

Impacts of service and infrastructure provision on Indigenous temporary mobility in the Northern Territory: Insights from the 2011 Census

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KEY FINDINGS

- This study examined the short-term mobility of 15,262 Indigenous people from remote towns in the Northern Territory using Census data. We applied modelling to assess and predict the impacts of the presence or absence of services and certain infrastructure at towns on mobility.
- 6.1% of Indigenous people were absent from home on Census night 2011, compared to 5.8% in 2006 with Hermannsburg having the largest proportion absent (12.5%) and Umbakumba the lowest (1%).
- Compared with 2006, Ngukurr had the greatest increase in people absent (88%), whilst Yirrkala and Gapuwiyak experienced declines (61% and 56% respectively).
- Of those who were absent, 56% of were women. Young people were particularly mobile while young children and older people were the least mobile.
- Absences from home were positively affected by people working in CDEP and health jobs, as well as households having access to the Internet.
- The provision of new or refurbished homes resulted in people being less likely to be absent on Census night.

RESEARCH AIM

This brief aims to determine whether some of the factors cited as drivers of global mobility can also help explain the temporary mobility of Indigenous people in and around remote communities.

We investigate the effects of some characteristics of Indigenous people and communities on Indigenous mobility. We were particularly interested in determining whether factors related to infrastructure and service provision affect the propensity for people to be away or at home on Census night.

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1. BACKGROUND

Indigenous people comprise a significant proportion of the population living in remote parts of Australia, particularly in the north. A growing body of literature has documented high mobility of residents between remote Indigenous settlements, service towns and cities. The extent and nature of this mobility is thought to be driven, at least partly, by the types of services and infrastructure available at communities. Information on which types of service or infrastructure are most influential in driving mobility, and the type of people who move, is essential for creating policy for remote communities and making investment decisions. We use 2006 and 2011 census data to examine this issue for the Northern Territory, the Australian jurisdiction with the highest Indigenous composition in its remote population, by constructing generalised linear mixed models and comparing Indigenous people's actual locations on census night with their stated usual place of residence.

2. MATERIALS AND METHODS

This research focuses on 15 discrete Indigenous communities (Figure 1): Angurugu (Groote Eylandt), Galiwin'ku (Elcho Island), Gapuwiyak, Gunbalanya, Hermannsburg, Lajamanu, Maningrida, Milingimbi (Crocodile Islands), Nguiu (Tiwi Islands), Ngukurr, Numbulwar, Umbakumba (Groote Eylandt), Wadeye, Yirrkala and Yuendumu. These communities were selected because they were designated as priority communities for accelerated investment into social and economic infrastructure (Department of Community Services, 2013; Department of Social Services, 2013a) under the National Partnership Agreement on Remote Service Delivery scheme (Department of Social Services, 2013b).

The communities range in population size from around 500 (the community of Umbakumba) to nearly 2,500 (Maningrida). Typically approximately 80% of the population are Indigenous. Economic activity in these communities is largely focused on the provision of government, education, and health services, with nearly three quarters of the workforce in the focus communities employed in these sectors. There are, however, also private sector activities in some communities. For example, about 7% of Angurugu residents were employed in the mining sector in 2006 while in Numbulwar and Yuendumu about 4% worked in the hospitality sector, and small (up to 5% of workforce) retail and arts sectors in most of the 15 communities.

Figure 1: Map of the NT showing major Indigenous service communities for which Census data was obtained for analysis.



Source: Northern Territory Government,

2.1. Data

We obtained 2011 Census data for Indigenous residents of the 15 communities using ABS Census Table Builder and then transformed the aggregated data into individual data (micro data). We then used a generalized linear mixed effects model (GLMM), which is a flexible generalisation of ordinary

linear regression. GLMM models have largely been used in ecology (Bolker et al., 2009), but their application in demographics is sparse. Although a lot of computing time is required, these models are more flexible than logit/probit models and can handle large Census data sets with hierarchical structure and spatial autocorrelation.

