability of per capita consumption/production figures at the appropriate geographic level

Lee: Given reliable per capita consumption/production figures, it is theoretically possible to estimate the size of the service population directly from the total amount of bread or milk consumed, or the total amount of wastewater produced within the LGA. However, such estimations would necessarily be based on a number of broad assumptions including an even distribution of that variable across the Australian population, accurate measurement of the indicator variable at the LGA level and the negligible influence of locational and environmental factors.

Comment: If per capita data is only available at a Territory level, then it would not be useful in estimating Health Zone service populations.

10. Whether the data can be obtained from a single data source

Lee: For reasons of consistency and ease of access, it is desirable if the indicator data for all LGAs within the State can be extracted from a single source. Data held by State government agencies, or State/national distributors, therefore, are generally preferable to data held by individual LGAs.

Comment: Agreed. In a situation where there are many service providers, this will cause complications.
11. Basic person characteristics (age, sex and Indigenous status, residential area and service area)

Lee: Nil.

Comment: In this project, an additional criterion is necessary-basic person characteristics (age, sex and Indigenous status, residential area and implicitly service area).
Appendix C – data source assessment

C1. Census of Population and Housing

Source
Australian Bureau of Statistics

Data description
The Census of Population and Housing aims to take a “snapshot” of Australia every five years – not only counting the population, but collecting information on the social, economic and housing characteristics of Australian society. The Census enumerates people where they are located on Census Night. Most standard output products from the Census provide characteristics of people on this place of enumeration basis. Census counts by place of enumeration include overseas visitors for age, sex and registered marital status, exclude overseas visitors for all other person variables, and exclude Australian residents temporarily overseas. Census data are also available on place of usual residence. Census counts by place of usual residence exclude overseas visitors and Australian residents temporarily overseas.

Assessment
The Census covers the whole Territory and the whole of Australia.

CD is the basic building block for collection, processing and output of the Census. CDs are used for the aggregation of statistics to larger Census geographic areas, eg Indigenous Location, Indigenous Area and Statistical Local Areas. The smallest area code is CD for past censuses but possibly sub-CD will be available in future censuses if geocoding or meshblocks are adopted.

The data are collected at Census Night every five years. In other words, the Census count is not ideal for deriving service population because it is only a snapshot of the population for one day out of the whole year. The most recent data are 1996 and 2001.

Census counts are readily available from ABS. Key products such as Basic Community Profiles and Indigenous Profiles are available through the ABS@ intranet website. CData and its add-on packages are also available. ABS also provides services for additional analysis of the Census counts to suit specific needs of the clients. ABS publications, eg Population Distribution, Aboriginal and Torres Strait Islander Australians (ABS, 2002b) are accessible through the intranet.

The Census counts cover the whole population excluding foreign diplomats and their families. In the 2001 Census young adult males had a high undercount rate while older people had a relatively low undercount rate. The undercount of Indigenous people is over 6% significantly higher than 2% for the total. The undercount rate of the Northern Territory is 4% the highest in Australia and to a significant degree is a consequence of the proportion of non-residents in the NT at the time the census is undertaken. In the 2001 Census the undercount rate for non-residents in the NT is estimated to be 32% (standard error 3.9%) much higher than that of residents, 1.4% (ABS, 2003b).

The influence by locational/environmental factors on the Census counts is minimal. ABS has standard protocols and trained Census field data collectors for Census. ABS conducts the Census in August because August is the time of year when most Australians are at home.
Because Census night falls during the peak tourist period in NT, seasonal population increase in the Top End affects the Census counts, by place of enumeration and to less extent by place of usual residence.

Both residents and non-residents are required to participate in the Census. Non-residents have a higher net undercount than residents.

ABS is the sole data source for Census data.

The Census counts provide population data by age, sex and Indigenous status at a CD level. The unknown or not stated category can be redistributed on the basis of proportions between the known categories. Census also collects information about residential address and place of enumeration. The place of enumeration count indicates the population in an area on Census Night and can for some purposes be used to provide an indication of some types of service populations, e.g. tourists. Journey to work data indicates daytime population.

Strengths
Census counts are readily accessible by Indigenous status, age and sex at a CD level. CD is clearly defined by ABS and mappable. ABS can assist with a split of CDs and construction of a concordance table between Health Zones and CDs. Data quality is reasonably good and there is a formal process in ABS to evaluate the data quality.

Weaknesses
Census count is a snapshot of the population for one day out of the whole year. If the service population is needed for the whole year, the Census count cannot provide information about seasonal population changes. A high undercount exists for visitors.

C2. Estimated Resident Population

Source
Australian Bureau of Statistics

Data description
ERP are estimates of the Australian population obtained by adding to the estimated population at the beginning of each period, the components of natural increase (on a usual residence basis) and net overseas migration. For the States and Territories, account is also taken of estimated interstate movements involving a change of usual residence. After each census, estimates for the preceding intercensal period are revised by incorporating an additional adjustment (intercensal discrepancy) to ensure that the total intercensal increase agrees with the difference between the ERPs at the two respective census dates.

Estimates of the resident population are based on Census counts by place of usual residence, to which are added the net Census undercount and number of Australian residents estimated to have been temporarily overseas at the time of the Census. Overseas visitors in Australia are excluded from this calculation. For single area estimates, account is also taken of known Census enumeration problems and local knowledge including that advised by local governments.

