UNPACKING EDUCATIONAL INEQUALITY IN THE NORTHERN TERRITORY

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Abstract

This paper discusses how publicly available community-level data and confidentialised unit-record information from existing longitudinal, administrative population datasets can be used to investigate the early life antecedents and contemporary factors associated with educational inequality in the Northern Territory. The recent development of the SA–NT DataLink facility has enabled integration of selected information from separate NT health, education and community datasets. This is being used to investigate policy-relevant questions not previously possible. Two examples of data-linkage analysis are presented to illustrate how such research can advance understanding of the individual, family and community factors associated with patterns of school attendance and National Assessment Program – Literacy and Numeracy (NAPLAN) achievement.

Getting a good education and doing well in school are widely acknowledged as essential preparations for future success in life. Sadly, for a substantial proportion of children in the Northern Territory, their experience of school seems unlikely to offer a path to a better future. According to the 2013 NAPLAN results, 47 per cent of NT Indigenous children had Year 3 reading scores at or below the national minimum standard. This compares with 18 per cent for all Australian Indigenous children (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2014). This suggests that almost half of NT Indigenous children are highly likely not to progress as they should through school. These children have a high risk of leaving school early with little or no functional literacy.

In seeking to understand why so many NT Indigenous children have this level of educational disadvantage, it is necessary to consider their sociocultural, geographic and economic contexts of child rearing and school education. It is also important to investigate how these contexts compare with those of Indigenous and non-Indigenous children elsewhere in Australia.

One of the headline targets of the 2008 Council of Australian Governments (COAG) Closing the Gap strategy is to halve the gap in the percentage of Indigenous and non-Indigenous children scoring at or above the national minimum standard (NMS) on the annual NAPLAN within 10 years (Steering Committee for the Review of Government Service Provision, 2011). However, after 5 years of NAPLAN testing, the national trend data suggest that the Year 3 Reading target is only likely to be reached in 2018 (Australian Medical Association, 2013). Furthermore, the NAPLAN trends for Indigenous children in the NT fall far short of their national counterparts and indicate that the Closing the Gap target may not be achieved for a further two decades (Australian Institute of Health and Welfare, 2012).

These continuing educational disparities will have very significant consequences for the health and wellbeing of the NT Indigenous population. Unless more effective preventive and remedial action is taken, the high proportion of Indigenous students leaving school early and/or functionally illiterate can be expected to involve substantial costs to communities, governments and society. This is why it is essential that policies, services and programs to improve Indigenous education are based on reliable evidence and a proper understanding of the complex interplay between individual, environmental and social forces shaping the lives of Indigenous children.

Most of the current policy discourse on improving outcomes in Indigenous education is focused on what is happening within schools, for example the quality of teaching in remote schools, the merits of different instructional approaches, the importance of setting high expectations, and the ways in which parent engagement and student motivation can be improved through school leadership. While all of these are clearly relevant, what is missing from the discourse is systematic consideration of schools' community contexts and the extent to which family and early-life health issues affect children's opportunity and capacity to benefit from the learning environment of school.

Using publicly available community-level data

We have recently been investigating how publicly available data on community-level socio-demographic factors can help explain the significant variation that exists between remote community schools in their levels of school attendance and achievement. The My School website (http://www.myschool.edu.au/) has proved to be a very useful source of such data – particularly when these data are combined with census data such as those available from the Australian Bureau of Statistics (ABS) Community Profiles (ABS, 2013; ACARA, 2014).

One example of how this has been used is an investigation we made of community factors associated with school attendance in the NT 'growth towns'. These are 20 of the larger remote NT communities selected for targeted government investments to improve remote service delivery. Using the My School website, we matched schools in these communities with their nearest 'like' schools in Western Australia and Queensland. This provided a study sample of 40 remote school-communities across northern Australia for which comparable data were available regarding school attendance rates, as well as school and community factors potentially relevant to attendance.

