Australian National University

Crawford School of Public Policy

TTPI

Tax and Transfer Policy Institute

Towards an estimate of Aboriginal and Torres Strait Islander human capital and how it is changing over time

TTPI - Working Paper 8/2024
July 2024

Nicholas Biddle
Head, School of Politics and International Relations
Australian National University

Abstract

Public policy in Australia has historically failed to provide the supports and infrastructure for the Aboriginal and Torres Strait Islander population to engage in formal education in a way which meets the needs and aspirations of the population. This includes early childhood, school, and postschool education. For this reason, Human Capital development including but not limited to school completion and post-school attainment has been less than equitable, leading to worse outcomes by standard measures (income, employment, and health) and also by Indigenous-specific measures that Aboriginal and Torres Strait Islander Australians have cause to value (including access to land, language, and culture). Over recent years, there has been substantial improvement in the level of education completion for the Aboriginal and Torres Strait Islander population, although the measurement of this change is complicated by changing patterns of identification and location. The aim of this paper is to use publicly available data to measure the level of Aboriginal and Torres Strait Islander Human Capital and document how it is changing through time. The process of this measurement involves estimating the level of education, calculating the economic returns to that education, and then comparing lifetime income streams for different levels of education. Through this process, the paper highlights that the level of Human Capital for the Aboriginal and Torres Strait Islander has increased substantially in the decade between 2011 and 2021, is higher per working age adult for males than females (by a ratio of 1.17 in 2021), and is substantially higher for the non-Indigenous population than for the Aboriginal and Torres Strait Islander population (1.69 times higher for males and 1.59 times higher for females in 2021). At the end of the paper, I discuss how the method can be applied on slightly different data to extend our understanding, as well as the implications of the findings for understanding the education decisions of Australia's First Nations population.

Keywords: Human Capital; Aboriginal and Torres Strait Islander population; Census; Lifetime income

* *This paper was written for the Australian Bureau of Statistics/Reserve Bank of Australia conference on Human Capital in June 2024. The author would like to thank participants at the conference for comments on an earlier draft of this paper, as well as Associate Professor Cain Polidano of the University of Melbourne who gave very detailed and helpful comments on a revised version of the paper.*
Author contact: nicholas.biddle@anu.edu.au +61-(0)466-841-595 (Mobile).

Tax and Transfer Policy Institute

Crawford School of Public Policy

College of Asia and the Pacific

+61 2 6125 9318

tax.policy@anu.edu.au

The Australian National University

Canberra ACT 0200 Australia

www.anu.edu.au

The Tax and Transfer Policy Institute (TTPI) is an independent policy institute that was established in 2013 with seed funding from the federal government. It is supported by the Crawford School of Public Policy of the Australian National University.

TTPI contributes to public policy by improving understanding, building the evidence base, and promoting the study, discussion and debate of the economic and social impacts of the tax and transfer system.

The Crawford School of Public Policy is the Australian National University's public policy school, serving and influencing Australia, Asia and the Pacific through advanced policy research, graduate and executive education, and policy impact.

The School of Politics and International Relations (SPIR) is a major teaching and research school within the Research School of Social Sciences and has a reputation for excellence in research, undergraduate education and postgraduate supervision, producing work on political parties, public administration, trade unions, pressure groups, elections and political behaviour.

1 Introduction

The Human Capital Model, or HCM, in more or less its current form was outlined by Becker (1964) and then revised in Becker (1994). At the heart of the model is the assumption that when deciding whether or not to undertake a certain type of education, potential students are rational (in the economic sense) utility maximisers who, above all, see education as an investment.

An investment in education will improve one's performance in the workplace and an individual will invest until the returns to an additional unit of education (measured by increases in discounted future income) just equal the cost. That is, until marginal returns equal marginal cost. According to Becker (1994) 'Schooling, a computer training course, expenditures on medical care, and lectures on the virtues of punctuality and honesty are capital too in the sense that they improve health, raise earnings, or add to a person's appreciation of literature over much of his or her lifetime.'

The Australian Aboriginal and Torres Strait Islander population comprises the self-identified descendants of the original inhabitants of the Australian continent and adjacent islands. Based on estimates following the 2021 Census, as of 30 June 2021, there were 983,700 Aboriginal and Torres Strait Islander people in Australia, representing 3.8% of the total Australian population. Public policy in Australia has historically failed to provide the supports and infrastructure for the Aboriginal and Torres Strait Islander population to engage in formal education in a way which meets the needs and aspirations of the population (Herbert 2012). Historically, Aboriginal and Torres Strait Islander populations have been excluded from mainstream education opportunities, with external constraints imposed on the development of their own Human Capital.

While there are limits to the application of the Human Capital model to the Aboriginal and Torres Strait Islander population (described later in this section), making use of the Human Capital approach has benefits for understanding the education decision, and other related outcomes. Even though it may not be the only or even the primary factor, income and access to economic resources are still important factors in motivating Aboriginal and Torres Strait Islander students and their families (Hughes et al. 2023). Related to this, if we want to understand the development levels, options, and constraints of Indigenous communities, then the Human Capital of those communities is a key determinant, even if that may not have been what was the main driver of that education decision in the first place.