The concept of ERP links people to one place of usual residence within Australia. Usual residence is that place where each person has lived or intends to live, for six months or more, in the reference year. There is no information on service area. The non-resident population is excluded from ERP data.
Assessment
ERP covers the whole Territory and the whole of Australia. ERP published contains the estimates of the resident population at a SLA level. Other ERP data is available on request from ABS.

The total State/Territory ERP is published quarterly. The population estimates at a SLA level are also available for each 30th of June. Indigenous ERP is provided for the census years. To meet the conflicting demands for accuracy and timeliness there are three estimates of ERPs - preliminary, revised and final.

ERP data are readily accessible from the ABS@ website at a SLA level, for example, Population By Age and Sex, Northern Territory, 2001 (ABS, 2002i). Other available data include: Regional Population Growth Australia and New Zealand 1991 to 2001 (ABS, 2002j) and Experimental Estimates of Indigenous Australians 2001 (ABS, 2002k). Other data, including for client specified areas, are available on request.

ERP covers both Indigenous and non-Indigenous population for the whole Territory.

The influence by locational/environmental factors on ERP is minimal. The Census undercounts due to locational factors have been taken into account in the ERP data.

The non-resident population is excluded.

ERP data is classified by age, sex and Indigenous status for a specified residential area. There is no information on service areas.

Strengths
SLA level ERP data are produced every year and take into account local knowledge. Territory level ERPs are available quarterly, which could be useful for modelling of seasonal change in resident populations.

Weaknesses
Small area Indigenous estimates are only available in Census years, although projections of Indigenous population can be done according to client agreed assumptions. Preliminary and revised estimates can be subject to major changes.

C3. Community Housing and Infrastructure Needs Survey
Source
ABS and for community level data, Aboriginal and Torres Strait Islander Commission

Contact for data access
Rod Silburn (Ph: 08-89432191), ABS and Alison Smith (Ph: 03-86198000), National Housing and Infrastructure Centre, ATSIC

Data description
ABS conducts CHINS on behalf of, and with funding from ATSIC. Personal interviews are conducted with key community and Indigenous housing organisation representatives knowledgeable about the community eg. council chairpersons, council clerks, housing officers, water and essential service officers and health clinic administrators (ATSIC 2002). The CHINS data are collected in conjunction with field preparation for the Census. A community’s usual population is generally estimated by the community representative, without reference to community records. This method is considered to be less reliable than a population count as undertaken in the Census. Although comparisons are assessed to be satisfactory at a broad level of geography, caution should be exercised in making data comparisons for most CHINS items at a
Apart from the estimated usual population, CHINS data has other useful qualitative and quantitative characteristics of the communities, such as increase in population (for two weeks or more) during last 12 months, reasons for largest increase in population (for two weeks or more) during last 12 months, distance to nearest secondary school (up to Year 12), distance to nearest hospital, distance to nearest community health centre, frequency of community access to a registered nurse, and length of time doctor has been working in the community.

Assessment
CHINS is a complete enumeration of all Indigenous housing organisations and discrete Indigenous communities. This includes organisations and communities located in urban and sparsely settled areas in all Australian States and Territories. Organisations which do not manage housing for Indigenous people, or are in liquidation or receivership at the time of enumeration, are considered out of scope. Communities found to be unoccupied and which are not expected to be reoccupied in the next 12 months are also considered out of scope. The data are available at the level of Indigenous housing organisation or Indigenous communities. It is possible to aggregate the unit records of Indigenous communities to LGA, SLA, CD, and to the Australian Indigenous Geographical Classification Indigenous Location level. Geographical information (longitude and latitude) of the surveyed communities is available from the CHINS frame.

CHINS data are available for 1995, 1999 and 2001. It is envisaged that CHINS reference years will be the same as those for the Census of Population and Housing in future.

At the community level, the CHINS data 1995, 1999 and 2001 are accessible subject to data confidentiality agreement. Data above the community level is in the public domain.

All discrete Indigenous communities, both in urban and rural, are in the scope for the 2001 CHINS. A discrete Indigenous community is defined as a geographic location, bounded by physical or cadastral (legal) boundaries, and inhabited or intended to be inhabited predominantly by Indigenous people, with housing or infrastructure that is either owned or managed on a community basis. Predominant means greater than 50% Indigenous people.

Data coverage of Indigenous communities is good for CHINS 2001. The response rates for the 2001 CHINS are 98.6% for Indigenous housing organisations and 98.1% for discrete Indigenous communities. The CHINS record the number of people who usually reside in the community.

The usual population of the community is the number of people whose only or main residence is that community. In this context ‘residence’ means the community in which a person resides or intends to reside for at least six months. This includes non-Indigenous residents who meet the above criteria.

Influence of locational/environmental factors on the data is likely to be minimal. The surveys 1999 and 2001 were evaluated by ABS. Only the usual residents in the Indigenous community are recorded. Population increase variables may give some indication about the non-resident population.

The resident population consists of both Indigenous and Non-Indigenous people. Only the Indigenous community is considered in CHINS.
Community level CHINS data is from the National Housing and Infrastructure Centre, ATSIC. Higher level data is available from ABS.

The CHINS data does not have basic person characteristics.

Strengths
CHINS data is a useful source of information for indicating the total number of people at a community level.

Weaknesses
The community level population data is not as reliable as Census for equivalent areas. The data does not have age, sex and Indigenous status differentiation.

C4. Community Information Access System
Source
NT Department of Community Development, Sport and Cultural Affairs.

