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Abstract

This paper examines the role of the Australian Census in the context of the wider statistical programs of the Australian Bureau of Statistics (ABS). The paper outlines the pivotal role of Census data in the calculation of population estimates and projections, some of the challenges associated with the estimation of demographic statistics based on Census data, and the importance of the Census as the cornerstone of Australia's Social Statistics Program.

The paper also covers the promotion and wider use of Census data. This includes coverage of the main uses of Census data, population growth and mobility in Australia, new products designed to assist more advanced uses of Census data, changes to ABS statistical geography, and initiation of the Census Data Enhancement Program, a feature of which is the establishment of a Statistical Longitudinal Census Dataset based on a 5% random sample of the Census.

Finally, new methodologies and improvements in data collection, and directions for the 2011 Census and beyond are explored.

1. Introduction

1 The Australian Census of Population and Housing is the largest data collection undertaken by the ABS. It is conducted every 5 years (due to relatively high rates of population growth and population mobility) and is the main source of data at the small area level and for small population groups. Census data are the basis for demographic estimates and projections, provide an essential framework for the design and planning of household surveys, and form the cornerstone of the ABS social statistics program.

2 The Australian Census is conducted on a drop-off pick-up basis using a single form type for each household, with approximately 50 questions about each person staying in the dwelling on Census Night, and a further 10 asking about the dwelling itself and absent members of the household. An eCensus option was introduced in 2006, which provided the public with the opportunity to complete their Census Form on-line. The sixteenth Australian Census is planned for August 2011.

2. Uses of the Australian Census for Demographic statistics

Estimating the resident population

3 The Australian Census of Population and Housing plays a pivotal role in the calculation of population estimates and projections for Australia as a whole, and for each state and territory of Australia. These statistics are produced using factors such as age, sex, Indigenous status and country of birth to provide estimates for specific segments of the Australian population.

4 The Estimated Resident Population (ERP) is the official measure of the Australian population, and is based on the concept of usual residence. Amongst its many uses is determination of the number of representatives from each state and territory of Australia to sit in the House of Representatives. It is also used to help determine the annual allocation of Commonwealth funds for state, territory and local governments. 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. The Estimated Resident Population includes usual residents who are overseas for less than 12 months and excludes overseas visitors who are in Australia for less than 12 months.

5 The Estimated Resident Population is based on Census of Population and Housing usual residence counts. It is compiled as at 30 June of each Census year and updated quarterly between Censuses. These intercensal estimates of the resident population are revised when the results of the next Population Census become available.

6 In the compilation of the 30 June Estimated Resident Population for a Census year, three important adjustments are made to the Census count to factor in:

- Census net undercount, which is derived from the Post Enumeration Survey conducted soon after each Census, and from estimates based on demographic analysis,
- the number of Australian residents who were temporarily overseas on Census Night and were therefore not covered by the Census, which is obtained from statistics on overseas arrivals and departures, and
- timing differences between the Census date and the reference date for the Estimated Resident Population (30 June), using data from birth and death registrations, overseas arrivals and departures, and estimates of interstate migration for the period 1 July to the Census date.

Challenges for demographic statistics

7 There is a range of challenges associated with the estimation of demographic statistics based on Census data. These challenges have emerged into prominence during recent Censuses due to changes within Australia society, and include:

- increasing rates of people who have more than one residence;
- a heightened mobility of the population;
- growing numbers of migrants from non-English speaking backgrounds;
- difficulties associated with enumerating Indigenous populations; and
- a rising proportion of dwellings which were identified by Census Collectors as being occupied, but from which no completed Census Forms were returned.

8 An increasing number of people in Australia have multiple places of residence. They include children living with separated or divorced parents in separate dwellings, students at boarding schools or university accommodation, workers who stay at another residence for convenience to their workplace, members of the armed forces, Indigenous communities in some parts of northern Australia who live in different areas in wet and dry seasons, and the emerging phenomenon of 'grey nomads' who travel north during winter. 'Grey nomads' are retired or semi-retired people who travel around Australia on extended holidays, usually in mobile accommodation such as caravans or camper vans.

