THE AUSTRALIAN NATIONAL UNIVERSITY

Mapping Indigenous Education Participation

N. Biddle, B.H. Hunter, and R.G. Schwab

DISCUSSION PAPER No. 267/2004
ISSN 1036 1774
ISBN 0 7315 5642 9

CENTRE FOR ABORIGINAL ECONOMIC POLICY RESEARCH

Series Note

The Centre for Aboriginal Economic Policy Research (CAEPR) was first established in March 1990 under an agreement between The Australian National University (ANU) and the Aboriginal and Torres Strait Islander Commission (ATSIC). Since 1 January 1999, CAEPR has operated as a University Centre and is funded from a variety of sources including the ANU, Australian Research Council, Aboriginal and Torres Strait Islander Services and the Department of Family and Community Services. CAEPR's principal objective is to undertake high-quality, independent research that will assist in furthering the social and economic development and empowerment of Aboriginal and Torres Strait Islander people.

CAEPR's aim is to be a world-class centre undertaking research on Indigenous economic development issues that combines academic excellence with policy relevance and realism. In Australia, CAEPR is currently the only dedicated research centre focusing on Indigenous economic policy issues from a national perspective. The Centre's publications, which include the CAEPR Discussion Paper series first established in 1991, aim to examine government policy, influence policy formulation, and inform public debate.

CAEPR Discussion Papers are intended as one forum for the rapid dissemination of peer-reviewed papers by Centre staff on relevant research topics. These papers are produced for widespread discussion and comment. Copies of most publications are available for free electronic download from CAEPR's website

<www.anu.edu.au/caepr/>

Printed copies can be purchased through the website or from:

The Centre for Aboriginal Economic Policy Research
Hanna Neumann Building #21
The Australian National University
Canberra ACT 0200

Telephone 02–6125 0587
Facsimile 02–6125 9730

As with all CAEPR publications, the views expressed in this Discussion Paper are those of the author(s) and do not reflect any official CAEPR position.

Professor Jon Altman
Director, CAEPR
The Australian National University
December 2004

Cover page images courtesy of the Australian Institute of Aboriginal and Torres Strait Islander Studies and CAEPR staff members.

MAPPING INDIGENOUS EDUCATIONAL PARTICIPATION

N. BIDDLE, B.H. HUNTER AND R.G. SCHWAB

No. 267/2004

ISSN 1036 1774

ISBN 0 7315 5642 9

Nicholas Biddle is a doctoral candidate and research assistant and Boyd Hunter is a Fellow at the Centre for Aboriginal Economic Policy Research, The Australian National University. R.G. (Jerry) Schwab is Fellow and Deputy Director of the Centre.

CONTENTS

Maps and Tables iv
Abbreviations and Acronyms v
Abstract vi
Acknowledgments vi
Introduction 1
Data and method 3
The geography of Indigenous education and other relevant factors 6
Geographic distribution of other explanatory factors 14
Multi-dimensional analysis of Indigenous educational outcomes 17
Descriptive statistics 17
Regression analysis 17
Changes of residence between 1996 and 2001 for tertiary students 19
Policy discussion 22
Notes 26
References 27

MAPS

Map 1. Indigenous adolescents attending educational institution, 2001 8
Map 2. Non-Indigenous youth attending educational institution, 2001 9
Map 3. The greater use of internet at home among non-Indigenous people compared to Indigenous Australians, 2001 10
Map 4. Indigenous households with more than one resident family, 2001 11
Map 5. Proportion of Torres Strait Islanders among Indigenous residents, 2001 13

TABLES

Table 1. Descriptive statistics of variables used in regression analysis, Indigenous adolescents at educational institutions, 2001 16
Table 2. OLS regressions of the percentage of Indigenous youth attending educational institutions, 2001 17
Table 3. Usual residence five years ago by ARIA, 2001 20

ABBREVIATIONS AND ACRONYMS

ABS	Australian Bureau of Statistics
AEP	(National) Aboriginal (and Torres Strait Islander) Education Policy
ANU	The Australian National University
ARIA	Accessibility/Remoteness Index of Australia
ATSIC	Aboriginal and Torres Strait Islander Commission
CAEPR	Centre for Aboriginal Economic Policy Research
CDEP	Community Development Employment Projects
CGC	Commonwealth Grants Commission
CHINS	Community Housing and Infrastructure Needs Survey
CIA	Consolidated Indigenous Area
DEST	Department of Education, Science and Training
MCEETYA	Ministerial Council on Education, Employment, Training and Youth Affairs
NATSIS	National Aboriginal and Torres Strait Islander Survey
NCVER	National Centre for Vocational and Educational Research
OLS	Ordinary Least Squares
TAFE	Technical and Further Education
TSI	Torres Strait Islander
VET	vocational education and training

ABSTRACT

Schwab and Sutherland (forthcoming) present a spatial analysis of the distribution of Indigenous education participation across Australia. Amongst their main findings is the marked effect of geographic isolation on participation. We extend this analysis by relating other Indigenous and non-Indigenous outcomes to the educational participation of 15–19 year olds via a regression framework, estimated at the geographic level.

We find that access to schools and other institutions is indeed associated with educational participation. However, other factors are also important; these are variables that act as a proxy for disruption within Indigenous households, access to electronic resources that support educational participation in the home, and the presence of the CDEP scheme.

In the paper we also compare the remoteness category of a student's usual residence on census night with their remoteness category of five years beforehand. We find that, amongst other things, although Indigenous students who lived in remote or very remote areas five years beforehand are more likely to have moved than the general population (especially university students), a substantial number still remain in these areas. This has important implications for the provision of distance and online learning.

ACKNOWLEDGMENTS

We are grateful for useful feedback from Bill Arthur, Anne Daly, Matthew Gray, Frances Morphy, Dale Sutherland, Robert Tanton, and John Taylor who provided useful comments on earlier drafts. John Hughes and Frances Morphy provided editorial and layout assistance, and Geoff Buchanan did the proof reading.

INTRODUCTION

Schwab and Sutherland (forthcoming) explore some of the factors that affect access to and early success of Indigenous students, including distance from home to school and literacy and numeracy skills. One of their focuses was on how spatial factors relate to overall patterns of educational participation and success. Overall, it appears that those individuals who live in the urban south-east of Australia are more likely to undertake and ultimately succeed in school and adult and tertiary education than their counterparts in rural and particularly in remote areas. While history has also played an important role in determining these patterns, spatial location is highly significant in the patterns observed.

Geographic data can be used to yield insights into the various factors underlying Indigenous educational participation. While Schwab and Sutherland (forthcoming) only examine education outcomes for Indigenous Australians, this paper seeks to relate relevant dimensions of Indigenous schooling participation to non-Indigenous outcomes, especially educational and employment rates, as well as other factors that are likely to drive Indigenous educational outcomes. Before outlining the analysis which we undertake in this paper, it is helpful to first consider the history of Indigenous education policy in Australia in order to understand contemporary patterns in educational outcomes. Following the 1967 Referendum, the Commonwealth assumed additional responsibilities for Indigenous affairs and took particular interest in developing a national Indigenous education policy framework. During the 1970s and 1980s a series of consultative and advisory committees were established culminating in the formation of the Aboriginal Education Policy Taskforce in 1988. Drawing together many of the findings and advice of the earlier committees, the Taskforce developed the 1990 National Aboriginal (and Torres Strait Islander) Education Policy (AEP) which established 21 long-term goals under four primary aims: involvement of Indigenous people in educational decision-making, equality of access to educational services, equality of educational participation, and equitable and appropriate education outcomes. The AEP has become the backbone of national Indigenous education policy and was endorsed by all Australian governments (Schwab 1995).

In 1993, a review of the AEP was undertaken by the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) to determine the degree to which the AEP had succeeded in advancing educational access, participation and outcomes among Indigenous Australians. The review found that while some improvements had been achieved, they were inconsistent across educational sectors and States and Territories. Subsequently, MCEETYA established an Indigenous Education Taskforce and created a National Strategy for the Education of Aboriginal and Torres Strait Islander Peoples, 1996–2002. The National Strategy provided some fine-tuning of the earlier AEP policy, promoted a focus on outcomes rather than inputs, and put additional policy and program emphasis on measuring progress in literacy and numeracy. The emphasis on outcomes continues to the present time with accountability and more stringent reporting by governments and educational providers emerging as a major theme.

These initiatives appear to have had mixed success. Altman, Biddle and Hunter (2004) outlined steady though not spectacular improvements in measures of Indigenous educational participation and achievement, at

least up until the 2001 Census. These improvements reflected educational expansion for the population in general as well as some (albeit limited) convergence between Indigenous and non-Indigenous people.

In the Howard government's plans for the next four years (2005–2008), there is a focus on accelerated literacy and numeracy, tutoring, homework centres, targeted national initiatives and special projects. In addition, the government announced it will place particular emphasis on the needs of remote area Indigenous students, citing 'greater educational disadvantage' (Department of Education, Science and Training (DEST) 2004). Needless to say, this focus on remote areas, however warranted, should not come at the expense of regional and urban areas where Indigenous youth still attend school at lower levels than their non-Indigenous counterparts.

The government's shift in policy attention to the special needs of Indigenous students in remote areas was no doubt propelled by the recent Commonwealth Grants Commission (CGC) 2001 Report on Indigenous Funding (Commonwealth of Australia 2001). The CGC found that educational disadvantage is greatest in remote regions. Yet school education for a long time has been delivered as a mainstream (State and Territory) service in such regions even though there is little evidence that it achieves the desired gains in achievement and furthermore, Commonwealth Indigenous-specific funding is not targeted to regions on the basis of need (Commonwealth of Australia 2001). Indeed, Commonwealth Indigenous education policy initiatives sometimes are criticised for providing only 'top-ups' to basic funding with little direction for providers on what or how to achieve improvements (Mellor & Corrigan 2004). In addition, the CGC found that access to training for Indigenous Australians is limited in remote areas and the high cost of delivering that training is not adequately recognised (Commonwealth of Australia 2001). More recent research has confirmed these findings and concluded that vocational education and training (VET) in regional and remote areas should be shaped around both the limited employment opportunities of those places and the fact that remote learners are not likely to relocate to urban areas where more jobs are available (Gelade & Stehlik 2004).