2.2. Data analysis

The total number of individuals who were included in the model was 15,262. From the 2006 and 2011 Census data, apart from the location at Census night, the age class and gender was obtained for each individual. We were particularly interested in the impact of service delivery and infrastructure on peoples' whereabouts on Census night. Data on services and infrastructure at the 15 communities were obtained from Local Implementation Plans (Department of Community Services, 2013; Department of Social Services, 2013c) and Job Profiles (Department of Community Services, 2013) and entered into the model as explanatory variables. Data on new houses and refurbishments were obtained from the NT Government's Department of Housing, Local Government and Regional Services (Department of Housing, 2013).

Some basic characteristics were similar across all 15 communities: for example, they all had primary and secondary schools and all had approximately the same levels of health care infrastructure. As a proxy for quality of the services, we considered the number of jobs in a sector per 100 residents. The 'job' variables were relative to community size, as larger communities would usually have more absolute numbers of jobs in each sector. For example, for education, we included the number of jobs per 100 residents in a community in the education sector rather than simply the number of schools. The more jobs, the 'better' the job prospects in the community and the better the prospects to cope with demand for the service might be. Data on the number of cars and internet connections were obtained from the Census. In total we included six variables describing the quality of service provision and four variables describing the infrastructure in each community (Table 1).

Yuendumu and Hermannsburg had the most jobs in the health sector at around 6 jobs per 100 residents; Umbakumba had only 0.3 health jobs per 100 residents (Table 1). Wadeye had the most jobs filled in the education sector with almost 9 per 100 residents, while Umbakumba had less than 1 education job per 100 residents. Yirrkala had the most public administration jobs per 100 residents (more than 17) while Umbakumba had only 1.5 per 100 residents. Numbulwar had almost 8 persons per 100 residents employed in the trade/retail sector while Angurugu had only 0.2 trade jobs filled per 100 residents.

The average ratio of houses with internet access versus houses without was 0.8 (ABS, 2012c), meaning that on average 45% of houses were connected in the 15 communities. For comparison, Australia-wide, 79% of households were connected to the internet with an even higher percentage (95%) among high income households (ABS, 2011). Hermannsburg was the best connected community with 72% of houses with internet connection. Gunbalanya and Milingimbi had almost twice as many houses with than without internet connection. Umbakumba had the lowest connection rate with 13% having internet access.

Table 1: Town characteristics used in the model from selected NT Growth Towns

	Infrastructure				Service provision (in jobs per 100 resident)					
	New houses	Refurbishment	Internet	Poor roads (%)	CDEP	Trade	PA	Health	Education	Arts/recreation
Angurugu	18	10	0.34	0.9	0	0.2	5.7	1.4	6.6	0
Galiwinku	11	24	0.61	0.6	1.6	2.6	8.5	3.0	3.7	0.3
Gapuwiyak	0	0	0.35	0.53	0.6	4.2	4.9	0.8	3.2	0.2
Gunbalanya	23	45	2.25	0.48	3.1	1.9	5.5	1.6	2.8	1.5
Hermannsburg	0	0	2.55	0.41	0.5	5.1	14.7	5.9	6.9	1.6
Lajamanu	0	0	1.05	0.96	0.6	3.2	6.1	2.7	5.5	1.1
Maningrida	47	32	0.49	0.66	7.2	0.3	8.2	1.0	2.9	0.0
Milingimbi	0	0	1.85	0.62	1.7	3.6	3.5	0.8	3.4	0.0
Nguiu	51	91	0.26	0.67	7.4	5.3	9.6	3.2	7.9	1.7
Ngukurr	0	57	1.21	0.4	3.2	2.8	10.2	2.6	7.4	0.9
Numbulwar	0	0	0.54	0.7	2.2	7.7	12.0	1.9	7.7	0
Umbakumba	12	34	0.13	0.18	0.5	0.4	1.5	0.3	0.8	0
Wadeye	100	104	0.33	0.75	2.0	2.9	12.2	2.7	8.7	0
Yirrkala	0	0	1.23	0.52	0	1.7	17.7	1.4	7.8	3.2
Yuendumu	0	0	1.20	0.15	1.5	1.7	11.4	6.3	6.0	0.7