9 One particular issue which is topical for demographic statistics in Australia, and is related to people with multiple residences, is that of 'drive-in/drive-out' and 'fly-in/fly-out' workers. Flexible working practices such as extended shift rosters and greater provision of temporary housing have made 'drive-in/drive-out' and 'fly-in/fly-out' arrangements common for mining company employees and associated contractors in regional and remote mining areas and towns.

10 In the 2006 Census, a considerable number of people enumerated in mining towns reported that they usually lived elsewhere, such as in a capital city or regional coastal city. These people were classified as 'visitors' to the town on the basis of their Census Form response. Yet many may spend most of their time at either the mining town, a nearby mine, or a service centre/town. For this reason, estimates of the usually resident population of mining towns tend to understate the number of people these towns need to service during any given 24 hour period.

11 The need for workers and accommodation in some regional and remote mining towns has led to increased incomes, property values, rents and people, though not necessarily a commensurate increase in the number who consider the town to be where they live.

12 The heightened mobility of the Australian population and use of population numbers for the allocation of resources has created a growing demand for estimates of service populations within local government boundaries. In recognition of the rising interest in service population estimation, the ABS has recently published the information paper *Population Concepts, 2008* (cat. no. 3107.0.55.006) which discusses various population definitions, conceptual clarifications, and associated measurement issues. Future directions for ABS population estimation will be influenced by the need for service population estimates and their application in terms of shaping policy and programs, and determining allocation of resources.

13 The growing ethnic diversity of the Australian population is also presenting a challenge for the calculation of population estimates by country of birth. People migrating to Australia from other countries, and whose first language is not English, are more likely than others to be missed in the

Census. This is due to a combination of unfamiliarity with the Census taking process in Australia, lack of awareness of the Census, and difficulties with understanding the Census Form and responding to questions in the English language.

14 Census counts for Indigenous populations are likewise affected by any undercount of Aboriginal and Torres Strait Islander peoples in the Census. Results from the Post Enumeration Survey following the 2006 Census highlighted the relatively large net undercount of the Indigenous population in comparison with their non-Indigenous counterparts. Issues such as transience, which increase the likelihood of a person being missed in the Census, are particularly related to Australia's Indigenous populations.

15 The final challenge associated with the calculation of population estimates and projections is the rising rate of dwelling non-response in the Census. Dwelling non-response occurs when no Census Form is returned from a dwelling which has been identified by the Census Collector as being occupied on Census Night. Key demographics (sex, age, usual address and marital status) are imputed for each person in a non-responding dwelling (using information provided by the Census Collector about the number of males and females in the dwelling where available), and the remainder of questions on the Census Form are set to 'not stated' or 'not applicable', depending on the imputed age of the person.

16 The impact of dwelling non-response on the accurate calculation of demographic estimates is two-fold. Firstly, there is no reliable information about the proportion of the population in non-responding dwellings to feed into calculations of demographic estimates. While the sex of the person may be known to the Census Collector in some cases, other characteristics of the person such as age, Indigenous status and country of birth are unknown. Results from the Post Enumeration Surveys following each Census show that there are particular groups which are more likely to be missed in the Census than others, and it is estimates for these population groups which are most likely to be impacted upon by dwelling and person non-response in population estimates and projections, and particularly at the small area level.

17 Secondly, estimates from the Post Enumeration Survey conducted after the 2006 Census revealed that, despite the net undercount in the 2006 Census, there was an over-imputation of persons into private dwellings which were thought to be occupied on Census Night but from which no Census Forms were returned. The primary cause of this overcount was misclassification of these dwellings as 'occupied' rather than 'unoccupied'.

18 Feedback from Census Collectors after the 2006 Census highlighted the difficulties surrounding determination of whether a dwelling was 'occupied' or 'unoccupied' in the absence of contact with the householder. Changes within Australian society over recent years mean that community knowledge can no longer be relied upon to verify that a neighbouring dwelling is occupied. In addition, heightened awareness of household security has changed community behaviour in that many householders, if they are away from their house for holidays or other reasons, arrange for family members or acquaintances to remove any signs that would indicate that the house is unoccupied, and thus deter potential burglars.

19 All of these factors impact on the accurate calculation of demographic statistics for the Australian population and the small population groups and small geographic areas which make up the nation as a whole. They each present challenges which will continue to be addressed through improved strategies and procedures for future Censuses.