Data description
The Community Information Access System (CIAS) is an Oracle database developed by the NT Government aiming to enhance community information management and access. CIAS is designed to manage both population and financial information for funding Local Councils via the Local Governments. The information is a yearly snapshot of over 1000 remote communities in the NT. The main body of the information is on-line accessible through BushTelegraph in the NT Government Intranet. Time series population estimates are also kept in CIAS. There is a lack of official documentation on the population data provided by CIAS.

Assessment
CIAS covers all communities funded by local councils in the Territory.

The data are geocoded for major remote communities and can be aggregated to CDs or directly to Health Zones. The geographical information is provided by the Lands and Planning Division in the Department of Infrastructure, Planning and Environment.

The data are collected yearly.

Data are accessible at the Community level via CIAS.

The data covers population for all remote NT communities. The figures include both the Indigenous and non-Indigenous population, in both urban and rural regions.

The influence by locational factors on CIAS population data is unknown. The local councils have direct link with their communities. Their population estimates are based on any selected 16 data sources including the Census of Population and Housing, CHINS, Aboriginal Communities Database, ATSIC/Government agreed for needs assessment, CIAS survey, community profile, environmental health survey, grants commission 3 year average etc. The data quality is dependent on the reliability of the data sources selected.

The Department of Community Development, Sport and Cultural Affairs has indicated that very few non-residents have been included in the data.

All socio-demographic groups are included in the population counts, if they are in the communities.
The data can be obtained from a single data source.

CIAS data does not include age, sex, or Indigenous status. It includes the community name and the total population in each community.

**Strengths**
CIAS data has community level population estimates.

**Weaknesses**
Population is not defined in a standard manner. The data does not have sex, age and Indigenous status.

**C5. NT Grants Commission service population**

**Source**

**Data description**
In making its assessment, the NT Grants Commission has used data supplied by the councils in their annual returns. The NT Grants Commission collects data on the number of Indigenous people within a council area and the number of people over the age of 15. The data does not include demographic breakdowns such as age and sex, because it is irrelevant for the purposes of the collection. The population figures are used by the Indigenous Housing Authority of the NT, for the determination of housing need within a council area. The population figures are publicly available between May and July each year.

In assessing the needs of communities, the Commission takes into account local resident population and includes a factor for those in outstations dependent on the relative council for local government services. In addition, the Commission takes into account interstate and overseas tourist visitors to communities that impact on the provision of local government services. To iron out short-term fluctuations in the population, the Grants Commission uses a three-year average population for calculation of grant entitlement.

**Assessment**
Grants Commission service population data include 66 local governing bodies which cover the majority of the NT population.

The data are available at the local council level.
The data is collected yearly.

The NT Grant Commission publishes data in its annual report.

The data covers everyone in the local council area including tourists in the communities and outstations funded by the local councils. The local council area includes both urban and rural regions.

The annual returns are generally of poor standard. The Commission makes the best possible judgement on the basis of information it obtains from departmental officers. The influence by locational/environmental factors on the data is moderate to large.

There are neither standard protocols nor trained data collectors in the whole process of data collection. A head count is done by the councils every year. Field staffs also seek to verify the figures. It is noted that some councils show a significant increase in
population. In a number of cases the Commission is unable to substantiate and consequently exercises its judgement (Northern Territory Grants Commission, 2001).

Both resident and non-resident populations are included in the Grant Commission’s service population estimates. Three-year average population figures are used to take into account the mobility of the Indigenous people.

The data can be obtained from a single data source - the NT Grant Commission.

No basic person characterises are given in the data set.

**Strengths**
The concept of service population is used.

**Weaknesses**
It does not collect information about age, sex and Indigenous status.

### C6. Client Master Index

**Source**
NT Department of Health and Community Services (DHCS)

**Data description**
Client Master Index (CMI) is based on a health registration system, whereby a client is registered when he/she accesses a DHCS service. The minimal dataset consists of a client identifier, given name, family name, date of birth, usual address (including locality code), Indigenous status, Medicare number, sex and marital status. Additional data items to be included in future developments are alias, date of death, temporary address, postal address, alternate identifiers, preferred language, country of birth and proficiency in English. Due to a restriction in the use of death information, people who die outside a Territory hospital may not be flagged as deceased in the CMI.

**Assessment:**
The CMI data includes both residents and non-residents accessing DHCS services. The CMI does not include residents and non-residents who only access services provided by a General Practitioner or a non-DHCS healthcare facility.

The data can easily be aggregated to CD and Health Zone using its locality codes. CMI data is accumulated from routine clinical practice from when the first occasion of service occurs. The data is updated regularly based on information provided by the client on each presentation of service.

Privacy protocol exist in DHCS for accessing the data set. The data can be accessed on request through Corporate Information Services.

The data covers both Indigenous and non-Indigenous clients from urban or rural areas who use DHCS services. Coverage of the NT population is unknown.

The DHCS Primary Care Information System which is linked with CMI, it is in the developmental stage and does not cover all rural remote communities. The CMI does not usually cover areas where people have no access to public hospitals and community health centre facilities in the NT. Both resident and non-resident populations are included in the data set. It is possible that non-residents are less likely to use DHCS services, because they are more likely to travel back home to get services for non-urgent health problem.
Indigenous people experience lower levels of access to primary health care services than non-Indigenous people, even though they are more likely to be hospitalised for the majority of diseases and conditions (AIHW, 2002). Indigenous people use more DHCS Community Health Centre services for primary care purposes, while non-Indigenous people use more GP services for their primary care. Women use considerably more Medicare services than men.