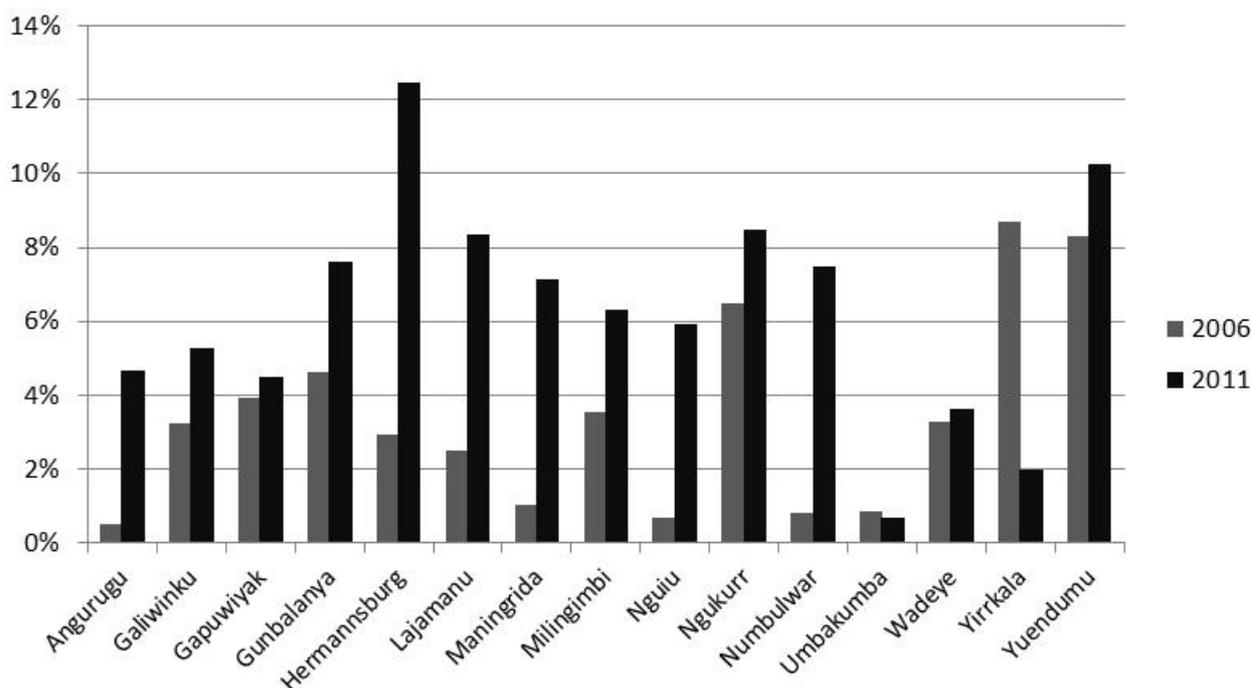
CDEP = Community Development Employment Projects; PA = public administration

3. RESULTS

3.1. Description of temporary migration on Census night 2011 and comparison to 2006

Overall 6.1% of Indigenous people (930 out of 15,262) in the 15 communities were absent from home on Census night 2011, compared to 5.8% (796 out of 13,650) in 2006. The largest proportion of people absent from home on Census night 2011 was in Hermannsburg (12.5%) and the lowest proportion in Umbakumba (1%; Figure 2). Compared to 2006 the greatest increase in people absent from home was found for Ngukurr (88%). Angurugu, Nguiu, Numbulwar and Wadeye also experienced high (around 50%) increases compared to 2006. Yirrkala (61%) and Gapuwiyak (56%) experienced large declines in the percentage of people absent from home on Census night. The percentage of people absent from home on Census night also decreased in Umbakumba, Milingimbi and Lajamanu while it remained stable in Galiwinku, Maningrida and Yuendumu.