The greater educational disadvantage of Indigenous people, heterogeneity in outcomes across the country, and lack of consistency in the effects of policy initiatives in the respective jurisdictions provides several rationales for conducting a geographic analysis. While Schwab and Sutherland (forthcoming) illustrate the distinct patterns of educational participation for Indigenous youth, the other chapters in the forthcoming *Macquarie Atlas of Indigenous Australia* also show a similar unevenness across a wide range of social and economic outcomes (Arthur & Morphy forthcoming).

Geographic analysis cannot provide the insights into the determinants of educational participation that are possible using individual-level data (Hunter & Schwab 1998). However, the focus on regional data allows us to graphically illustrate the process underlying the low level of Indigenous participation in mainstream education with a view to identifying hot-spots where policy action is urgently required.

This paper builds on the largely visual analysis in Schwab and Sutherland (forthcoming) by providing a more formal geographic analysis of the factors associated with educational participation. The remainder of the paper contains five sections. The first introduces the data and method used. In the second, geographic

distribution of the relevant variables is discussed with particular attention being paid to maps that are omitted from the forthcoming *Macquarie Atlas*. The third section will provide a multivariate analysis of the regional data to demonstrate the relative significance of the various factors. A sensitivity analysis will be conducted to ensure that the analysis is reasonably robust. The fourth section uses a tabular analysis of the relationship between educational participation and mobility to highlight some important dynamic aspects of the geography of Indigenous education. The final sections draw together the factors underlying Indigenous educational participation and highlight the potential lessons for policymakers.

While our discussion focuses on constructive policy options, especially the issue of accessibility to institutions, it should be recognised that many Indigenous people do not necessarily have a strong commitment to formal western education because it sometimes lacks relevance for their lives (Schwab 1996). Indeed, Folds' (2001) study of the Pintupi people argues that there is an intrinsic conflict between the pursuit of western and Indigenous aspirations. While Folds' account can be contested (see e.g. Smith 2002), the main point in the context of this paper is that our ability to augment formal educational participation is limited by cultural preferences and local history which can vary significantly between regions. Policy-makers need to take into account the local demand for education, and incentives that might motivate students when designing policy options.

DATA AND METHOD

The main geographic unit of analysis used in this paper is the Consolidated Indigenous Area (CIA), a classification developed especially for the *Macquarie Atlas of Indigenous Australia* (Arthur & Morphy forthcoming) that exploits the smallest areas for which census data is published. When the Aboriginal and Torres Strait Islander Commission (ATSIC) was first created in 1989 it was made up of some 60 or so regions nationally. Later the regions were reduced in number to 36. These became the key Indigenous political, administrative and planning units and have been a common unit of analysis for census-related data.

Unfortunately, the 36 ATSIC regions are often extremely large. For example, between them Rockhampton and Roma in Queensland extend from the coast almost to the South Australian border. ATSIC regions also fail to capture the fact that many Indigenous people reside along an eastern coastal belt, and there is no ATSIC region for either Melbourne or Adelaide. In an attempt to provide a finer grained analysis Arthur and Morphy (forthcoming) created an alternative geography by subdividing several ATSIC regions into two or more parts and by delineating areas for Adelaide and Melbourne. The boundaries of this new geography are based on the Australian Bureau of Statistics (ABS) Indigenous geographical unit below that of the ATSIC region, namely the Indigenous Area, and the units in the new geography are thus called Consolidated Indigenous Areas (CIAs). The size of the CIAs was determined from a consideration of the distribution of the Indigenous population and the original ATSIC regions. In the final analysis, 62 CIAs were created and we use these in the following analysis.

The maps in this paper are drawn to illustrate the geographic distributions, especially for those variables that will not be examined in the *Macquarie Atlas of Indigenous Australia*. These maps will be constructed following the conventions used in that atlas. For example, while all effort is made to maximise the amount of information about geographic distributions in the maps, categories were chosen to facilitate the interpretation and textual description of the maps. In order to facilitate comparisons with non-Indigenous outcomes, those maps are presented using the same legend categories as used for the Indigenous maps.

The ABS provided the census data on CIAs in a series of detailed, confidentialised tabulations used to construct regional averages for the factors identified by us as having a potential impact on local Indigenous educational participation. These averages were used to construct a multivariate analysis of the determinants of participation rates. The grouped nature of data means that the dependent variables are a proportion of a group that attend educational institutions. Ordinary Least Squares (OLS) is used to identify the factors associated with positive educational outcomes.[1]

The basic model used to explain attendance in this paper is analogous to that set out in Hunter and Schwab (1998). The main differences arise from the geographic focus of the following analysis. While the use of regional averages reduces the statistical power of the analysis, it does permit us to have a greater focus on variables with an explicit spatial dimension, especially physical infrastructure and local labour market conditions.

Hunter and Schwab (1998) argue that an individual's education participation will depend on the interaction of labour demand and labour supply factors, especially age, location, family, and other socioeconomic variables. They use individual level data from the 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS) to capture the effect of such factors. For example, the locational determinants of education are measured by the region of current residence of respondents (capital city, other urban, rural or remote). Note that access to educational institutions is likely to vary significantly across these regional categories. Indeed, the remote variable is defined as being in a rural area that is more than 100 kilometres from the nearest Technical and Further Education (TAFE) institution (Hunter & Borland 1997). The family variables used capture a mixture of resource and social constraints affecting the success of individuals in furthering their education. Family-type variables included 'dummy' variables that capture whether a respondent is married, is a sole parent, is living in a mixed family, and/or has a certain number of children. In addition to these variables a set of household variables is included to test the importance of the immediate social environment.[2] Other socioeconomic factors examined by Hunter and Schwab (1998) include whether an individual speaks an Indigenous language, spent time in hunting and gathering activities in the previous year, had a long-term health condition, and/or is a Torres Strait Islander.

The effect of being arrested (in the five years before the 1994 NATSIS) on education outcomes is a special case of socioeconomic or household variables. There are several reasons why we might expect arrest to adversely affect educational attainment. For example, being detained in either a youth detention centre or jail directly interferes with the process of human capital formation by removing an individual from familiar

surroundings. While people in detention have more time to study, they may be less motivated to do so. Also, when peers have lower educational attainment the motivation to continue or recommence studies may be reduced. To the extent that experience of arrest reduces one's employment prospects or wage levels there is a feedback which reduces the returns to education and therefore further diminishes the incentive to pursue education. Hunter's (1998) analysis shows that the direction of causality appears to be from arrest to education rather than vice versa.

Given that there are only 62 CIAs in Australia it is not possible to include as many explanatory factors as was included in Hunter and Schwab (1998). That is, there is probably insufficient geographic variation in the educational attendance of Indigenous youth to allow a more comprehensive model.[3] However, it is not obvious which variables should be included a priori, so a range of variables were included and significance tests were iteratively applied to work out the best specification (i.e. a stepwise regression was conducted—see Hosmer & Lemeshow 1989).

Several explanatory variables are used in the following multivariate analysis to explain the rate of Indigenous youth (aged 15–19) attending an educational institution in a CIA. The local attendance rate of non-Indigenous youth (aged 15–19) was used to capture the regional differences in accessibility of schools. The proportion of Indigenous adults with access to either the internet or a computer at home provides a measure of a household's ability to secure educational resources, and hence enhance an individual's capacity to participate in mainstream education. Another aspect that informs the capacity to participate in educational institutions is the proportion of Indigenous people in an area that speak English only. Completed school to Year 12 was included to capture the overall (and the relevant dimension of) socioeconomic status of Indigenous families.

Following Hunter and Schwab (1998), a proxy for Torres Strait Islander (TSI) status was incorporated. The proportion of the Indigenous residents in a CIA who were TSI or both Aboriginal and TSI was also included to capture this effect.

The prominent feature of the explanatory factors used in Hunter and Schwab (1998) was that social and economic disruption in Indigenous households played a prominent role in reducing educational participation. Such influences were captured by the proportion of Indigenous households in a CIA with more than one family in them. While this variable may also capture cultural diversity among Indigenous households to some extent, there is a long established link between the number of families in a household and social stress experienced by residents (Commonwealth of Australia 1991).[4]

One of the strengths of a geographic analysis is that it can control for the conditions in the regional labour market. It was possible to construct a range of proxies for labour market conditions, especially as they affect Indigenous youth. The first two variables used were Indigenous and non-Indigenous employment–population ratios. The existence of the Community Development Employment Projects (CDEP) scheme complicates the interpretation of Indigenous employment data (Hunter 2003), and therefore it could be argued that non-Indigenous employment is a better indication of local labour market conditions. However, Indigenous people

are employed in different sectors of the economy to other Australians so it is better to use a measure of Indigenous employment that controls for the (geographic) distribution of the CDEP scheme. Following Hunter (2004), we examine the incidence of Indigenous employment in the private (and non-private) sector and full-time (and part-time) jobs. The buoyancy of the youth employment sector is captured by the proportion of Indigenous and non-Indigenous youth (aged 15–24) in a CIA who were employed.

Despite there being relatively little variation in the age profiles of larger areas such as CIAs, the proportion of the local Indigenous population in various age groups is included. Age categories used are: 0–4, 5–14, 15–24, 25–44, 45–64, and 65 or over. The interpretation of these variables is difficult; however it could be that youths living in a relatively young population may have fewer role models upon which to gauge the benefits of finishing high school. This may have a positive or negative effect on the proportion of Indigenous youth attending an educational institution, depending on the net effect of these role models.

Note that our multivariate analysis does not include several variables used in Hunter and Schwab (1998) because there was no analogous information in the census. Such variables include: arrest, being a member of the 'stolen generation', time spent in hunting and gathering activities in the previous year, and having a long-term health condition. Another reason for not including some particular variables in the analysis was that the information provided in the census only related to a few individuals (e.g. speaks an Indigenous language).

THE GEOGRAPHY OF INDIGENOUS EDUCATION AND OTHER RELEVANT FACTORS

Schwab and Sutherland (forthcoming) map several factors that affect the school attendance rates of Indigenous youth. The distance a child must travel is certainly one of the factors that influences whether or not a child attends school regularly or at all. Proportionally more Indigenous Australians live in remote parts of the country than do other Australians and access to schools is often more difficult in remote regions simply because there are fewer schools. While the presence of a primary school is not uncommon even in remote areas, relatively few Indigenous communities have a secondary school in or near the community. For example, only about 12 per cent of Indigenous communities in the Community Housing and Infrastructure Needs Survey (CHINS) are within 10 kilometres of a secondary school providing education up to Year 12. In a pattern similar to that for primary schooling, communities in the far north and central regions of the country are the least likely to have easy access to secondary education. Not surprisingly, distance to a secondary school has a strong effect on the attendance and completion of studies by individuals.