The data can be obtained from a single data source - DHCS.

The CMI dataset has basic person characteristics, such as age, sex, Indigenous status and usual residential address. It does not have service location without linkage with other DHCS activity data.

**Strengths**
CMI is potentially useful to link to other DHCS activity datasets for future derivation of service population.

**Weaknesses**
CMI data does not cover people who never use DHCS services. Death information is not currently recorded, unless the person dies in a NT public hospitals. Service area is not recorded in the CMI data, unless it is linked with a certain activity dataset.

**C7. Hospital morbidity**

**Source**
NT Department of Health and Community Services

**Data description**
Hospital morbidity data is a routine collection of hospital inpatient data for five DHCS public hospitals. The data is collected through the hospital information system. The demographic data consists of age, sex, Indigenous status, residential address (including locality code), service dates, client identifier and servicing hospital. It does not have information about primary health care and community health centre usage. The referral source is not agency or location specific.

**Assessment**
The hospital morbidity data covers all clients who have used public hospitals in the Territory, regardless of residential address.

The geographical level of recorded residential address is Locality, which is basically the community in remote areas and the suburb name in urban areas. Locality is smaller than CD in rural and remote area and equivalent to SLA in urban areas. The Locality data is originally taken from the ABS locality codeset. The end operational users ie hospital staffs add on more locality names as required in clinical practice. The alias function allows multiple alternative community names including alternative spellings and misspelt names to concord with standard locality codes and to be grouped into major communities. Geographical information is included in the data, which is necessary for mapping communities correctly into Health Zones.

The data is accumulated on a daily basis. In general, data extraction occurs once every month. Non-identified individual records are accessible.

The data cover people who have been admitted to a public hospital. In the NT, between the public hospitals, a common hospital registration number exist for each individual. In other States/ Territories, the hospital registration number is not common for each individual customer.
Hospital admissions are influenced by epidemics of infectious diseases, which are often seasonal or local. There is less coverage in areas where alternative service providers exist.

It is possible that non-residents use hospitals less often than residents, because they are more likely to travel back to their home state for non-urgent health problems. On the other hand, international travellers may be more susceptible to local infectious diseases. People with low socio-economic status tend to have a low health status and are therefore more likely to use hospitals, than high socio-economic groups.

The data can be obtained from a single data source - DHCS.

The data has information about sex, age, Indigenous status, residential area and servicing hospitals.

**Strengths**
The data is complete and of good quality. It is readily accessible. It is a nation-wide data collection.

**Weaknesses**
The data mainly contains information about tertiary health care and hospital in-patient services. It covers only a small proportion of the primary health care service population.

**C8. Immunisation Register**

**Source**
NT Department of Health and Community Services

**Data description**
The Department manages this centralised dataset to gather information on the immunisation program for children under 7 years of age. Data is collected and updated constantly with regards to immunisation history of a child from all of the immunisation providers including GPs, Community Health Centres and clinics in NT and transmitted to the Australian Childhood Immunisation Register (ACIR). The data items include provider details (type, state, provider number-GP and ancillary and sex), practice address, and child’s details (name, date of birth, immunisation and/or Medicare address, immunisation history, immunisation due date).

ACIR is administered by the Health Insurance Commission (HIC) and commenced operating on 1 January 1996. All children from birth to six years, registered with Medicare, are enrolled on the Register. Information about immunisation encounters is forwarded to the HIC by recognised providers for inclusion in the Register. Previous comparison with the perinatal data collection indicated that the immunisation register tended to over-estimate the population aged 0-6. The definitions of population in the two data sets are inconsistent. Immunisation Register deals with service population while the perinatal data collection deals with births, including stillbirth.

**Assessment**
The immunisation register covers the whole Territory at the community level.

The data are available at the community level and can be aggregated to the CD or Health Zone level. Address details are not always updated unless the Immunisation Register is notified of a change. The data is based on an immunisation schedule where children are seen regularly until they are 18 months of age and then not seen again in
the majority of cases for 2.5 – 3.5 years. This makes the data regarding location quite inaccurate for the 2 and 3 year olds, especially the urban-based children.

The data is updated constantly, regarding vaccinations of children. Data between 1996 and 2002 are complete and of good quality. Earlier data, before 1996, are mostly incomplete.

The data are accessible subject to privacy consideration. Consultation with the NT database staff regarding what data is required and what can be supplied should be done prior to official requests being made for this data.

The data covers the whole NT for children under the age of seven years who have had immunisation. It includes both urban and rural regions for Indigenous and non-Indigenous children. This database contains all children regardless whether they have been immunised or not, as the data is generated from the hospital birth lists and through ACIR lists (based on Medicare Numbers). The only time the database would miss a child is if the child is not born at an NT Hospital and never had an immunisation and did not have a Medicare number.

The data collection is certainly influenced by the experience and expertise of the persons (Nurse, AHW, GP) who are responsible for vaccine administration and recording the information. Also the problem with some clinics being without staff or being significantly under-staffed at times can influence the timeliness of sending the data in to the database and the quality of that data. Rural clinics also have the issue of problems with equipment such as faxes taking a very long time to get repaired.