The socio-demographic community variables examined were:

- community size (number of usual residents)
- Indigenous residents (percentage)
- Australian Remoteness Index for Areas (ARIA+) (Trewin, 2006)
- community age structure (percentage of residents less than 15 years of age)

- education (percentage of residents with Year 10 education and percentage of residents with Year 12 education)
- English speakers (percentage of residents with English as their main language)
- income (median income of residents more than 15 years of age)
- bedroom occupancy (mean number of people per bedroom)
- school size (total student enrolment)
- Index of Community Socio-Educational Advantage (ICSEA) (ACARA, 2012)
- student to staff ratio
- qualified teacher to total school staff ratio.

Initial examination of the distribution of these variables revealed significant differences between communities and jurisdictions. For example, the scatter plot shown in Figure 1 illustrates the extent to which adult levels of education and the percentage of adults speaking English varies between communities.

Similarly, it was observed that the NT remote communities had much higher levels of housing overcrowding (i.e. average number of people per bedroom), lower average weekly income, fewer adults with Year 10 or more education, and far fewer English-speaking adults than their 'like' communities in Queensland and Western Australia.

Multi-variable linear regression was then used to investigate how these aspects of disadvantage operated together in predicting school attendance. Those variables with weakest associations were iteratively dropped from each of the regression models examined. The final model having the best fit in predicting school attendance revealed the socio-demographic factors with the strongest associations were: the percentage of adults in the community with Year 12 education (B = 0.426), the youthful age structure of the community (i.e. the percentage of residents age 15 and younger (B = –0.293), the level of geographic remoteness (i.e. ARIA+ score) (B = –0.28), the percentage of adults who speak English (B = –0.267), and housing overcrowding (i.e. mean number of people per bedroom) (B = –0.22). Of note is the fact that community information on these variables served much better than ICSEA in the prediction of school attendance rates. Also, the magnitude of the effect