Given the distribution of schools, it is not surprising that attendance of Indigenous children in the early years of primary school is relatively high, with attendance dropping as students reach late primary and early secondary levels. Overall there is a clear pattern of higher attendance in the urban areas, particularly in the metropolitan regions of capital cities. Attendance among children is much lower in rural and particularly in

remote parts of the country. Research shows that attendance is directly linked to school achievement and so the lower proportion of school attendees for some remote areas, as revealed in the census data, is potentially problematic (see Schwab & Sutherland forthcoming).

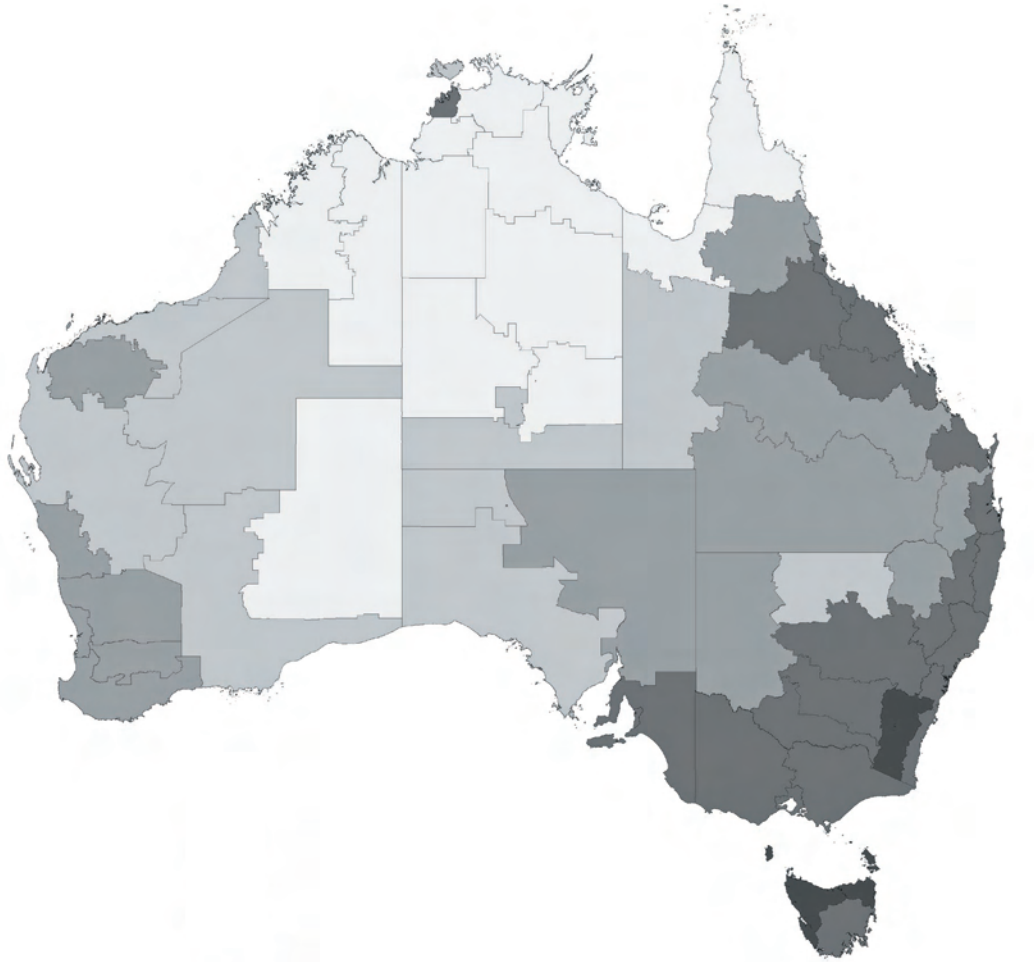
Most Indigenous students attend public (government) schools with fewer than one in ten enrolled in the Catholic school system, and fewer than one in twenty in other private (non-government) schools (Schwab & Sutherland forthcoming). This is a different pattern than that found among other Australians, where about one-third of all students attend private schools. The differential pattern of Indigenous and non-Indigenous enrolments at public schools means that Indigenous educational outcomes will be disproportionately affected by any re-allocation of resources between government and other schools.

Across the country the highest Indigenous enrolments in non-government schools are in Western Australia and the Northern Territory and the Canberra region. While the Canberra pattern probably reflects the relative affluence of Indigenous people there the relatively high levels in Western Australia are related to the high number of independent schools that exist in remote areas in that State. The high proportion of private school attendees in the Darwin region is most probably an effect of the need for students in remote areas to come to an urban location as boarders in order to study at the secondary level.

Schwab and Sutherland (forthcoming) also examine patterns of school completion for Indigenous students, who are far less likely than other Australians to complete Year 12 (about 17% of Indigenous adults have completed Year 12, a rate less than half that of non-Indigenous Australians). Across the nation, the greatest proportion of adults who completed Year 12 appear to be living in capital cities and the metropolitan regions surrounding them. Those least likely to have completed secondary schooling are resident in rural and especially remote parts of the country. Given that historically secondary schooling has been more difficult to access in rural and remote areas, it is not surprising that a sizeable number of people who reside in these areas have not completed Year 12.

Attendance of Indigenous adolescents (aged 15–19 years) at an educational institution of any type is low, with the majority of CIAs having less than half of the relevant age group involved in formal study (see Map 1). The highest attendance levels for adolescents are, as for children, in the metropolitan and urban regions, especially on the eastern coast of Australia. Indigenous adolescents are least likely to attend educational institutions in northern Australia (especially the Kimberley, Cape York Peninsula and most of the Northern Territory). While the relatively urban areas in south-west Western Australia have higher rates of attendance than the rest of the State, attendance is moderate at best compared to the national average for Indigenous adolescents.

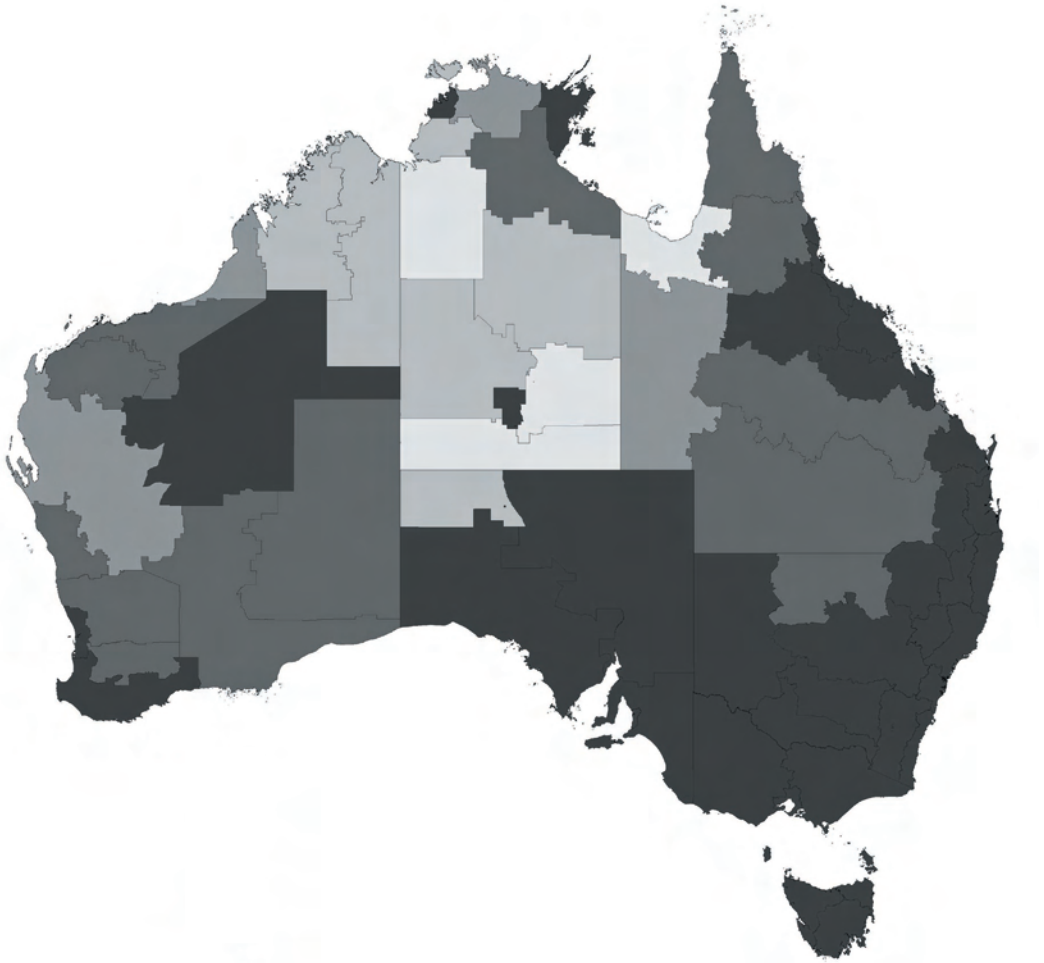
Map 1. Indigenous adolescents attending educational institution, 2001



Note: This map describes the proportion of Indigenous adolescents aged between 15 and 19 who are attending an educational institution. The legend categories are expressed in per cent and rounded down fractional values to a whole integer. The numbers enclosed in brackets in the legend refer to the number of CIAs that fall within the corresponding range of values.

Source: 2001 Census.