Both resident and non-resident populations are included in the immunisation dataset. International visitors, who are not registered with Medicare, are also included in the data set. All children remain on the database, at the last clinic they attended until the register is informed otherwise, which sometimes never happens, particularly if no more immunisations are due. This problem can make the population estimates higher than they should be.

There is no evidence that the Indigenous children are immunised less than the non-Indigenous children. The data does not cover children over six years. Non-Indigenous people have a higher conscientious objection rate to immunisation in general, but the Indigenous population is very mobile, often late for vaccination. There is a problem of identification for children with multiple names.

The data can be obtained from a single data source - NT DHCS Centre for Disease Control.

All basic person characteristics, except Indigenous status, are given. The data collection form does have residential address of the client but it does not have service location, except a service provider number. Potentially service location can be derived using service provider contact information.

**Strengths**

The data is a good indication for service population of children aged 0-6 for immunisation.

**Weaknesses**

Because the dataset is an accumulative collection of records in immunisation, the records are never deleted and the residential information is never updated until the person is serviced again.
C9. School enrolment and attendance

Source
Business Information Services, Department of Employment, Education and Training

Data description
The Department of Employment, Education and Training has an enrolment attendance registration system, whereby enrolment and attendance details of school children are recorded from all schools in NT. The schools include private and public schools, and both primary and high schools. The data are aggregated on number of enrolments and attendances by sex, age group, Indigenous status, school and residential community. The data have been collected by the Department from each school since 1986.

Assessment
School enrolment and attendance data covers all school children in the Northern Territory.

Community and locality of the school can be aggregated to CDs or Health Zones.

The data are collected every semester.

Accessible upon approval from the Department of Employment, Education and Training or administrative organisations of non-government schools, including Association of Independent Schools of the Northern Territory and Catholic Education Office. The data are not available at the individual student level but are available at the school level. ABS publishes data for August in Schools, Australia (ABS, 2002).

The data covers all school students who have attended schools in the NT. School attendance rates for the Indigenous population are much lower than non-Indigenous population. It includes both the urban and rural regions.

School attendance rates in remote communities are much lower than urban communities.

School enrolment and attendance mainly involve the resident population.

All school-age children are required to attend school. However, Indigenous children tend to have a higher degree of non-attendance.

The data can be obtained from a single data source - the Department of Employment, Education and Training.

All basic person characteristics are given in the dataset.

Strengths
The data is a good source of information about the number of children of a younger age. Data quality gets poorer as children get older.

Weaknesses
The data only captures the population aged 5-20 years who attend school.
C10. Central Australia population list
Source
NT Department of Health and Community Services

Data description
The Department’s remote clinical staff started the data collection for the population list in Central Australia in 1998. It was originally designed for remote health screening purposes. It is based on community health centre records. The definition of residence is the person staying in the community long enough to warrant a recall. A new record is added every time the clinic opens a new file for a new client. The data is updated every 6 months to capture population mobility. The population minimal dataset consists of names, date of birth, sex, hospital registration number, Medicare number and community name.

Assessment
The population list covers all DHCS Community Health Centres for Alice Springs Rural and Barkly Region. It does not include the urban population.

The data is a collection of individual records at a community level, which can be aggregated to CDs or Health Zones.

The dataset is updated every six months.

The data is accessible upon approval from DHCS Privacy Committee.

The population list contains information for both Indigenous and non-Indigenous people who have used a DHCS Community Health Centre in the remote areas of Alice Springs Rural and Barkly Regions.

Locational or environmental influence is believed to be minimal.

The population list consists of both resident and non-resident populations as long as the person stays in the community long enough to warrant a recall.

Women and children are believed to use Community Health Centres more often than men and adults respectively.

The data is stored in the population health unit, Central Australia Service Network of the Department.

Basic person characteristics such as age, sex, Indigenous status and community are recorded. Service area and residential area are not clearly distinguished.

Strengths
In specified areas, the data could be used for service population in Central Australia, subject to deaths being taken into account.

Weaknesses
The coverage of the data is limited to specified areas in Central Australia. Service address and residential address are not clearly distinguished.
C11. Coordinated Care Trial

Source
NT Department of Health and Community Services

Data description
The Coordinated Care Trial (CCT) is a national program established in 1996 to test new ways of care delivery for people with complex health needs. In the NT, CCT is a special case because it involves pooling funds from Medicare resources significantly higher than current level. The NT CCT, involving seven remote Indigenous communities, started in the 1997/98 financial year. The CCT information system has been established to routinely capture data from clients in the CCT program, concerning their demographic and clinical information.

The PHCAP was announced in the 1999/2000 Budget, with funding of four years to be implemented in areas where joint regional planning had been completed and at the four former Indigenous CCT sites.

Assessment
The CCT data covers seven communities in the Top End, which make up two Health Zones.

The data is available at the community level and can be aggregated to CDs and Health Zones.

The CCT data are accumulated from clinical practices during the trial. The data is updated regularly based on the information provided by the clients and health providers on each presentation. The data covers from 1997/98 to the present.

Approval from DHCS Privacy Committee is required for accessing the dataset.

The data covers mainly the Indigenous clients from seven rural communities.

Influence of locational or environmental factors is minimal.

The data collects information on primary care for both the resident and non-resident populations.

The datasets gather information on consumer patterns of primary care between different Indigenous and socio-demographic groups. Every occasion of primary care service is included in the data.

Data can be obtained from a single source (DHCS).

The data has basic person characteristics, such as age, sex, Indigenous status and usual residential address.

Strengths
The data is suitable for deriving service population for two Health Zones.