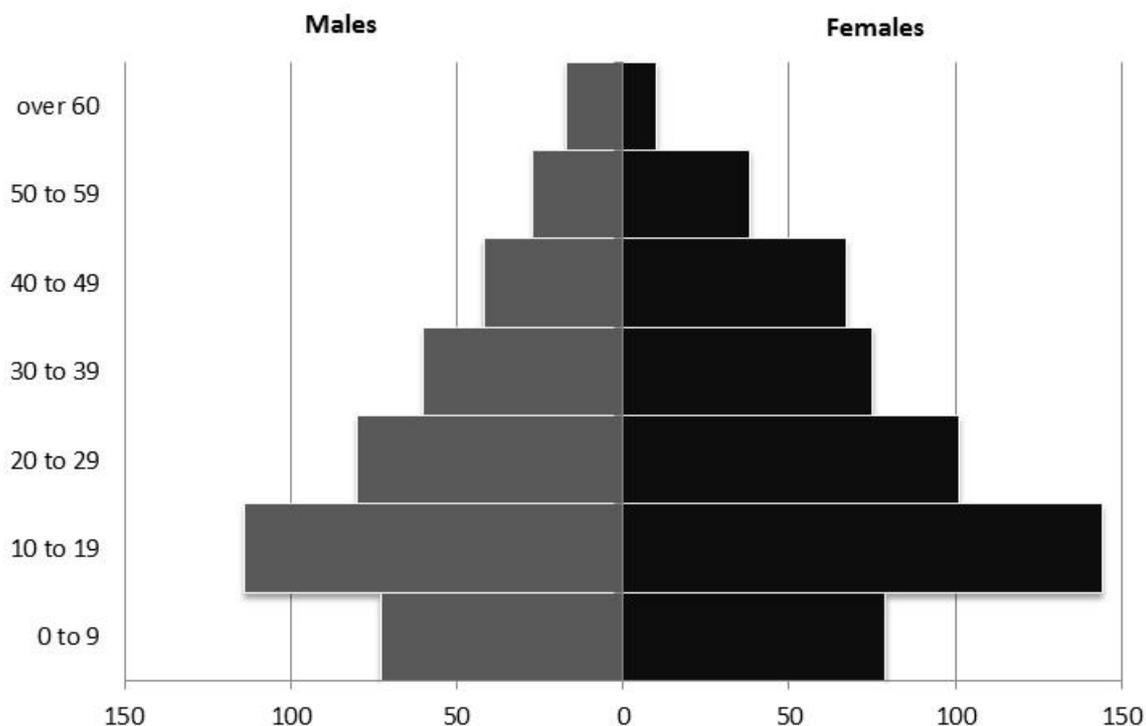
Figure 2: Proportions of Australian Indigenous people away from home on Census night 2006 and 2011 in 15 communities in the NT



Fifty-six percent of those away (517 out of 930) were women and the strongest temporary mobility was among young people (teenagers between 10 and 19; Figure 3). Apart from small children in their dependent ages, the older people were the less mobile on Census night. In six communities (Gapuwiyak, Lajamanu, Maningrida, Ngukurr, Numbulwar and Yirrkala), the proportion of men and women absent from home on Census night was about equal. In Nguiu it was only women who were absent and significantly more woman than men were absent from home on Census night in Gunbalanya, Milingimbi, Wadeye and Yuendumu. Hermannsburg had the largest proportion of men

absent on Census night, and Angurugu and Galiwin'ku also had significantly more men than women absent from home on Census night.

Figure 3: Age-sex structure of Indigenous people away from home on Census night 2011 in 15 communities in the NT



The model showed several factors were positively correlated to an absence from the home community on Census night: proportion in CDEP (Community Development Employment Projects) jobs, proportion in health jobs and proportion of households with internet access.

An increase in the odds of houses having internet access by a factor of one, increased the odds of being absent from home on Census night by 44%. For each additional CDEP job available, peoples' propensity to be absent increased by 0.1% and for each additional job in the health sector it increased by 0.2%. The variable 'new houses', on the other hand, had a negative impact on being away, i.e. the more new houses a community obtained under the Strategic Indigenous Housing and Infrastructure Program (SIHIP), the less likely people were to be away on Census night in that community. The odds ratio showed that for each new house built in a community, peoples' propensity to be absent from home on Census night decreased by 0.1%.