3. Role of the Australia Census as a framework for the Household Survey program

20 Census data are the cornerstone of the ABS' social statistics program. The social statistics program presents information relating to the social and economic wellbeing of the Australian population. Apart from the Census, social statistics are produced mainly through the ABS' household survey program and from administrative data. Information from the Census is essential for designing household surveys, and ensuring that survey data are correctly weighted up to the whole population.

21 The ABS framework for social statistics is built around two key dimensions. The first relates to a number of key areas of social concern: health, family and community, housing, education and training, work, economic resources, crime and justice, culture and leisure, and population.

22 The second dimension focuses on population groups, which are of particular interest to the community and to governments for reasons such as their special need or disadvantage. These groups include: older people, children, youth, families with children, long-term unemployed, lone parents, people with disabilities, carers, recipients of various government benefits, low income earners, Aboriginal and Torres Strait Islander peoples, migrants, and people whose language background is not English.

23 The ABS provides a wide range of data on the above topics through its ongoing social statistics program. These data are important as inputs to the development, monitoring and evaluation of policy in each of the relevant fields. The Census provides:

- the base population and dwelling data that are used to select samples for all household surveys,
- essential sample design information for household surveys focussing on small populations (e.g. Aboriginal and Torres Strait Islander peoples),
- critical population counts which support estimation methodologies for household surveys, and
- key information about the size and characteristics of populations in small areas and small population groups (which survey samples generally cannot support).

24 While the Census is the best process for the collection of population counts and for information about the size and characteristics of populations in small areas and small population groups, it is not suitable for in-depth analysis of a particular topic due to the number of questions that need to be asked of the populations of interest and the unsuitability of the Census self enumeration methodology for complex topics. Household surveys are used to provide in-depth focus on particular topics. They require complex question modules, and enumeration by highly trained interviewers.

25 There is a critical relationship between the Census and the household survey program in providing both the methodological basis and subject coverage for population and social information required to support analysis and planning across all levels of government and the community.

4. Promoting wider and more advanced use of statistics

Uses of Census data

26 The objective of the Census is to accurately measure the number and key characteristics of people in Australia on Census Night, and the dwellings in which they live. This provides a reliable basis for the estimation of the population of each of the states, territories and local government areas primarily for electoral purposes and the distribution of government funds. It also provides the characteristics of the population and its housing within small geographic areas and for small population

groups to support the planning, administration, policy development and evaluation activities of governments and other users.

27 Under Australia's Constitution the 'number of members (in the House of Representatives) chosen in the several States shall be in proportion to the respective numbers of their people'. Population estimates based on the Census are used to determine the number of seats allocated to each state in the House of Representatives. Population estimates are also used in the allocation of Goods and Services Tax revenue by the Commonwealth to the states and the territories. Population estimates based on the Census are key elements in the criteria used by the Commonwealth Grants Commission in recommending the appropriate distribution of these funds.

28 The Census also provides important information on the characteristics of the population. While this is valuable in its own right it is also possible to relate one characteristic with other characteristics so any relationships that exist between them can be identified. For example, relationships between the localities in which people born overseas were living at Census date, their employment status, the main occupations and industries they worked in, and their educational qualifications can be studied. As another example, those planning transport facilities can study the main traffic flows within a city and the methods people use to get to work, relating these data to average income levels and the availability of motor vehicles to households.

29 The range of uses of Census data at the small area level is enormous and diverse. Some specific examples of how Census data are used within the community include: determining the most appropriate locations for new schools, child-care centres or aged care accommodation; assessing the need for medical facilities such as general practitioners, dental surgeries or breast-screening clinics in particular areas; targeting the most useful locations for community service programs for groups such as migrants, unemployed persons, the elderly and, for the 2006 Census, people with disabilities; and even deciding the optimal geographic location for shopping centres and recreation facilities.

30 While information on some characteristics of the population is available from other sources, only a Census can provide information on a standard basis for the country as a whole and for small geographic areas and small population groups.