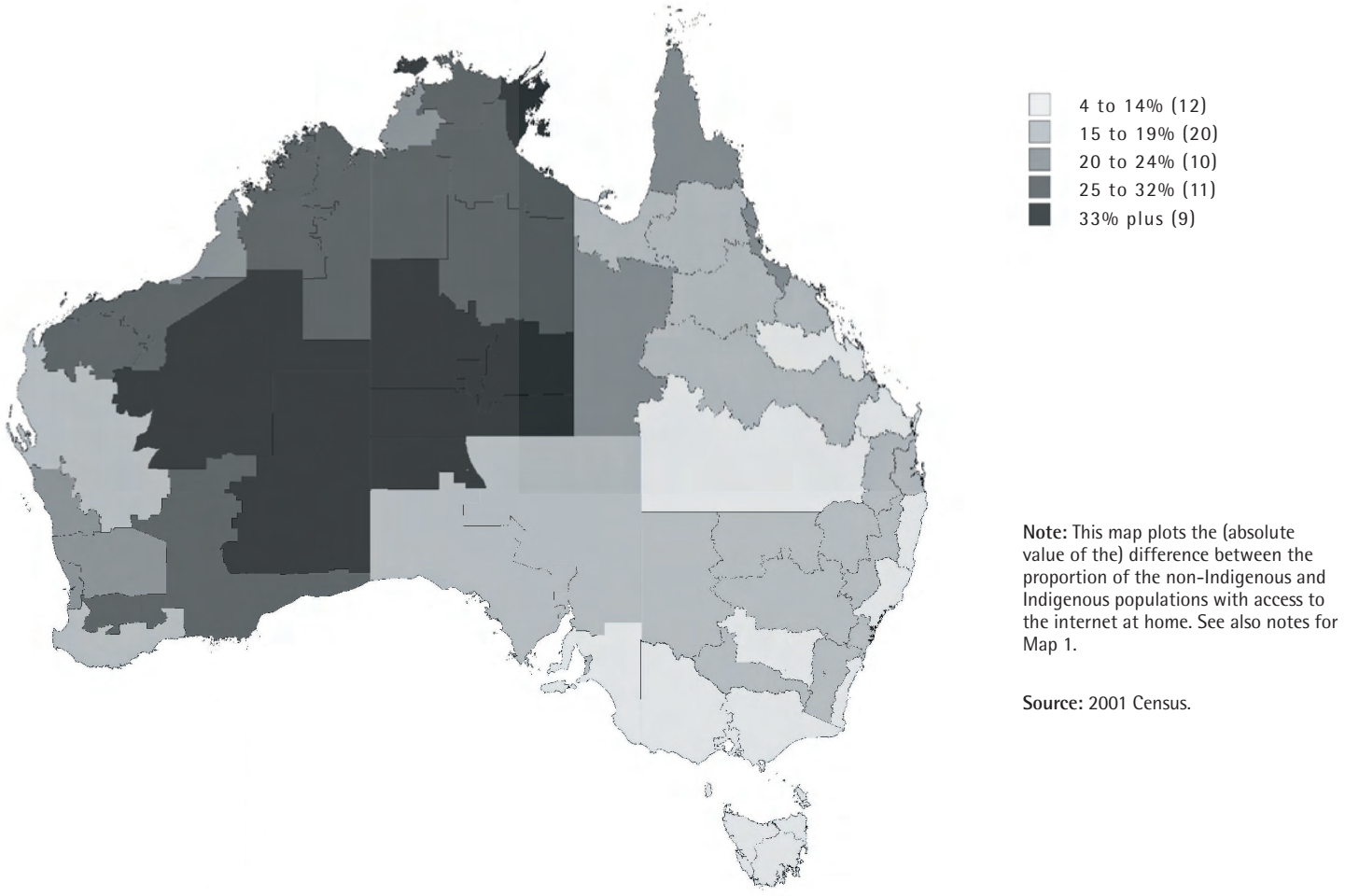
Map 2. Non-Indigenous youth attending educational institution, 2001



Note: This map describes the proportion of non-Indigenous adolescents aged between 15 and 19 who are attending an educational institution. See also notes for Map 1.

Source: 2001 Census.

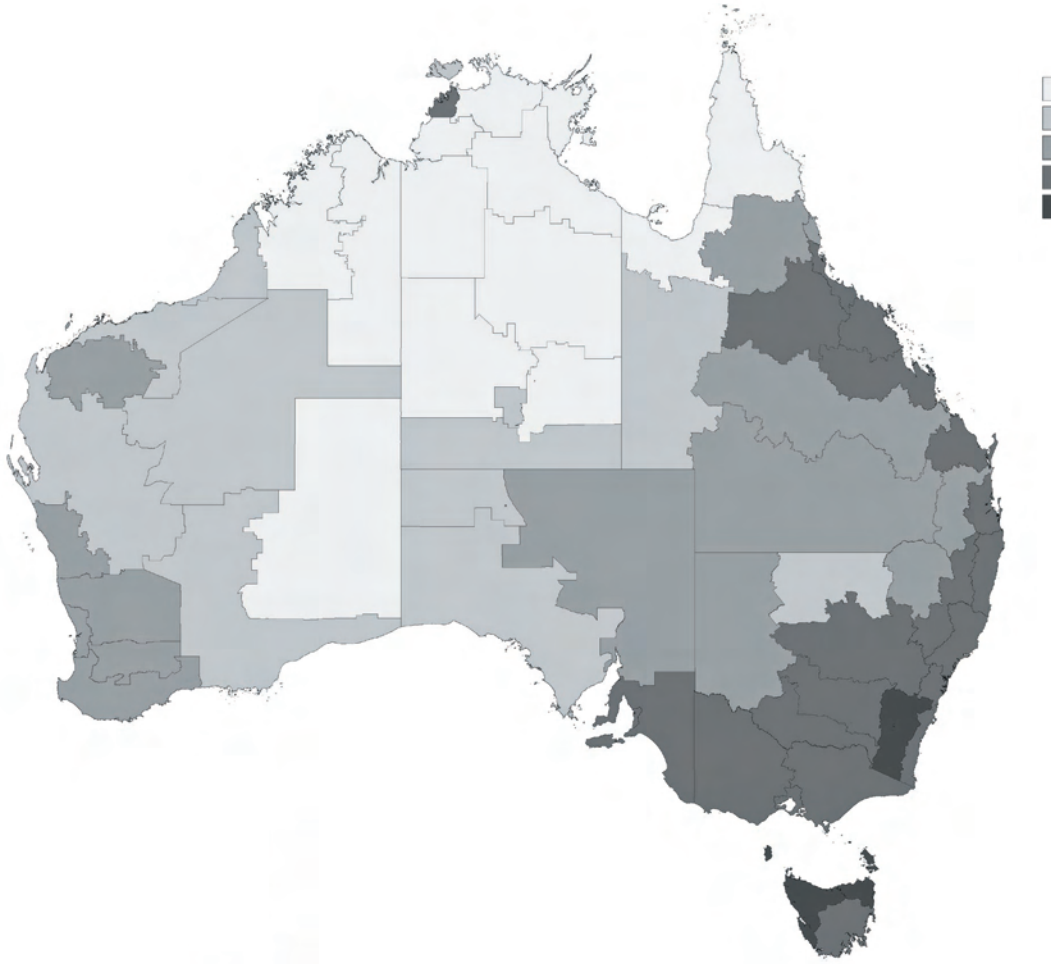
Map 3. The greater use of internet at home among non-Indigenous people compared to Indigenous Australians, 2001



Note: This map plots the (absolute value of the) difference between the proportion of the non-Indigenous and Indigenous populations with access to the internet at home. See also notes for Map 1.

Source: 2001 Census.

Map 4. Indigenous households with more than one resident family, 2001



Note: This map describes the proportion of Indigenous households with more than one resident family. See also note to Map 1.

Source: 2001 Census.

The attendance of non-Indigenous youth at educational institutions is almost uniformly higher than that for Indigenous youth in all regions (compare Maps 1 and 2). The only exceptions were in Torres Strait in Queensland, and one or two CIAs in the Jabiru and Apatula areas of the Northern Territory. This fact in itself illustrates that physical access to schools and other educational institutions is a major impediment to attendance of both Indigenous and non-Indigenous youth. One would expect this correlation to manifest itself in the multi-variate analysis. Notwithstanding a certain similarity in the attendance rates in remote Australia, attendance is substantially lower for Indigenous youth living in other areas. However, it must be recognised that this non-Indigenous variable is at best an imperfect proxy for physical accessibility to schools because Indigenous and non-Indigenous people can live in very different locations within a CIA, especially in remote Australia.