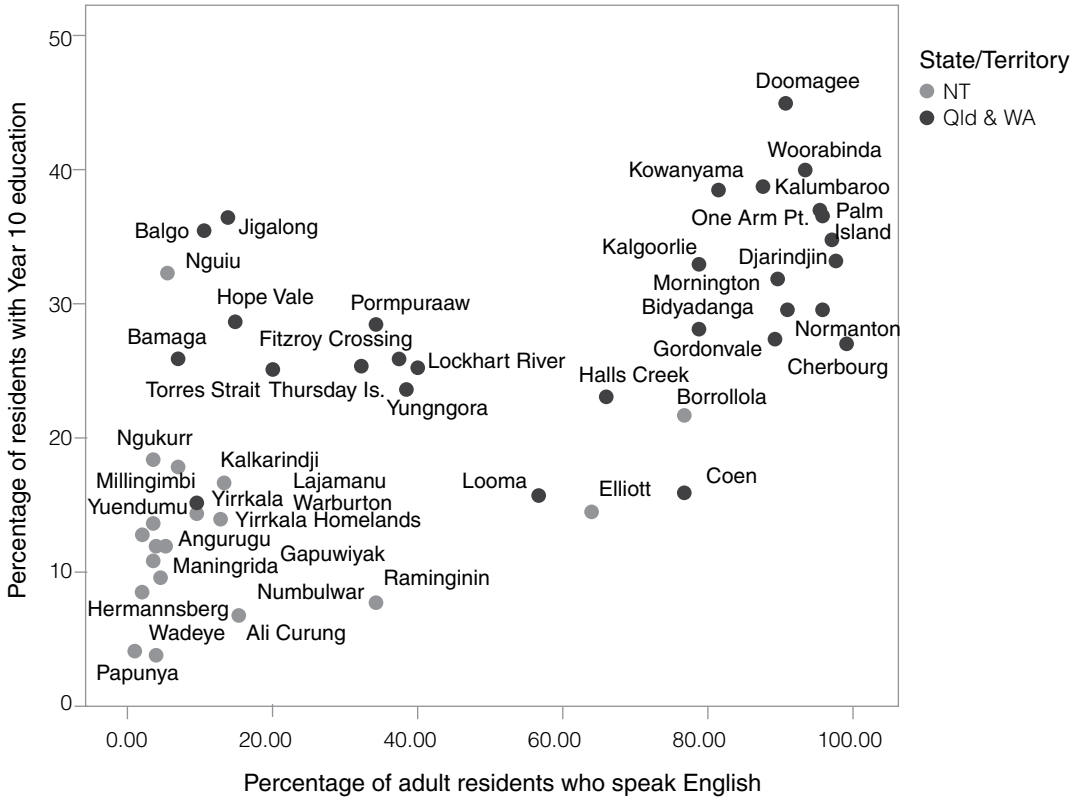

Figure 1 Comparison between NT and Qld & WA remote communities: percentage of adults with Year 10 education by percentage of adults who speak English

size of the association of these community factors with attendance highlights the importance of policy and planning taking these issues into account in their targeting of programs and allocation of resources to improve school attendance.

Confidentialised linkage of individual-level data

There are some research questions that can only be investigated by combining information from separate datasets. The recent establishment of the SA–NT DataLink facility has developed new capacity for data-linkage research in the NT. In a demonstration study of the feasibility and effectiveness of the linkage of NT administrative datasets, we assembled a research dataset of 17 584 perinatal records for all live-born children, born to NT resident mothers, between 1999 and 2004. From these perinatal health data, 7601 children (4603 Indigenous and 2998 non-Indigenous) were successfully linked to government school enrolment data and NAPLAN Year 3 results for the period 2008 to 2012.

Using this linked dataset, we examined the complete individual school attendance histories of 6448 of the study children for whom we had linked data from their birth, health and school records. The distribution of the cumulative percentage of the possible school days that each of these children had attended over their school career is shown below in Figure 2.

Here it can be seen that 66 per cent of Indigenous children had attended fewer than 80 per cent of the school days that they could have attended. In contrast, just 5 per cent of non-Indigenous children had attended school this infrequently. Given that in NT schools, 80 per cent attendance is generally accepted as the minimum for students to progress as they should through school, the large proportion of Indigenous students with much lower rates of attendance highlights the appropriateness of the recent policy focus on better enforcement of school attendance and improving support to school communities to enable this.

This study next used logistic regression modelling to investigate the relationship between a range of socio-demographic and early life health factors and NAPLAN Year 3 literacy outcomes. This required the NAPLAN scores being categorised as either 'below' or 'at and above' the NMS in reading to establish the binary outcome for the analysis. Covariates included in the analysis were selected on the basis of previous research on perinatal inequalities (Brinkman et al., 2012; Li, Guthridge, Tursan d'Espaigne & Paterson, 2007; Li, Jacklyn, Carson, Guthridge & Measey, 2006; Malacova et al., 2009; Noble, Fifer, Rauh, Nomura & Andrews, 2012; Williams et al., 2013; Zubrick et al., 2006).

The perinatal covariates were:

- maternal age at the time of birth
- birth weight
- Apgar score at 5 minutes after birth