The control factors broadly gave the expected results. Being a woman increased the odds of being absent from home on Census night by 27%, holding all other factors constant. Children (0-9) were one third less likely to be absent from home on Census night as other people of all other age groups, while teenagers (10-19) were 33% more likely to be absent than people of all other age groups. Older people (above 60) were only less likely to be absent when they were female; older men were almost

three times more likely to be absent than older women. People of other age groups were not significantly more or less likely to be absent from home on Census night compared with the average.

The model results predicted an overall percentage of people absent from home on Census night at 6.28%, slightly higher than observed on the 2011 Census (Table 2). Almost 7% of women were predicted to be away on future Census nights but only 5.7% of men. The percentage increased to slightly more than 7% for women in their teens. The biggest increase in mobility was predicted for communities with a high percentage of houses connected to the internet. If internet access was to be increased to three out of four houses (75%) being connected, overall mobility doubled to 12.4%. While the mobility doubled on average, the changes were slightly less in some of the communities. If the odds of having internet increased by a factor of one in Maningrida (from a ratio of 0.49 to 1.49, Table1 – or from 33% to 60% of all houses), for example, and holding all other factors constant, mobility in this community was predicted to increase by 29%. In Wadeye, another community with few houses having internet connection, increasing the ratio of having internet by a factor of one would lead to an increase in mobility by 30%. In Hermannsburg, a community with already high internet connectivity, increasing the odds of having internet by a factor of one (from a ratio of 2.55 to 3.55 – or from 72% to 78%) and holding all other factors constant, mobility was predicted to increase by 29%.

Table 2: Predictive temporary mobility for particular town infrastructure

	All	Men	Women	Young women	Men over 60
Without changes	6.28	5.70	6.89	7.08	6.61
Town with 100 new houses	4.01	3.62	4.41	4.53	4.22
Town with 75% of houses connected to Internet	12.40	11.34	13.51	13.86	13.02

If a community was to receive 100 new houses, mobility in that community was predicted to decrease to about 4% on average (from 6.28% = 36% decrease). In some communities the decrease was even greater. In a community with no new houses received at the time of the study (for example, Hermannsburg) overall mobility in this community was predicted to decrease by 46%, holding all other factors constant. In Ngukurr and Yirrkala mobility was predicted to decrease by 47% with the reception of 100 new houses. In Wadeye, which had already received 100 new houses, increasing this number by another 100 would lead to a decrease in mobility by 48%.

4. DISCUSSION AND CONCLUSIONS

While the model results corroborate earlier research on rising mobility of young people and of women across Indigenous communities in developed countries (Hamilton and Seyfrit, 1994; Rasmussen, 2007), they also show interesting ambiguities: some service provision increased the propensity of an individual to be away on Census night while others decreased it. It was surprising to see that some factors did not appear to influence temporary mobility at all. All of these findings can be important for policy-makers wishing to design the efficient and effective allocation of government

services and investments into new infrastructure. They can also help private service providers to deal more effectively with temporary visitors.

The application of a generalized linear mixed effects model (GLMM) helps to understand factors influencing Indigenous Australians temporary mobility (defined here as the propensity to be away on Census night). While mobility has usually been described as a function of peoples' characteristics, we investigated if differences in community characteristics affect peoples' temporary mobility. We found that temporary mobility is more likely in communities with more health care, more Community Development Employment Program (CDEP) jobs and higher rates of internet access. There was less mobility, however, where new houses had been recently provided. Personal characteristics also explain temporary mobility with the propensity to be away on Census night being higher for women and people in their teens while babies and older women were least mobile on Census night.

Recent policies delivered by the national and State or Territory Governments of Australia aimed at improving the livelihoods of Indigenous Australian's living in remote areas have focused on improving services and infrastructure in situ (at remote communities). This policy paradigm is founded on the tenet that improving employment, housing, education and infrastructure at communities is important for developing local economies and 're-connecting' a mobile population with services and employment opportunities (Taylor et al., 2011a; Department of Social Services, 2014). In light of this study, government and private service providers in Indigenous communities may need to consider how to deliver timely and effective services to more temporary visitors to communities given that some service improvements lead to increased rates of temporary mobility.

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