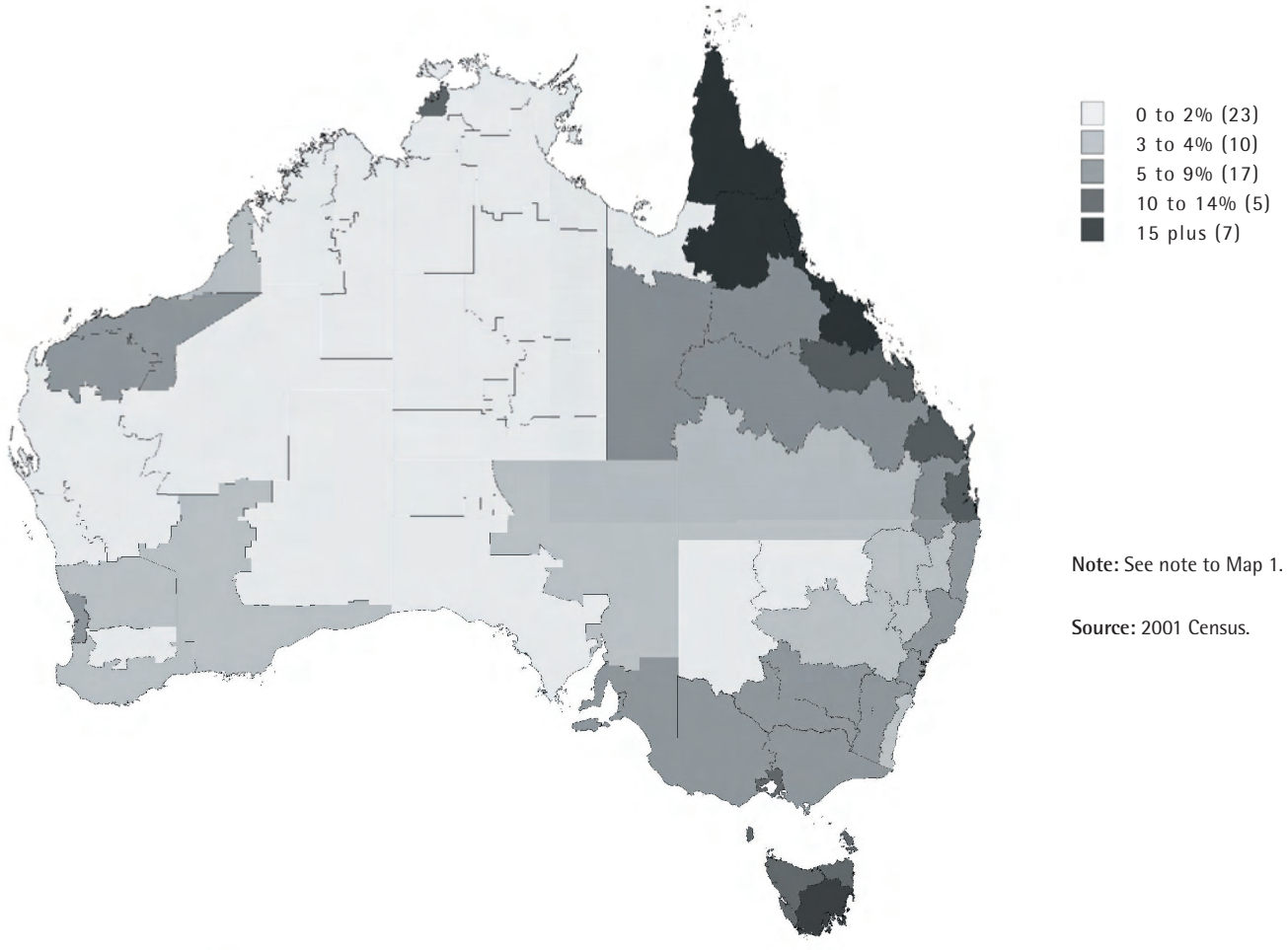
The patterns of attendance in Maps 1 and 2 pointed to the limited access to schools and other education and training facilities and providers as hindering the participation of both Indigenous and non-Indigenous youth. While it is beyond the household budget to build and resource a school for a community, there may be viable strategies, especially for non-Indigenous households that tend to have much higher incomes, to mitigate their geographic isolation—for example, buying computing and internet services for home consumption. Similarly, there are other options for extending community access to such technologies that might be viable. For example, while most remote communities lack libraries, it may be possible to provide community access to computers and the internet 'after hours' in the local primary school (Schwab & Sutherland 2003).

In contrast to the previous Maps, Map 3 illustrates *differences* in the patterns of access to the internet of Indigenous and non-Indigenous households especially in remote areas where other infrastructure is limited. Non-Indigenous households are substantially more likely to use internet services at home than Indigenous households. One explanation is that non-Indigenous households are consciously investing in computing services to mitigate disadvantage of isolation. Indigenous households will probably not be in a position to make such investments because they are disproportionately classified as poor and typically crowded (Altman & Hunter 1998).

The internet is a relatively recent technology (and was even more so in 2001) and its variable uptake by Indigenous people probably reflects its greater availability in urban centres where the telecommunications infrastructure is better developed (see Daly 2001). Overall, fewer than one in five Indigenous people accessed the internet at home in 2001; in contrast, three out of five non-Indigenous Australians used this new technology. Among the people who stated they had used the internet in 2001, most lived in capital cities and surrounding urban regions. The internet was rarely accessed among people living in the far north, with the exception of urban Darwin, or in the Central and Western Deserts, the Kimberley, Gascoyne, and East Pilbara regions of Western Australia or the Gulf region of Queensland.

The failure to complete secondary school is reflected in the relatively low level of Indigenous enrolments in higher education. Those Indigenous people who do enrol in higher education tend to live near universities, most of which are located in capital cities or to a lesser extent the highly populated regions along the

Map 5. Proportion of Torres Strait Islanders among Indigenous residents, 2001



Note: See note to Map 1.

Source: 2001 Census.

east, south-east and south-west coasts. While the failure to complete Year 12 is one factor driving low enrolments in the tertiary education sector, the role of mobility also needs to be explored. For example, the preponderance of purely local movement on the part of Indigenous people underscores evidence that Indigenous mobility is not driven entirely by labour market conditions (Hunter 2004). We will return to mobility in the penultimate section.

Overall, Indigenous people are most likely to hold some sort of post-school qualifications if they live along the south-eastern seaboard of the country and in a capital city (Schwab & Sutherland forthcoming). Those people who live in remote areas of Arnhem Land, the Kimberley in Western Australia, the Gulf region of Queensland and the inland deserts of the continent are the least likely to have earned a qualification. The urban focus probably reflects increased opportunities for post-secondary studies in areas where people have completed schooling, and therefore have the requisite skills for study as adults. It is also the case that these regions are densely populated with non-Indigenous people and so various institutions of learning—universities, TAFEs and other adult education providers—exist to serve that larger population; Indigenous people in such areas are also able to enrol for studies and gain qualifications. People living in remote areas have far fewer options.

Diplomas and degrees are a more advanced form of qualification than certificates, and require more time spent studying and higher literacy and numeracy skills. Consequently, it is not surprising that the distribution of Indigenous adults who hold such qualifications is even more localised in capital cities and surrounding urban areas. Again, to study for these qualifications most students will need to live near institutions that offer them. Since those institutions tend to be far more common in urban areas, the concentration in relatively high-density areas is to be expected (ignoring mobility for the moment).

GEOGRAPHIC DISTRIBUTION OF OTHER EXPLANATORY FACTORS

In addition to attendance of non-Indigenous youth and internet usage, several other variables are used to explain the observed geographic pattern of educational participation of Indigenous youth. The main variables used include the distribution of households with more than one resident family, TSI status, and Indigenous adults employed outside in the private sector. While the multivariate analysis includes other variables, we only examine the distribution of each of these variables to save space.

Map 4 illustrates that multi-family households are most common in remote Australia. For example, in many CIAs in the Northern Territory, the Gulf of Carpentaria, and the desert areas of Western Australia over one in five households have more than one family living in them. To some extent, this reflects both cultural preference and a chronic lack of adequate housing. However, it is easy to imagine that there is greater scope for disruption for potential students in such circumstances.

The geographic concentration of Torres Strait Islanders is most marked in the Strait and along the eastern seaboard, especially in Queensland cities (see Map 5). Taylor and Arthur (1993) speculate that the large

number of Torres Strait Islanders on the Australian mainland is due to many former residents of the Strait seeking employment and related services, including education.

There appears to be a substantial number of Torres Strait Islanders in Tasmania. However, several researchers have identified a tendency for other islanders (South Sea Islanders, and persons living in Bass Strait), to misidentify as Torres Strait Islanders (Gaminiratne 1993; Hugo 1990; Jones 1982). These researchers suggested that this confusion is due to lack of clarity in the census question—a hypothesis that can still not be discounted.

Any significance of the TSI status variable in the multivariate analysis may be due to the fact that the density of Torres Strait Islanders is highest in cities in eastern Australia, presumably because they have moved there for improved economic prospects. This is consistent with the fact that Hunter and Schwab (1998) found that the TSI status variable is either not significantly related or only weakly related to attendance of Indigenous youth at educational institutions.

The geographic distribution of CDEP scheme and hence non-CDEP employment is well known and there is little point in producing another map (see Hunter & Altman 1996). Despite the relatively sparse population in remote Australia, CDEP schemes are reasonably evenly distributed across the continent. In this way, the CDEP addresses the structural disadvantage facing many Indigenous people whose employment prospects are severely constrained by their limited access to well-developed labour markets. Altman and Hunter (forthcoming) illustrate this using maps with over one-third of the adult Indigenous population working in the scheme in remote areas of South Australia and Western Australia, the Top End of the Northern Territory and Cape York and Torres Strait regions of Queensland. In remote Australia, CDEP scheme employment accounts for between 16 per cent and 68 per cent of employment.

The extent of market activity can be captured by the prevalence of private sector employment (Altman & Hunter forthcoming). Again metropolitan south-eastern Australia generally fares well as this is the part of Australia that has engaged most successfully with the global economy. In this region over one-quarter of Indigenous adults are working in the private sector. The South Hedland area is one non-metropolitan exception; being a place where private sector employment is driven by the prominence of the mining industry in that area. Conversely, in almost all of the Northern Territory and large remote regions in Western Australia less than 10 per cent of the adult population works in the private sector, reflecting the absence of a substantial market sector. Despite the presence of a major bauxite mine in the Weipa region, the market sector is also very small on Cape York Peninsula.

Table 1. Descriptive statistics of variables used in regression analysis, Indigenous adolescents at educational institutions, 2001

Variable	Mean	Standard Deviation
Dependent variable		
Indigenous adolescents (aged 15–19) attending an educational institution	45.9	12.7
Explanatory variables used		
Non-Indigenous youth (aged 15–19) attending school	64.1	13.9
Indigenous people with access to the internet at home	16.7	8.4
Indigenous people with access to a computer at home	18.5	9.9
Completed school to Year 12	19.4	8.2
Completed school to Year 11 or higher	30.1	10.4
Non-Indigenous employment–population ratio	61.1	8.1
Indigenous employment–population ratio	41.6	7.6
Indigenous adults employed in private sector	22.8	9.5
Indigenous adults employed full-time	21.4	6.6
Indigenous adults employed outside the private sector	18.8	9.8
Indigenous adults employed part-time	20.2	6.6
TSI status	10.6	13.2
Speaks English only	79.8	25.4
Indigenous household with more than one family	6.9	10.2
Proportion of Indigenous population aged 0–4	12.9	1.0
Proportion of Indigenous population aged 5–14	26.4	1.8
Proportion of Indigenous population aged 15–24	18.3	1.4
Proportion of Indigenous population aged 25–44	27.8	1.7
Proportion of Indigenous population aged 45–64	11.8	1.0
Proportion of Indigenous population aged 65+	2.8	0.7
Indigenous youth (aged 15–24) employment–population ratio	35.1	8.6
Non-Indigenous youth (aged 15–24) employment–population ratio	60.5	8.7
Number of CIAs		62

Source: 2001 Census.