Population Growth and Mobility

31 Compared with other developed countries, Australia has relatively high rates of population growth and internal population mobility. High rates of population growth (6.6% between 2001 and 2006) are matched by relatively high rates of net overseas migration (just on 600,000 persons between 2001 and 2006). High internal mobility of the population is demonstrated by the fact that over forty percent of persons counted in the 2006 Australian Census had a place of usual residence which was different to their place of usual residence at the time of the 2001 Census.

32 These rates of growth and mobility have particular relevance for planning infrastructure and services, and Census results and related estimates and projections are used extensively by government, business and the community in determining strategies and responses.

Promoting widespread use of Census data

33 On 27 June, 2007, first release data from the 2006 Census of Population and Housing became available to all Australians via the ABS website free of charge. This release was an important event in the history of the ABS with more detailed data being made freely available in a shorter timeframe than

ever before. The release generated significant media coverage around the nation and saw the ABS featured prominently on the front page of every major newspaper in the country. Few other events on the ABS calendar can attest to this level of coverage.

34 The high visibility of Census output is evidenced by the overwhelming hit rates experienced on the ABS website on the day of the first release. The ABS website recorded 1,693,476 hits in the three hours following the launch, at the rate of 9,408 per minute, far exceeding all expectations.

35 The availability of a wide range of publications, data and technical documentation free of charge from the ABS website is an important tool used in promotion of the use of statistics from the Census and ABS surveys.

Promoting more advanced uses of Census data

36 More advanced uses of Census data are being promoted and facilitated through the development of resources which are taking ABS data dissemination to a new level. These resources include tools such as TableBuilder and the 5% Expanded Census Sample File. TableBuilder is a new product aimed at experienced users of Census data. This tool will provide users with remote access to the Census output record file via the ABS Website. TableBuilder will enable users to extract and manipulate an unlimited number of Census tables. TableBuilder is expected to become available in 2009.

37 Another first for the 2006 Census is the planned release of a 5% Expanded Census Sample File, which is additional to the 1% Census Sample File which has traditionally been offered. The 2006 Census Expanded Census Sample File is a comprehensive 5% sample unit record file containing Census characteristics for person, family, household and dwelling variables. It will be offered through the Remote Access Data Laboratory (RADL) which will ensure a heightened level of confidentiality for individual Census records.

Promoting Census data through stories

38 Later this year the ABS will release the ABS flagship publication *Picture of the Nation: the Statistician's Report of the 2006 Census*. This publication is returning after a long absence (it was last published for the 1961 Census). The publication fills a very important gap in the output program by providing analysis and exploration of the many fascinating stories that Census data tells.

Mesh Blocks

39 To increase the flexibility of the geographic outputs from the Census, and provide users with the ability to specify areas of interest, the ABS has created a new level of geography called a mesh block. To maintain confidentiality mesh blocks will generally be greater than 30 dwellings and most will be less than 60 dwellings in size. The new Australian statistical geography will be built up from mesh blocks and composed of a hierarchy of geographical units. Collection Districts have traditionally been the base geographical output unit for data from the Australian Census. Under the new geography, the Collection District will be replaced by a geographical unit of similar size.

40 As an initial step toward the new geography, coding to mesh blocks as well as Collection Districts was trialled in the 2006 Census. Following the success of this trial, the ABS is now progressing in a staged way towards implementing the new Australian statistical geography for output purposes. The new geography, including the complete hierarchy of mesh blocks, will be fully implemented and output for the 2016 Census.

Census Data Enhancement

41 In the lead up to the 2006 Census, the ABS initiated the Census Data Enhancement Project. This project involved the establishment of a Statistical Longitudinal Census Dataset based on a 5% random sample of the Census. The dataset will be brought together from successive Censuses, starting in 2006, using probabilistic linking techniques and variables such as date of birth, sex, country of birth and geographic area. Through this project, it is envisaged that the Census can be made more useful to researchers. The first longitudinal view of the Statistical Longitudinal Census Dataset will be available after the 2011 Census has been processed.

5. New methodologies and improvements in data collection

42 Strategies and procedures used in conducting the Australian Census of Population and Housing are continually evolving. Procedures are developed and refined for each Census so that they can be optimally effective in a changing Australian society, providing consistency across the nation as well as the flexibility to tailor strategies where appropriate to suit particular geographic areas and population groups.