Weaknesses
The coverage of CCT data is a problem-only a small number of communities are currently involved.
C12. Northern Territory Travel Monitor

Source

Data description
Apart from the International Visitor Survey conducted by Bureau of Tourism Research, Australia, the Northern Territory Tourist Commission, manages Northern Territory Travel Monitor (NTTM) for its own regional statistics. The NTTM contains two discrete surveys, the Commercial Accommodation Survey (CAS) and the Household Survey (HHS). The CAS includes all visitors who spent at least one night of their Territory trip in commercial accommodation, while the HHS considers those visitors who stay exclusively in free accommodation. Strategic Research Unit publishes selected statistics annually. Results in the published statistics combine visitation from the CAS and HHS to give an overall picture of tourism in the Territory.

Assessment
The data covers the whole Territory. Nationally, the Bureau of Tourism Research collects similar information in the International Visitor Survey.

The data is available at the level of Northern Territory Tourist Regions. Statistics from the NTTM are divided into four main regions: Top End, Katherine, Tennant Creek and Centre. These regions are based on a combination of SLA boundaries, produced by the Australian Bureau of Statistics. Each of the four tourism regions is comprised of a number of sub-regions. However, these are too small to report on separately, with the exceptions of Darwin and Alice Springs where total visitor numbers are available.

Selected statistics are available based on financial year (2000/01). Quarterly data is available for the Tourist Regions (ABS, 2002h).

Fact sheets are available on-line (http://www.nttc.com.au/StrategicResearch/fact.asp). More detailed analysis, by sub-regions, is unavailable unless specific analysis is requested.

The data cover international and interstate visitors in both urban and rural areas.

The data reflect seasonal and locational changes in tourism.

International and interstate visitors basically constitute a part of the non-resident populations. Hence, the data is collected for the non-resident population only.

Travellers who did not stay in an accommodation are not included.

The data can be obtained from the NTTC.

The basic person characteristics of the tourists are not readily available, except by usual residence.

Strengths
The data can be used to estimate non-resident population by region. The data may be useful for modelling seasonal change of international and interstate tourists for the non-resident population.

Weaknesses
The data do not have person characteristics such as age and sex. Due to the purpose of the tourist data collection, this data covers a proportion of non-residents only.
C13. Service Activity Reporting

Source
Commonwealth Department of Health and Ageing (DHA)

Data description
Service Activity Reporting (SAR) is an annual collection of service data from Commonwealth funded Aboriginal primary health care services. SAR is a joint activity between DHA and National Aboriginal Community Controlled Health Organisation. The questionnaire used in this data collection covers the resident population for a service area, information source for the population estimate, client contact episodes, substance use service, health related activities, emotional and social well being, service workforce, management and resource issues. The number of episodes can be further divided by sex and Indigenous status (National Aboriginal Community Controlled Health Organisation and Department of Health and Aged Care, 2001).

DHA published an annual report of key results on SAR data in 1998-99. The term “service population” has been used as the total Aboriginal and Torres Strait Islander resident population of the health service area. It was also acknowledged that there was double counting due to overlap in each service area’s population.

Some increase in population between the two reporting periods could be explained by the inclusion of new services. Population and activity data were often estimated to be reasonable by key staff. There was no audit to check the accuracy of these figures.

Assessment
SAR data is only available for Commonwealth funded Indigenous primary health care services. There were seventeen such clinics in 1998-99 in the NT. Geographical locations of the surveyed clinics are available. Service areas of the surveyed clinics are not clearly defined.

The data is collected annually covering the whole 12 months.

Individual personal records are not collected for SAR. Activity and population data is available on request. The data is limited to some Indigenous community health clinics in remote rural areas.

The key activity measure is ‘episodes’ by sex and Indigenous status, which is an estimate thought to be true by people in charge of the clinic. Activity data can easily be affected by locational factors such as staffing level, the introduction of new programs, seasonal closure or relocation of the clinic.

Non-residents are excluded from the population figures. A percentage is estimated for people who normally live outside the health service area.

The surveyed clinics mainly service Indigenous people. Females use clinics more often than males. Young children and the elderly use clinics more often than adolescents and young adults. Both examples demonstrate frequency of access to primary health care services, but do not fully reflect the service population size between different socio-demographic groups. The data can be obtained from a single source-DHA.

The population estimates do not have any basic personal characteristics apart from service location.
Strengths
The percentage of episodes, for people who normally live outside the health service area, may be indicative of the non-resident population.

Weaknesses
Service area is not clearly defined and nor is service population. The data is limited to a few remote communities.

C14. Medicare

Source
Health Insurance Commission (HIC)

Data description
Medicare is Australia's universal health insurance scheme. The Medicare data contains personal level information on item number, Medicare benefit, date of service and processing, provider number of requesting/referring provider, recipient of the service, and an indication of whether or not the item was provided in hospital. Patient information covers Medicare card number, name and address of cardholder, date of birth and sex. Medical practitioner information includes provider's name and location, sex, prescriber and provider number, speciality by qualification, and by speciality, based on type of claims.

The Medicare data population base theoretically exceeds Australian citizens and permanent residents, also covering persons who have applied for permanent residence in Australia and New Zealand citizens. The Commonwealth Government has signed Reciprocal Health Care Agreements with some countries. Under these arrangements, residents of these countries are entitled to restricted Medicare access while in Australia. Conversely, Medicare data do not cover temporary residents, who are not eligible for Medicare benefits.