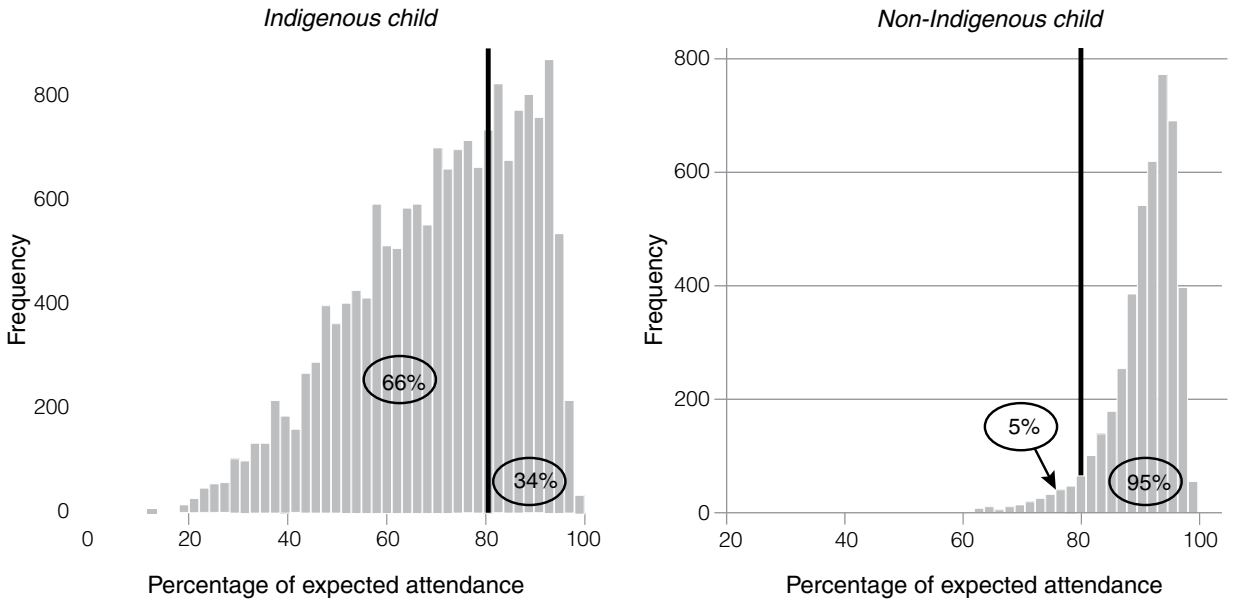

Figure 2 Individual school attendance: Children born in the NT 1994–2004 (N = 6448)

- gestational age, sex, remote residence (based on Trewin, 2006)
- birth order
- plurality (i.e. the number of the mother's prior live births or stillbirths)
- mother's self-report of having smoked or used alcohol during pregnancy.

The covariates available from student enrolment and school records were:

- child's Indigenous status
- child's age at the time of taking the NAPLAN test
- school education level of the child's primary caregiver.

The analysis was first undertaken at a univariate level to estimate the unadjusted risk of each covariate with children's NAPLAN outcomes. Multivariate fully adjusted models were then used to estimate the adjusted odds ratios (ORs) and 95 per cent confidence intervals (CIs) for all the selected risk factors. Knowing the size of the adjusted risk for each risk factor and the percentage of children in the population exposed to each risk, it was then possible to calculate the population attributable fraction (PAF). This is an epidemiological measure commonly used in public health research for evaluating the relative importance of potentially preventable risk factors. Put simply, PAF is an indication of the theoretical reduction in an outcome of interest which could result if one or more of the risk factors were somehow eliminated or reduced. As the details of this study and its findings are currently under review for a separate journal publication, they are not to be presented here. However, they will be discussed in the presentation at the ACER Research Conference.

Discussion

This paper has described how publicly available community-level data and confidentialised unit-record linkage of information from existing longitudinal population datasets can be used to investigate how early life antecedents and contemporary factors are associated with educational inequality in the NT. These data examples illustrate the value of investigating non-school factors for gaining a broader understanding of the role of local socio-demographic contexts and individuals' early life health factors in determining Indigenous education outcomes.

Much of the variation between Indigenous communities in their rates of school attendance is associated with: high ratios of children to adults, parents being of younger age and having low levels of school education, the small percentage of adults in the community who speak English, geographic remoteness, and level of housing overcrowding. While schools and education services have limited ability to directly address many of these community issues, they can ensure that governments understand the urgency of addressing those that are potentially amenable to change.

The second example of the analysis using unit-record linked data confirmed that much of the variation in Indigenous Year 3 literacy outcomes in the NT is attributable to the high proportion of Indigenous children living in very remote communities with poor access to services. Though not included in this analysis, these communities have a high proportion of adults who do not speak English. Importantly, the analysis also indicated that the high proportion of NT Indigenous mothers who have children at an early age, and who have limited education themselves, are factors which account for a surprisingly sizeable proportion of children with NAPLAN literacy below the NMS.