Strategies to address a rising rate of dwelling non-response

43 Results from the 2006 Census in terms of net undercount and non-response highlighted the increasing difficulty of conducting the national Census. Net undercount for the 2006 Census, as measured by the Post Enumeration Survey, was 2.7%. For the 2006 Census, 4.2% of the population identified as being in Australia on Census Night were imputed into non-responding dwellings. The vast majority of dwelling non-response is due to non-contact (that is, the Census Collector believed that the dwelling was occupied on Census Night but was unable to establish contact with the householder).

44 In response to rising rates of non-contact, the ABS has implemented a number of targeted strategies. These include a specific strategy for the enumeration of Secure Apartment Buildings, which are apartment buildings with security arrangements that restrict access. An increase in the number of households residing in Secure Apartment Buildings is a trend associated with increasing privacy concerns in the community and a heightened awareness of household security. Following the 2006 Census, feedback from Census Collectors emphasised a range of issues associated with the enumeration of households within Secure Apartment Buildings, such as problems with: contacting management bodies in order to gain entry to the building; verifying the occupancy status of individual flats, units or apartments; and establishing contact with householders once access was enabled. Householders residing within Secure Apartment Buildings are not accustomed to unexpected visitors and so may not answer the door when the Census Collector calls.

45 Increasing rates of non-contact by Census Collectors for the 2006 Census are also linked to issues with recruiting sufficient numbers of suitable field staff and a high turnover of field staff after recruitment. Developments for 2011 will focus on methods for engaging with local and state governments and associated organisations which may potentially assist with a range of issues including recruitment of field staff. A Northern Australia Enumeration Strategy is being developed to address the particular issues associated with this part of the country.

46 A more intensive post collection follow-up was conducted after the 2006 Census to assist in reducing the level of non-contact. However, while this proved beneficial in some identified areas, it

did not stem the overall increase in non-contacts when compared to 2001. This is a key issue for 2011 and the ABS will be adopting different approaches to address the issue, such as revising the procedures of Census Collectors in relation to non-contact dwellings and adopting measures to target areas of high non-contact with promotion of options such as eCensus or mail back.

47 In 2006 there was an increased focus on improving the enumeration of Indigenous communities in remote locations and other identified areas, especially in terms of how the information was collected. Tailored procedures, including the use of an interviewer-based Census Form, are implemented for these Indigenous communities to address factors which may impact on participation in the Census such as: cultural and language differences; unfamiliarity with form-filling among people living a traditional lifestyle; high levels of transience between communities and with towns and cities; and the geographical remoteness of traditional communities. The enumeration period is often extended for remote Indigenous communities to enable the implementation of targeted procedures such as liaising with local organisations, training of interviewers from within the communities and ensuring that all people in the community are counted in the Census. The large geographic distances which supervisors are required to cover when travelling between communities also needs to be factored into timing, as does the possibility of unexpected cultural events.

48 Remote Indigenous enumeration procedures generally appeared to work well. However, results from the Post Enumeration Survey following the 2006 Census highlighted the potential impact of the increased enumeration period for remote Indigenous communities. A key focus for the 2011 Census will be to reduce the timeframe of remote Indigenous enumeration. Results from the 2006 Census also highlighted urban areas such as the outskirts of towns and cities as having potentially significant enumeration issues for Indigenous populations. To address issues associated with the enumeration of Aboriginal and Torres Strait Islander peoples in non-remote areas, a tailored strategy for Indigenous populations in urban areas will be further developed for the 2011 Census.

49 Travellers have been identified as a particular population group that need to be catered for to ensure they can participate in the Census no matter where they may be. Results from Post Enumeration Surveys following recent Censuses have consistently emphasised the increased likelihood of people who are away from their usual address on Census Night being missed in the Census.

50 Recommendations from the evaluation of the 2006 Census are being incorporated into the planning for the 2011 Census.

eCensus

51 In response to the evolving needs and preferences of the Australian community, a major development introduced for the 2006 Census was the eCensus. The eCensus option provided the public with the opportunity to complete their Census Form on-line, and will continue to be a vital tool for the 2011 Census and beyond. The eCensus was very successful for the 2006 Census, being taken up by 9% of the population. Nearly one third of the total eCensus returns were received in the peak 4 hour period on Census night. The system performed well with no security, load or performance issues. The vast majority of feedback from eCensus users was positive. Feedback was also sought from people who did not use the eCensus, with reasons for this choice including lack of Internet access and ready availability of a paper Census Form.