Table 2. OLS regressions of the percentage of Indigenous youth attending educational institutions, 2001

	Expanded model		Parsimonious model	
	Coef.	T-stat	Coef.	T-stat
Non-Indigenous youth attending school	0.27	2.84	0.28	4.52
Household with more than one family	-0.45	-3.20	-0.41	-4.71
Access to internet at home	0.48	2.33	0.48	3.41
Adults employed outside private sector	-0.17	-0.44	-0.27	-3.24
TSI status	0.15	1.91	0.15	5.18
Non-Indigenous youth employment–population ratio	-0.03	-0.20		
Youth employment–population ratio	-0.07	-0.26		
Adults employed in private sector	0.09	0.23		
Completed school to Year 12	-0.06	-0.41		
Speaks English only	-0.02	-0.29		
Constant	30.90	2.02	27.24	5.80
R^2	0.9143		0.9135	
Heteroscedasticity χ^2	4.67		4.44	

Note: Unless otherwise indicated, all the variables refer to the Indigenous population. Robust standard errors are used to account for the presence of heteroscedasticity that was significant at the 5 per cent level.

MULTI-DIMENSIONAL ANALYSIS OF INDIGENOUS EDUCATIONAL OUTCOMES

DESCRIPTIVE STATISTICS

Table 1 provides the descriptive statistics for all of the variables used in the multivariate analysis of the proportion of Indigenous adolescents (i.e. those aged 15–19 years) in a CIA attending an educational institution. The statistics in Table 1 were weighted by the total Indigenous population in each CIA at the time of the 2001 Census.[5] The descriptive statistics correspond closely (accurate to 2 significant digits) to the Australian average data reported elsewhere (e.g. ABS 2002).

REGRESSION ANALYSIS

OLS, the standard linear regression framework, was used to model empirically the rate of attendance in CIAs. One potential issue with this technique is that the dependent variable (and all the explanatory variables for

that matter) must be bounded by the usual range for variables measured in per cent (0–100). One test for the appropriateness of the OLS technique is whether any of the predicted rates fall outside this range. The predicted values for all models estimated fell well within this range (usually between 10% and 60%).

In the first pass at estimating the attendance of Indigenous youth at educational institutions, all variables in Table 1 were included in the OLS regressions. The demographic variables were not significant, and so they were left out of Table 2 results. This decision can be justified on the grounds that we have no real reason to expect that the demographic profile of a region could affect the educational participation. Other variables in Table 1 were left out of the expanded model in Table 2 because they are basically measuring the same thing. For example, there is a high correlation between computer use and internet use in the home, so computer use was dispensed with. The proportion of the population who attend to at least Year 11 or Year 12 are also highly correlated, so Year 12 only was chosen. Finally, full-time (and part-time) employment and private sector (and non-private sector) employment are both designed to control for the extent of CDEP participation in a CIA. Only private sector employment is included in Table 2.

Various specifications were used to test which set of variables performed best, and to ensure that the results were not sensitive to which variables were included, but ultimately a stepwise elimination of insignificant coefficients yielded the final specification in the parsimonious model. The extended model is reported here to illustrate that the parameter estimates for the parsimonious model are not substantially altered by the inclusion of a greater range of data, and to highlight the insignificance of some of these additional variables.

The most consistent and significant predictors were the proportion of non-Indigenous youth attending educational institutions, multi-family households, TSI status, internet access, and Indigenous adults employed outside the private sector.[6] All the other variables are not significant. Neither of the non-Indigenous employment-population ratios (i.e. for youth or adults), had a significant impact on Indigenous attendance. The apparent lack of a role for labour market conditions is confirmed by the insignificance of Indigenous private sector employment and overall employment of Indigenous youth. However, there appears to be a negative interaction between the CDEP scheme and education as evidenced by the significant effect of non-private sector Indigenous employment. This is consistent with evidence on employment and labour force participation from the last five censuses for various geographic areas (Hunter 2002a; Hunter 2002b; Hunter 2003).

In contrast to earlier research (Hunter & Schwab 1998), these data suggest there is no significant effect of the proportion of Indigenous adults who have completed secondary school to Year 12 (or to Year 11). One interpretation of this result is that educational attendance is not related to the behaviour of local Indigenous role models. We suspect, however, that this result may be an artefact of our aggregate geographic analysis, which may not always be a suitable tool for illuminating some of the subtle social interactions within households. It also may be that there are too few Indigenous adults who have completed Year 12 or that many Indigenous youth have moved away from their families. Alternatively, and more plausibly, access to internet is acting as a proxy for the level of education and that is already captured in the model. A related

finding is that the proportion of Indigenous people who speak English only is not related to educational attendance. This suspicion is confirmed as the models that include either Year 12 completion or English only as the sole explanatory variable have a significant ability to explain Indigenous participation. That is, their effects appear to be captured adequately by other variables in the model.

It is probably not surprising that the empirical models have reasonably high coefficients of determination (R^2) because we are using grouped data for regions. Using the standard interpretation of such statistics, over 90 per cent of the inter-regional variation of educational participation of youth can be explained by the models.

Given that we are using grouped data, another potential issue is heteroscedasticity where error terms may be more variable for smaller regions. The Cook–Weisberg (1983) test for heteroscedasticity is significant at the five per cent level and hence robust standard errors are used to adjust the regression estimates.

To summarise, the most important factors explaining the rates of educational participation of young Indigenous adults in order of importance are: access to schools and other institutions, crowding and disruption within Indigenous households, being a Torres Strait Islander, access to electronic resources that support educational participation, and the presence of the CDEP scheme. While the effect of TSI status is significant, it is probable that this result is acting as a proxy for other factors since there are relatively few Torres Strait Islanders in most CIAs. This notwithstanding, the result for the TSI status variable can be thought of as capturing other unmeasured socio-economic factors. The interpretation of other variables is relatively straightforward and we will revisit them in the concluding section.

CHANGES OF RESIDENCE BETWEEN 1996 AND 2001 FOR TERTIARY STUDENTS

The analysis of 'mobility' in this section is estimated by comparing the remoteness of usual residence of 2001 census respondents with the remoteness of their usual residence five years beforehand, using the standard Accessibility/Remoteness Index of Australia (ARIA) Classification (ABS 2001). We focus on residence five years ago as it is likely to be before the student started studying.[7] If we only examined residence one year before the census, then many or even most students at tertiary education institutions would still be studying the same course, and would therefore of necessity still be in the same place. Going back five years allows us to build a picture of where the students and their families come from originally. We can then ask the question: given a student's family's original residence where does the student choose to study (at least in terms of remoteness).

Table 3 documents the changes in the remoteness of residence for TAFE and university (and other tertiary) students, and compares this to the patterns in the changes in remoteness for non-students. The benchmark for non-students allows us to say how the remoteness of Indigenous and non-Indigenous students changes vis-à-vis the patterns observed in the rest of their respective populations.

Table 3. Usual residence five years ago by ARIA, 2001

ARIA on census night	ARIA of usual residence five years ago: Major cities	Inner regional	Outer regional	Remote	Very remote	Total % in region on census night 2001	Total number in region on census night 2001
TAFE							
Indigenous							
Major cities	83.9	12.0	7.6	10.7	5.5	34.4	4,197
Inner regional	9.7	78.9	10.2	6.5	3.3	28.2	3,434
Outer regional	4.8	7.8	76.6	12.9	13.4	25.4	3,097
Remote	1.1	1.0	4.0	64.9	11.3	6.4	783
Very remote	0.5	0.2	1.7	5.1	66.6	5.5	676
Non-Indigenous							
Major cities	93.3	18.1	16.3	21.9	26.9	69.8	330,263
Inner regional	5.2	74.6	13.4	11.4	12.1	20.1	95,374
Outer regional	1.1	6.7	67.2	12.7	15.7	8.5	40,437
Remote	0.3	0.5	2.6	51.1	8.5	1.2	5,684
Very remote	0.1	0.2	0.5	2.9	36.8	0.3	1,647
University or other Tertiary Institutions							
Indigenous							
Major cities	87.8	25.2	20.4	23.4	14.1	52.2	3,642
Inner regional	7.3	66.2	12.3	6.4	4.7	21.6	1,505
Outer regional	3.7	7.1	62.7	15.9	14.4	17.9	1,252
Remote	0.7	0.7	3.4	48.9	7.5	4.4	309
Very remote	0.5	0.8	1.1	5.5	59.3	3.8	268
Non-Indigenous							
Major cities	95.1	40.1	38.2	45.8	40.8	81.8	576,067
Inner regional	3.7	55.4	15.9	14.1	14.6	12.9	91,117
Outer regional	0.9	4.0	44.1	13.9	17.4	4.6	32,421
Remote	0.2	0.4	1.4	24.2	6.3	0.5	3,508
Very remote	0.1	0.2	0.4	2.1	20.8	0.2	1,446
Non-students aged 5 and over in 2001							
Indigenous							
Major cities	86.9	10.6	6.1	4.9	1.0	29.8	71,106
Inner regional	7.8	78.0	6.8	3.9	0.8	19.0	45,394
Outer regional	3.6	9.6	80.6	8.0	3.2	22.1	52,852
Remote	1.1	1.2	4.7	70.7	5.7	8.8	21,062
Very remote	0.6	0.6	1.9	12.5	89.3	20.3	48,486
Non-Indigenous							
Major cities	93.5	10.7	8.2	11.3	14.0	67.0	8,475,817
Inner regional	5.1	81.4	8.1	8.4	8.8	20.8	2,627,340
Outer regional	1.1	7.3	79.4	12.1	11.8	10.2	1,289,127

Note: 'Non-students' excludes pre-school, primary, and secondary school students as well as the students at tertiary institutions listed in this table.

The numbers given in the first five columns represent as percentages the whereabouts of members of the stipulated populations both in 1996 and 2001. Thus the first data rows of the first column show that 83.9 per cent of current Indigenous TAFE students who lived in a major city five years ago still lived in a major city on census night 2001. Of the same population 9.7 per cent now live in an inner regional area, and so on down to 0.5 per cent who now live in a remote area. The penultimate column (% in region on census night) gives the proportion of the corresponding population who lived in each remoteness category on census night 2001 (regardless of where they were five years ago) with the last column giving the total number in that region.