The Medicare's population base exceeds its service population base with regard to registrations relating to international visitors and former Australian usual residents who have died or are now permanently resident overseas, but have not as yet been deleted from the register. Medicare records only include services that qualify for Medicare benefits and for which claims have been processed. They do not include services which qualify for benefits under the Department of Veterans' Affairs National Treatment Account. In addition, the HIC does not hold information about services which have been provided by a doctor in a hospital to public patients or services provided in outpatient or emergency departments of hospitals. Services eligible for Medicare benefits are listed in the Medicare Benefits Schedule Book.

Assessment
The data covers the whole Australia including rural and remote areas.

Postcode is available. In the rural and remote, the post codes covers areas larger than a CD and a Health Zone in many cases. Address data in the Medicare file is based on postcodes, which can be converted to SLAs using a concordance.

The Health Insurance Commission is likely to be notified of changes of addresses through card-holder contact with a Medicare branch through patient claims, a person seeking a replacement for a lost or stolen card; and a person seeking to replace an expired card. Actual address is potentially useful for deriving CD level and Health Zone level service population.

The data is accumulated every working day. It is possible to capture information about population seasonal mobility between Health Zones, by using Medicare data.
All requests for the release of information are subject to the secrecy provisions under section 130 (1) of the Health Insurance Act 1973 and the Privacy Act 1988. Consent of the person to whom the information relates is required if identified data is requested. Non-identified aggregated data may in general be provided without consent. It is difficult and costly to access HIC Medicare data directly, even for non-identified data. It may be possible to access the non-identified Medicare data held by ABS.

Medicare data covers both urban and remote areas, although Medicare uptake in rural remote areas is much lower than that of urban areas. In theory, it covers both Indigenous and non-Indigenous population. In practice, Indigenous persons often use Indigenous medical services, many of which in 2002 did not link in with Medicare. In 1999-2000 the average person in Australia received 10.92 Medicare services. There was variation between States ranging from the Northern Territory having an average of 5.71 services to New South Wales having an average 11.75 services (Berger, 2001).

If there are no GP services and no other services doing Medicare bulk billing in an area, then the quality of Medicare data from this area will be poor. The Medicare claims from remote Indigenous communities is poor in the Northern Territory.

There is no evidence that non-residents use more or less primary care resources than the residents.

Indigenous people use less GP services than non-Indigenous people. Women and children use GP services more often than the other demographic groups.

The Medicare data is available from a single source.

The Medicare data has information about client’s age, sex, residential and mailing addresses and service provider’s identification. But Indigenous status is not included in the data collection.

Strengths
For some Health Zones, Medicare data could be used for analysis of population mobility and estimation of service population.

Weaknesses
Data accessibility is difficult. Medicare claims are much lower in the NT than the rest of Australia, which makes Medicare data less useful (in 2002) for service population estimation in the NT. The lowest level of geographic coding is by postcode, which is problematic in the NT.
C15. International Visitor Survey

Source

Data description
The data are from the BTR International Visitor Survey (IVS), conducted by the BTR. For the 9 months ending March 2002, interviews were conducted with 15,008 short term international visitors (that is, with duration of stay of less than 12 months) aged 15 years or older, at Australia’s major international airports: Sydney, Melbourne, Brisbane, Cairns, Perth, Adelaide and Darwin.

The total number of interviews conducted with residents of each country or region is distributed among airports by selecting monthly samples of departing flights and visitors on those flights to achieve acceptable sample sizes in various categories. Survey results are weighted to passenger card data on international visitor numbers over the period, which is output from the ABS and Commonwealth Department of Immigration and Multicultural and Indigenous Affairs (DIMIA), Overseas Arrivals and Departures collection. The whole year 2001 IVS data is not available.

The resulting publication *International Visitors in Australia* covers nine months ending on 31 March 2002. Some data for earlier periods are also included. Visitor arrivals and departures data at a state/territory level are also published monthly by the ABS (ABS, 2002f). Data collected in IVS include the person’s age, sex, reason for visit, travel arrangement, arrival and departure, duration of stay and region of stay, accommodation and expenditure.

Assessment:
The data is representative of all international visitors.

Region of stay item in the publication is limited to a state/territory level. Information on regional destinations can be provided in tabulated form on request. The IVS information can be drawn at a regional or even SLA level.

BTR quarterly publications contain quarterly and rolling annual data. Some general data is readily accessible via BTR reports, and specific data is available on request.

The data only cover international visitors
International visitors constitute a part of the non-resident population.
The data can be obtained from the BTR.

The basic person characteristics of the international visitors are given such as age, sex, country of residence and service area (region of stay).

Strengths
The data is specifically dealing with international visitors, which constitute a part of the non-resident population.

Weaknesses
The data has little information for deriving service populations for Health Zones.
C16. Survey of Tourist Accommodation

Source
Australian Bureau of Statistics

Data description
The ABS quarterly Survey of Tourist Accommodation (STA) produces small area data for Northern Territory. The STA is a mailout collection that completely enumerates all in-scope accommodation establishments. Survey results are published each quarter for Australia as a whole and yearly for the NT (ABS, 2002g; ABS, 2002h).

The publications contain the results of the STA. The STA includes hotels, motels, guest houses and serviced apartments with 15 or more rooms, caravan parks and visitor hostels, excluding charity type accommodations. It provides information about establishment, capacity, employment, guest night, room and bed occupancies.