52 The success of the eCensus in 2006 was recognised with the project winning the Australian Government Information Management Office's e-Award for Excellence in e-Government as well as receiving Laureate status in the 2007 Computerworld Honours Program.

Directions for 2011

53 The primary goal for 2011 is to improve coverage. Priority will be given to the implementation of strategies and procedures to achieve this goal. These will include:

- increased focus on forming partnerships with state and local government authorities, commissions and community organisations,
- tailored field procedures for northern Australia including the possible establishment of satellite offices,
- improved strategies for enumerating the Indigenous populations in both remote and urban areas,
- reducing the enumeration period for remote/discrete indigenous communities,
- use of enumeration teams in remote and difficult areas,
- improved field management structures and capacity,
- improved design of the work loads of Census Collector, taking into account the anticipated level of difficulty and effort required,
- identification of likely problematic areas before enumeration to ensure that they are given careful consideration in the planning stage,
- increased paid advertising including post Census Night, and
- improved remuneration for field staff.

54 A key focus will be improvement of identification of all residential dwellings and refinement of processes for differentiating between occupied and unoccupied dwellings.

6. Looking forward – toward the 2016 Census

55 In order to remain relevant and effective in a changing Australian society, the Census is continually evolving in terms of procedures, methodologies and data outputs. Improvements are implemented for each Census based on recommendations from the previous Census, consultation with users, and outcomes from a comprehensive testing program.

56 The introduction of the eCensus for 2006 was an important landmark for the Census in Australia. It is expected that the functionality and uptake of the eCensus will increase for future Censuses, and that the online form will prove to be a vital and accessible means of Census participation in a technologically advancing society. This may require development of a new approach to Census field operations which are currently based on a drop-off/pick-up collection management approach.

57 While the ABS will be implementing minimal change for the 2011 Census, the decision to move in a staged way towards implementing the new Australian statistical geography, with a view to full implementation of mesh blocks in 2016, is an important milestone. As well as providing users with increased flexibility in specifying geographic areas of interest, the introduction of mesh blocks will facilitate a more stable and underlying geography for the Census.

58 The further development and mainstream adoption of tools such as Geographic Information Systems will offer new opportunities in the way Census data are accessed in the community. Census data are optimally suited to visual representation through geographic mapping and display. Widespread adoption of tools such as these by users will enable a diverse range of rich geographical data to be

accessed and displayed in a way which is meaningful and visually interesting. The full implementation of mesh blocks for the 2016 Census will provide users with greater flexibility in tailoring their data requirements to specific geographic areas of interest for mapping and display.

59 An advancement initiated for the 2006 Census was the Statistical Longitudinal Census Dataset which will, for the first time in the Australian Census, enable investigation of a sample of individual records over time between successive Censuses. Other innovations introduced for 2006 Census data, such as TableBuilder and the 5% Expanded Census Sample File, are important achievements in terms of promoting and facilitating more advanced uses of Census data.

60 A key future challenge for the ABS will be continual evolution of flexible and accessible on-line tools which will enable users to fully engage with Census statistics and survey data, and extract the information which is most relevant to their needs through an efficient and uncomplicated process.

61 Efforts to reduce underenumeration, particularly in northern Australia and in Indigenous communities, will continue to be a key focus.

7. Further information

62 The following references are available on the ABS Website at abs.gov.au:

- 1 ABS catalogue number 2903.0 - How Australia Takes a Census, 2006
- 2 ABS catalogue number 2915.0 - Discover Your Census, 2007 to 2012
- 3 ABS catalogue number 2062.0 - Census Data Enhancement Project: An Update, June 2006
- 4 ABS catalogue number 3101.0 - Australian Demographic Statistics, September 2006
Feature Article: Rebasing Australia's Population Estimates Using the 2006 Census of Population and Housing
- 5 ABS catalogue number 3107.0.55.006 - Information Paper: Population Concepts, 2008

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