Before analysing the changes in remoteness of residence between 1996 and 2001, it is worth reflecting on the distribution of students and other people across the various categories of remoteness in 2001 (second last column in Table 3). The distribution of university students in 2001 is heavily concentrated in major cities relative to non-students. This observation is valid for both the Indigenous and non-Indigenous populations and probably reflects the location of universities. If anything the difference between students and non-students is even more pronounced for the Indigenous population with 52.2 per cent of students living in major cities compared to 29.8 per cent of non-students (contrasted to the 81.8% and 67.0% respectively for the analogous non-Indigenous people). That is, while Indigenous university students are less likely to live in major cities, this is mainly due to the fact that the underlying population is more likely to be drawn from non-metropolitan areas.

One would expect the proportion of remotely located TAFE students in the 2001 Census to be closer to the proportion for non-students because there is reasonably good access to TAFE colleges in regional, and to a lesser extent remote Australia. And indeed, 34.4 per cent of Indigenous TAFE students lived in major cities compared to 29.8 per cent of Indigenous people who were not studying—a much closer correspondence than for university students. Furthermore, non-Indigenous TAFE students have a very similar geographic distribution to the general non-Indigenous population.

Table 3 illustrates that people who lived in major cities in 1996 tended to be living in cities and to a lesser extent regional areas in 2001. While Indigenous people were more likely to move away from major cities than non-Indigenous people, there is remarkable similarity between students and non-students for both populations.

A clearer difference between students and non-students emerges when we examine people who lived outside the major Australian cities. For those who were resident in inner regional areas in 1996, around 80 per cent of non-students stayed in inner regional areas with about 10 per cent moving to major cities. Among university students who formerly lived in inner regional areas, over one-quarter moved to major cities where the appropriate institutions are located (25.2% of Indigenous and 40.1% of non-Indigenous students).

The disparity between students and non-students gets gradually larger as one looks at the more remote areas. For example, of the non-student populations in very remote areas, 89.3 per cent of Indigenous and 56.2 per cent of other residents had not changed remoteness between 1996 and 2001. However, Indigenous and non-

Indigenous university students were over 30 percentage points less likely than their respective non-student populations to have been in very remote areas in both census years. This notwithstanding, the substantial numbers of Indigenous students who remain in very remote areas indicate that it is likely that there is some sporadic delivery of university short courses in remote locations as well as access to distance education and correspondence courses. It highlights the fact that Indigenous people prefer to stay reasonably close to their families. We might conclude that if options for studying close to their country are provided, then Indigenous people are more likely to avail themselves of the opportunity to study.

One attraction of studying at TAFE is that it allows many students to stay closer to home. For example, only 5.5 per cent of Indigenous TAFE students who lived in very remote areas in 1996 moved to major cities in 2001. This compares to 14.1 per cent of Indigenous university students. However, at least some TAFE students appear to have had to move for their study because the analogous statistic for non-students is 1.0 per cent.

Therefore, one possible factor driving the increase in TAFE participation vis-à-vis university studies is the relative ease of furthering one's education close to home. Another is that vocational education is cast by providers—and perceived by students—as being practically rather than academically focused. In this sense it has long been recognised as the best avenue for an educational 'second chance' for early school leavers. While other factors such as student achievement on a standard curriculum are relevant, it is probable that facilitating university education in local remote and regional communities will enhance university participation rates. This is not an argument that universities should be relocated in the bush, rather that distance education and provision for short-term contact should be facilitated through changes to university rules and delivery strategies, and the structuring of student financial assistance to ensure that distance education is widely accessible to Indigenous people, especially those who would not otherwise study.

POLICY DISCUSSION

This paper illustrates that the most important factors explaining rates of educational participation of young Indigenous adults in order of importance are: access to schools and other institutions, disruption within Indigenous households, TSI status, access to electronic resources that support educational participation, and the presence of the CDEP scheme. Given that the result for TSI status is difficult to interpret and that racial status is not amenable to being affected by policy, we will focus on the other results.

The adequate provision of schools and vocational and higher education infrastructure is important. Furthermore, the fact that there is little direct effect of the labour market on participation at school means that the provision of accessible educational facilities will enhance Indigenous educational participation irrespective of the local market conditions. Enhancing the school attendance of Indigenous youth will promote the capacity for residents in Indigenous communities to be active Australian citizens who can take responsibility for their own health and well-being.

The potential importance of disruption in Indigenous households means that it is important to target program resources to reduce crowding and stress in Indigenous households. For example, this paper points to the presence of several families in a household as having some potential negative consequence for both short-term and long-term educational participation. Similarly, policy interventions that address the quality of housing stock should be considered in light of the impact of crowding.

The role of internet (and computer) usage in encouraging education may provide another dimension to the household disruption argument. Obviously it is hard to provide computing facilities if the household is in some form of housing stress. However, given that so many educational resources are provided online, access to the internet provides a clear advantage in engaging with the educational system. Many youth, irrespective of their Indigenous or non-Indigenous status, have a facility for engaging with new and evolving technologies—especially the internet which involves immediate response and feeds social connectivity. However, the limited ability of Indigenous youth to connect with an increasingly electronic syllabus is circumscribed by the lack of access to computing facilities and the internet. While it would be difficult to argue for policy to subsidise the provision of such facilities in households that have limited capacity to maintain a fully operational computer, there may be a sound argument for providing resources to provide such facilities in public spaces such as schools and youth centres. If this were done, the lack of internet access in the home might cease to have such negative consequences for educational attendance. This is a key component of the strategy put forward in Schwab and Sutherland's call for the development of 'Indigenous learning communities' (Schwab & Sutherland 2003).[8]

General telecommunications policy, such as the proposed full privatisation of Telstra, may have important implications for Indigenous education. If privatisation leads to expanded telecommunications access in regional Australia because of investments funded by the sale of shares, then such a move may increase internet access, thereby improving education outcomes.[9] If, on the other hand, privatisation leads to Telstra disengaging further from the less profitable areas as is feared by some (Quiggin 1998), then the sale of Telstra may further worsen educational outcomes in the bush. Whatever the outcome of the privatisation debate, the poor access to telecommunications infrastructure in remote Australia is a potentially important constraint on the extent to which such a policy will be effective (Daly 2001). The provision of stand-alone computing facilities in communal and public spaces may enhance the educational experience of many Indigenous people despite the loss of face-to-face interactivity that the internet entails.

Hunter (2003) shows that the collapse in the market for low-skilled jobs since the 1970s did not adversely affect Indigenous job prospects in areas where the CDEP scheme's expansion is most pronounced. One important issue, however, is that the *incentive* to finish high school may be blunted by the way CDEP tends to shield people from the lack of labour market opportunities. This hypothesis is supported by the fact that there was an increase in the incidence of early school leaving in the areas where the CDEP scheme expanded in the late 1980s and early 1990s (Hunter 2002a). If Indigenous youth are to be encouraged to complete school rather than move straight onto CDEP, one avenue would be the enhancement of vocational training programs as a part of the school experience. Nationally, the expansion of VET-in-school and School Based

New Apprenticeship programs coincided with increased school retention in the general population (Knight 2004). This pattern was especially pronounced in rural Australia, suggesting that it may have relevance for Indigenous communities outside of urban areas.

Misko (2004) criticises Hunter's (2003) argument that the success of the CDEP scheme may encourage students to leave school early and not complete the educational qualifications essential for entry into the mainstream labour market. According to Misko, this does not seem to be true for 15- to 17-year-olds because only 8.7 per cent of this age group are employed in the scheme, with well over one-third of the group (43.5%) having already left school. While these are interesting facts, Misko's argument fails to engage with the substance of Hunter's argument—that the incentives to pursue formal education are blunted because a 'career' in the CDEP scheme does not require attendance at school. The incentive issue may affect educational participation well before a person's fifteenth birthday. As Teese (2004) has recently pointed out for non-Indigenous youth, early school leaving can be viewed as an economic strategy, even in settings where unemployment is high and opportunities are few. The lack of jobs does not seem to lessen the demand for work, 'especially if (as in country districts) there is a long cultural acceptance of early entry into the workforce (Teese 2004: 2). The findings in this paper provide independent support to the proposition advanced in Hunter (2003) that there is a negative interaction between the provision of CDEP scheme employment and school attendance that needs to be addressed.[10]

Since CDEP may react negatively with participation at school and possibly other educational attendance, it would be advisable to ensure that Abstudy payments made to children who stay at school are higher than payments that youth can get through the CDEP scheme (say CDEP wage plus 10 per cent). The government may choose to reduce CDEP wages for youth, vis-à-vis student payments, to limit the cost of this proposal. This could be justified in terms of instituting a training wage (if not by the equivalence with lower youth allowances).

One rather harsh option would be to preclude Indigenous youth under 18 from participating in the CDEP scheme unless they are involved in some training. This would curtail the use of the CDEP scheme as simply a means of getting out of the educational system. As this option might place some additional financial stress on families, a system of incentives for those who stay on at school would need to be provided to families (in addition to those for individuals) through augmenting existing programs such as Abstudy. However, it may be ineffective as a motivation for Indigenous youth who tend to be much more independent of their families at a younger age. The long-term consequences of creating cohorts of inactive and disaffected youth are potentially significant as they tend to place even more stress on communities. Accordingly, adopting this option is probably a more risky strategy than increasing the Abstudy payment so that it is greater than CDEP youth wages.

Misko (2004) does make many valid points, especially in saying that the CDEP scheme cannot be expected to solve the problems of unemployment or under-employment for Indigenous Australians in the bush or elsewhere. Major changes in the way we think about the types of economic development possible in rural

and remote areas are essential. However, the CDEP scheme can assist by providing funds to support employers to provide training and employment for participants, and paid part-time work for those between jobs.

Misko (2004) is correct in identifying the challenge to protect the positive aspects of the scheme—its provision of employment in depressed labour markets, and its assistance to community development—while ensuring that all young Indigenous people are encouraged to complete their schooling. From a policy perspective, one of the key challenges is to focus on the promotion of the value of learning, not just jobs, and to recognise that successful outcomes from engagement with learning are not only or not always related to employment. This may be difficult in the light of a history of disengagement and negative experiences at school. However, as Gelade and Stehlik (2004) point out, increased confidence and facility with non-Indigenous culture, improved literacy and increased family and community wellbeing are equally important outcomes of better education that need to be recognised and resourced by appropriate policy.

Schwab (forthcoming) describes a range of tradition-based land and resource management programs and models that provide opportunities for Indigenous early school leavers to re-engage with learning by working 'on country'. These programs not only allow students to appreciate alternative career options opened up by the educational participation, but they also allow young people to enjoy the immediate experience of learning in a culturally and locally meaningful context. Such approaches fit well with recent calls for regional economic development strategies but also foster perceptions about the positive value of learning across communities. Such a shift in perceptions should ultimately increase educational participation at all levels.