Assessment
STA is a quarterly national survey which covers the whole Territory.

The NT is divided into nine Tourist Regions ie. Darwin, Kakadu, Arnhem, Katherine, Tablelands, Petermann, Alice Springs, MacDonnell and Daly. The Tourist Regions consist of distinct SLAs.

The scope and survey strategy of STA are consistent and comparable since March quarter 1998. The STA data is published by ABS quarterly.

The publications are accessible on the NT Government intranet through ABS@. Much of the data at the NT Tourist Region level is not published due to confidentiality restrictions.

The STA covers both urban and rural regions, poorly for Indigenous people. It covers both residents and non-residents in a non-distinctive mode.

The impact of locational or environmental factors is small.

The statistics predominantly reflect changes in non-resident population.

Mobility of Indigenous population will not be reflected due to Indigenous people being less likely to use commercial accommodation when they travel between communities.

The information can be obtained through ABS.

There are no personal information recorded in STA.

Strengths
The data may be useful for modelling seasonal changes of people travelling. ABS publication is available quarterly for small areas.

Weaknesses
The data collects information about tourist accommodation which is an indirect measure for the seasonal change of tourist population. There is no personal information about people travelling.
C17. Other datasets

Hospital emergency and outpatient data
The data have been routinely collected for hospital emergency department patients and outpatients since 1997, through the hospital information system (CareSys or JadeCare). The demographic data consists of age, sex, Indigenous status, residential address (locality), service dates, hospital registration number, and servicing hospital.

The hospital emergency and out-patient data covers every client who has had medical consultation or emergency service in public hospitals in the Territory regardless of their residential address.

The geographical level of recorded residential address is Locality which is basically the community name in remote areas and the suburb name in urban areas.

The data covers people who have been seen by a doctor in a public hospital. In the NT, the hospital registration number is unique for each individual between the hospitals within the Territory, while in other jurisdictions the hospital registration number is not unique for each individual between hospitals.

Hospital activity may be influenced by epidemic of infectious diseases, which could be seasonal or local. It is possible that non-residents may use hospitals less often than residents, because they are likely to travel back to their home state for health problems of a non-urgent nature. On other hand, international travellers may be more susceptible to local infectious diseases. People with low socio-economic status tend to have a low health status and therefore may use hospitals more often than those of a higher socio-economic group.

The information is potentially useful for estimating non-resident to resident ratio on the basis of the district (Darwin, Alice Springs, Katherine, East Arnhem and Tennant Creek). The data mainly contains information about tertiary health care and hospital inpatient services, not primary health care services. It covers only a small proportion of the service population.

Chronic Diseases Register
The Department has established a system of chronic disease registers, by district medical officers during their daily medical practices in discrete remote communities. The data are accumulatively collected. The dataset consists of a population list and records of chronic diseases with demographic information on age, sex, date of birth, Indigenous status and community.

The data covers the whole Territory, but only for the communities where the DHCS district medical officers provided medical consultation services. It does not cover communities where the medical consultations are provided by GPs, the Aboriginal Medical Services Alliance-Northern Territory and other non-DHCS medical practitioners. The remote communities which receive DHCS district medical officer’s services change over time and so does the data coverage. The data contains community name data that can be aggregated to CD or Health Zones.

The Chronic Disease Register covers both Indigenous and non-Indigenous clients who sought medical consultation with DHCS district medical officers. Local epidemic of infectious diseases may have impact on the activity data.

The datasets are managed separately at district level. Dataset from Katherine, East Arnhem and Alice Springs have a different format and coding system. Design of the database is unique for each district. The dataset has information about age, sex,
Indigenous status, residential community and service location for medical consultations in remote Indigenous communities.

The weakness is that data format varies between Chronic Disease Registers in different districts. Data coverage changes over time with variation to service provision.

Perinatal collection
With the agreement of State and Territory health authorities, the Royal Australian College of Obstetricians and Gynaecologists and the Australian College of Paediatrics, the National Committee on Health and Vital Statistics recommended a minimum data set for perinatal collections in July, 1979. The perinatal data collections include information about the characteristics and outcomes of mothers giving birth and their babies. Notification forms are completed for all live births and stillbirths of at least 20 weeks' gestation or 400g birthweight. The residential status of the child is the same as the residential status of the mother.

The Indigenous status also follows the Indigenous status of the mother.

Perinatal data covers all births in the Territory. The data does not give the actual population aged zero years.

Growth Assessment and Action program
The objectives of Growth Assessment and Action Program (GAA) program are to undertake timely and accurate assessment of the nutritional status of individual children, ensure an appropriate and timely response is made (especially when growth faltering occurs in individual children) and provide regular information on growth patterns.

The program was introduced in Central Australia in 1997 when information was collected on 375 children from remote areas. The program was extended to the Top End region in 1998 when information was collected on additional 556 children, bringing the total number of children assessed to 1316. The total number of children assessed in the first half of 2001 was 2351. The routine monitoring of an increased number of children reflects the commitment of DHCS personnel across a range of programs.

The program only covers a proportion of children residing in certain remote communities. Usefulness of the data for deriving service population figures for children is limited.
Selected Health Gains Planning publications

**Information**

Chondur R, Guthridge S, Lee H. Socio-economic indexes for areas (SEIFA) of administrative health districts and urban centres/localities in the Northern Territory. Department of Health and Community Services, Darwin, 2005


**Health Economics**


**Epidemiology**