As the age of child bearing and the mother's level of education are both potentially preventable factors, these need to be factored into the current government and community efforts to improve educational outcomes in remote Indigenous communities. This is also why school outreach programs such as the NT Families as First Teachers program and the Central Australian Aboriginal Congress Preschool Readiness Program are so important in building parent and family capacity to support children's early childhood development and readiness for school.

Finally, the compounding effect of the multiple areas of disadvantage experienced early in life by Indigenous children highlights the importance of high-quality preschool being universally available in both urban and remote areas to maximise these children's opportunities for a successful transition into school learning.

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References

Australian Bureau of Statistics. (2013). *Community profiles*. Retrieved from http://www.abs.gov.au/

websitedbs/censushome.nsf/home/communityprofiles

Australian Curriculum, Assessment and Reporting Authority. (2012). *Guide to understanding ICSEA*. Sydney: Author. Retrieved from http://www.acara.edu.au/verve/_resources/guide_to_understanding_icsea.pdf

Australian Curriculum, Assessment and Reporting Authority. (2014). *National report on schooling in Australia 2009*. Sydney: Author. Retrieved from http://www.acara.edu.au/naplan/naplan.html

Australian Institute of Health and Welfare. (2012). *A picture of Australia's children 2012*. Canberra: Author. Retrieved from http://www.aihw.gov.au/publication-detail/?id=10737423343

Australian Medical Association. (2013). *Aboriginal and Torres Strait Islander health report card 2012–2013: The healthy early years – getting the right start in life*. Retrieved from https://ama.com.au/2012-13-ama-indigenous-health-report-card-healthy-early-years-getting-right-start-life

Brinkman, S. A., Gialamas, A., Rahman, A., Mittinty, M. N., Gregory, T. A., Silburn, S., Goldfeld, S., Zubrick, S. R., Carr, V., Janus, M., Hertzman, C., & Lynch, J. W. (2012). Jurisdictional, socioeconomic and gender inequalities in child health and development: Analysis of a national census of 5-year-olds in Australia. *BMJ open, 2*(5), e001075. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3437432/

Li, S. Q., Guthridge, S. L., Tursan d'Espaignet, E., & Paterson, B. A. (2007). *From infancy to young adulthood: Health status in the Northern Territory 2006*. Darwin: Department of Health and Community Services.

Li, S. Q., Jacklyn, S. P., Carson, B. E., Guthridge, S. L., & Measey, M. L. (2006). *Growing up in the Territory: Social-emotional wellbeing and learning outcomes*. Darwin: Department of Health and Community Services.

Malacova, E., Li, J., Blair, E., Mattes, E., de Klerk, N., & Stanley, F. (2009). Neighbourhood socioeconomic status and maternal factors at birth as moderators of the association between birth characteristics and school attainment: A population study of children attending government schools in Western Australia. *Journal of Epidemiology and Community Health, 63*(10): 842–849.

Noble, K. G., Fifer, W. P., Rauh, V. A., Nomura, Y., & Andrews, H. F. (2012). Academic achievement varies with gestational age among children born at term. *Pediatrics, 130*(2), e257–e264.

Steering Committee for the Review of Government Service Provision. (2011). *Overcoming Indigenous disadvantage: Key indicators 2011*. Canberra: Productivity Commission.

Trewin, D. (2006). *Statistical Geography Volume 1 – Australian Standard Geographical Classification (ASGC)* (ABS Cat. No. 1216.0). Canberra: Australian Bureau of Statistics.

Williams, B. L., Dunlop, A. L., Kramer, M., Dever, B. V., Hogue, C., & Jain L. (2013). Perinatal origins of first-grade academic failure: Role of prematurity and maternal factors. *Pediatrics, 131*(4), 693–700.

Zubrick, S. R., Silburn, S. R., De Maio, J. A., Shepherd, C., Griffin, J., Dalby, R. B., Mitrou, F. G., Lawrence, D. M., Hayward, C., Pearson, G., Milroy, H., Milroy, J., & Cox, A. (2006). *The Western Australian Aboriginal child health survey: Improving the educational experiences of Aboriginal children and young people.* Perth: Curtin University of Technology and Telethon Institute for Child Health Research.