NOTES

1. Given that both the dependent and explanatory variables are bounded between the values of zero and one, the standard OLS estimation may not be appropriate (Greene 2000). One solution to this problem is to transform the dependent variables using a logistic transformation, and then perform a weighted OLS analysis on the transformed data (see Hunter 2002b). However, it was deemed unnecessary to conduct any transformations since a simple OLS analysis did not yield any anomalous results whereby the predicted participation rates lay outside the feasible range (between zero and one). That is, the simple OLS methodology is a reasonably good approximation, and is relatively easy to interpret.
2. Given the possibility that educational outcomes and the family or household environment are simultaneously determined, the regression analysis in Hunter and Schwab (Hunter & Schwab 1998) was conducted both with and without these variables. The results for the other explanatory variables were not sensitive to the inclusion of these environmental variables.
3. In more technical terms, there are insufficient degrees of freedom to include more than a few variables.
4. See Schwab and Sutherland (2004) for a brief discussion of the complex interactions of stress, child development and literacy (and by implication educational participation and attainment). See also Petrill et al. (2004) for details of a provocative study suggesting links between chaos in the home and diminished cognitive abilities in children. Though 'chaos' is obviously a culturally variable notion, the study's findings may have some relevance for exploring the impact of crowding in households.
5. The estimated residential population of Indigenous Australians in 2001 was approximately 460,000 people.
6. While the estimated coefficient for adults employed outside the private sector is not significant in the expanded model, this parameter estimate appears to have a wider confidence interval because of the inclusion of similar variables in the expanded specification. The coefficient does not change substantially when the parsimonious specification is used and, the parameter estimate remains reliable.
7. Although students should theoretically mark their usual residence as the place they are living during their current period of study, this may not always be the case. The greater the number of students who refer to their previous 'home' as their usual residence, the greater the similarity of the profiles of students and non-students. However, any difference between the 'mobility' of students and non-students is still informative.
8. A similar notion has been put forward in the Northern Territory's recent review of secondary education suggesting the establishment of 'learning precincts' (Charles Darwin University & Northern Territory Government 2004).
9. The Howard Government re-introduced the *Telstra (Transition to Full Private Ownership) Bill* in 1998. The Bill was rejected in the Senate in July 1998) but provided that an independent inquiry certify that Telstra has met prescribed service standards before the Commonwealth can relinquish majority ownership—a condition that is likely to hold in any future move to fully privatise Telstra. The Bill also sets out the Social Bonus proposal that included substantial investment in telecommunications infrastructure in regional Australia.
10. The claim that the evidence in this paper is independent from Hunter (2003) is based on the fact that this paper examines ecological correlations between geographic areas, whereas Hunter (2003) examines employment returns to education using individual-level data.

REFERENCES

ABS 2001. *Statistical Geography, Volume 1, Australian Standard Geographical Classification (ASGC) 2001*, cat. no. 1216.0, ABS, Canberra.

—— 2002. *Australian Indigenous Geographical Classification: Maps and Census Profiles*, cat. no. 4706.0.30.001, ABS, Canberra.

Altman, J.C., Biddle, N. and Hunter, B.H. 2004. 'Indigenous socioeconomic change 1971–2001: A historical perspective', *CAEPR Discussion Paper No. 266*, CAEPR, ANU, Canberra.

Altman, J.C. and Hunter, B.H. 1998. 'Indigenous Poverty' in R. Fincher and J. Nieuwenhuysen (eds) *Australian Poverty: Then and Now*, Melbourne University Press, Melbourne, 238–57.

—— forthcoming. 'Economic life' in W. S. Arthur and F. Morphy (eds) *Macquarie Atlas of Indigenous Australia*, Macquarie Library Pty Ltd, Sydney.

Arthur, W.S. and Morphy, F. (eds) forthcoming. *Macquarie Atlas of Indigenous Australia*, Macquarie Library Pty Ltd, Sydney.

Charles Darwin University and Northern Territory Government 2004. *Report on future directions for secondary education in the Northern Territory*, Department of Employment, Education and Training, Northern Territory Government, Darwin.

Commonwealth of Australia 1991. *Royal Commission into Aboriginal Deaths in Custody*, vol. 2, (Commissioner E. Johnston), AGPS, Canberra.

—— 2001. *Report on Indigenous Funding*, Commonwealth Grants Commission, Canberra.

Cook, R.D. and Weisberg, S. 1983. 'Diagnostic for heteroscedasticity in regression', *Biometrika*, 70 (1): 1–10.

Daly, A.E. 2001. 'Implications of developments in telecommunications for Indigenous people in remote and rural Australia', *CAEPR Discussion Paper No. 219*, CAEPR, ANU, Canberra.

Department of Education Science and Training (DEST) 2004. 'Indigenous Education: Achievement through choice and opportunity. Australian Government Indigenous-specific funding for the 2005–2008 Quadrennium', *DEST Discussion Paper*, DEST, Canberra.

Folds, R. 2001. *Crossed Purposes: The Pintupi and Australia's Indigenous Policy*, UNSW Press, Sydney.

Gaminiratne, K.H.W. 1993. 'Change in Aboriginal and Torres Strait Islander population distribution, 1986–91', *CAEPR Discussion Paper No. 49*, CAEPR, ANU, Canberra.

Gelade, S. and Stehlik, T. 2004. *Exploring locality: the impact of context on Indigenous vocational education and training aspirations and outcomes*, National Centre for Vocational Education and Training, Adelaide.

Greene, W.H. 2000. *Econometric Analysis*, Prentice Hall, New Jersey.

Hosmer, D. and Lemeshow, S. 1989. *Applied Logistic Regression*, Wiley, New York.

Hugo, G. 1990. *Atlas of the Australian People: Tasmania 1986 Census*, AGPS, Canberra.

Hunter, B.H. 1998. *The effect of high rates of arrest on educational attainment among indigenous Australians*, presented to the Annual Meeting of the American Economist Association, Chicago, 3–5 January 1998.

—— 2002a. 'The rise of the CDEP scheme and changing factors underlying Indigenous employment', *CAEPR Working Paper No. 13*, CAEPR, ANU, Canberra, available online at <**http://www.anu.edu.au/caepr/**>.

—— 2002b. 'Institutional factors underpinning Indigenous labour force participation: The role of the CDEP scheme and education', *CAEPR Working Paper No. 14*, CAEPR, ANU, Canberra, available online at <**http://www.anu.edu.au/caepr/**>.

—— 2003. 'The rise of the CDEP scheme and changing factors underlying Indigenous male employment', *Australian Journal of Labour Economics*, 6 (3): 473–96.

—— 2004. *Indigenous Australians in the Contemporary Labour Market*, ABS cat. no. 2052.0, ABS, Canberra.

Hunter, B.H. and Altman, J.C. 1996. 'Welfare assistance and the Indigenous labour force: an analysis', *People and Place*, 4 (2): 46–58.

Hunter, B.H. and Borland, J. 1997. 'The interrelationships between arrest and employment: more evidence on the social determinants of Indigenous employment', *CAEPR Discussion Paper No. 136*, CAEPR, ANU, Canberra.

Hunter, B.H. and Schwab, R.G. 1998. 'The determinants of Indigenous educational outcomes', *CAEPR Discussion Paper No. 160*, CAEPR, ANU, Canberra.

Jones, F.L. 1982. 'Aboriginal Australians' in Economic and Social Commission for Asia and the Pacific (ed), *Population of Australia, Country Monograph Series, vol. 1, no. 9*, United Nations, New York, 128–59.

Knight, B. 2004. 'Vocational learning in schools as an equity strategy', in K. Bowman (ed), *Equity in Vocational Education and Training: Research Readings*, NCVER, Adelaide.

Mellor, S. and Corrigan, M. 2004. *The case for change: A review of contemporary research on Indigenous education outcomes*, Australian Council for Educational Research, Camberwell, Victoria.

Misko, J. 2004. *The role of Community Development Employment Projects in rural and remote communities*, NCVER, Adelaide.

Petrill, S.A., Price, A., Price, R. and Plomin, R. 2004. 'Chaos in the home and socioeconomic status are associated with cognitive development in early childhood: Environmental mediators identified in genetic design', *Intelligence*, 32 (5): 445–60.

Quiggin, J. 1998. 'Competition hangups', *Eureka Street*, 8 (4): 23–4.

Schwab, R.G. 1995. 'Twenty years of policy recommendations for Indigenous education: overview and research implications', *CAEPR Discussion Paper No. 92*, CAEPR, ANU, Canberra.

—— 1996. 'Indigenous participation in higher education: culture, choice and human capital theory', *CAEPR Discussion Paper No. 122*, CAEPR, ANU, Canberra.

—— forthcoming. 'Indigenous junior rangers: developing tradition-based land and resource management programs as a mechanism for the educational and social re-engagement of Indigenous youth', *CAEPR Discussion Paper*, CAEPR, ANU, Canberra.

Schwab, R.G. and Sutherland, D. 2003. 'Indigenous learning communities: a vehicle for community empowerment and capacity development', *Learning Communities: International Journal of Learning in Social Contexts*, 1 (1): 53–70.

—— 2004. *Literacy For Life: A Scoping Study for a Community Literacy Empowerment Project*, The Fred Hollows Foundation and The ANU, Sydney and Canberra.

—— forthcoming. 'Education' in W. S. Arthur and F. Morphy (eds) *Macquarie Atlas of Indigenous Australia*, Macquarie Library Pty Ltd, Sydney

Smith, D. 2003. 'When the Starship Pintupi Meets the Klingons of Policy. Review Essay of Ralph Folds, Crossed Purposes: The Pintupi and Australia's Indigenous Policy', *The Australian Journal of Anthropology*, 14 (2): 259–64.

Taylor, J. and Arthur, W.S. 1993. 'Spatial redistribution of the Torres Strait Islander population: A preliminary analysis', *Australian Geographer*, 24 (2): 26–38.

Teese, R. 2004. 'Early school leavers and VET' in K. Bowman (ed) *Equity in Vocational Education and Training: Research Readings*, NCVER, Adelaide.