Taking a Human Capital approach to understanding Aboriginal and Torres Strait Islander education may be also useful in that it can help shed light on some of the other aspects of the education decision. If we acknowledge that community, culture, language, and wellbeing are important, but there are still many Aboriginal and Torres Strait Islander Australians not engaging in education, then this may be in part because the economic costs are too high, or the returns are too low.

Finally, the Human Capital approach to education has undoubtedly seeped into the public policy approach adopted for the Aboriginal and Torres Strait Islander population. This includes the framing of the Closing the Gap policy agenda, including the most recent iteration that was developed in partnership with Indigenous peak organisations. Target 6 of the policy is that 'By 2031, increase the proportion of Aboriginal and Torres Strait Islander people aged 25-34 years who have completed a tertiary qualification (Certificate III and above) to 70 per cent' whereas

Target 8 is that 'By 2031, increase the proportion of Aboriginal and Torres Strait Islander people aged 25-64 who are employed to 62 per cent.'

Unlike the original version of the Closing the Gap targets, which only focused on mainstream measures, there are also targets in the revised approach related to social and emotional wellbeing (Target 14), as well as culture and language (Target 16). However, despite this recognition of broader notions of wellbeing, mainstream education achievement and employment still matters in government policy, and it is important to identify the link between the two.

There are undoubtedly limits to the Human Capital approach when applying it to the Aboriginal and Torres Strait Islander population. The traditional definition of Human Capital is very European-centric (for example the reference to 'literature' as opposed to other forms of cultural expression in Becker's framing). However, it need not be interpreted in such a way. A broader definition of Human Capital that is arguably of greater relevance to other populations would be the 'knowledge, skills, competencies and attributes that allow people to contribute to their personal and social well-being, as well as that of their countries', or more succinctly, a person's 'skills, learning, talents, and attributes' (Brian 2007).

Analyses of the education outcomes of the Aboriginal and Torres Strait Islander population rarely make use of the Human Capital model as a framing device. This is partly driven by the European-centrism of the traditional model articulated by Gary Becker and utilised within the field of economics, a field that rarely engages with issues of Indigenous peoples (with some exceptions, including Biddle (2018) which explicitly took a Human Capital approach to development and Indigenous peoples).

This reluctance to make use of the Human Capital model also reflects the view expressed by many if not most Indigenous researchers, community leaders, and families, that education is much more than a means to a comfortable lifetime income stream. Rather, for the Indigenous community, education should ideally be directed towards supporting community development, cultural strength, language maintenance, and broader notions of wellbeing.

For example, as part of the design and evaluation of a program focused on supporting Aboriginal and Torres Strait Islander Students (the Redefining Indigenous Success in Education (RISE) Project), Hughes et al. (2023) collected qualitative data from Indigenous high school students, parents/carers, and program alumni. The analysis showed that 'their perceptions of 'success' in education reside at the intersection of participation in the 'Indigenous world' and 'mainstream world'.' More specifically, the findings from the interviews suggested that:

- 'participants emphasised the importance of education in supporting social and emotional wellbeing and achieving personal goals.'
- participants associated ''success' in education with 'giving back' to family and community through pursuing careers that could generate social goods, mentorship and making family proud' and
- 'participants recognised participation in high school as important in accessing future opportunities and described 'success' in terms of attending school, getting good grades, completing Year 12 and accessing higher education'

There is also a legitimate concern that a Human Capital-style approach to understanding Aboriginal and Torres Strait Islander education participation and attainment can veer into what has come to be known as 'deficit discourse' (Fogarty and Kral 2011; Sarra 2011; Griffin and

Trudgett, 2018). This refers to a perceived way of thinking and talking about Aboriginal and Torres Strait Islander students and their communities that emphasizes what they lack compared to the dominant (often non-Indigenous) population. The critique is that such approaches attribute educational underachievement among Indigenous students to deficiencies within the students, their families, or their cultures, rather than systemic issues or structural inequalities.

These concerns are valid. However, as I will attempt to show in this paper, there are insights from utilising a Human Capital approach to shed some small insights into the education outcomes of Aboriginal and Torres Strait Islander Australians. Indeed, many of the critiques of the Human Capital approach and its limitations are true for other populations. Even the strongest proponents of the model would concede that lifetime income streams are not the sole motivator for sending a child to an early education program, a high school student paying attention in class, or a recent high school graduate making a decision as to whether or not to enrol in a degree and, if so, which one. Many other factors, including community development, culture, and wellbeing are also important factors in the education decision for non-Indigenous students. However, the approach can still be useful.

With that in mind then, the aim of this paper is to make use of the latest available data, as well as historic data to provide some initial, plausible estimates of the level of Aboriginal and Torres Strait Islander Human Capital in Australia. After introducing the data and methods (in Section 2) the paper steps through the components of the Human Capital calculation. In Section 3, I outline the current level of education attainment in Australia, making comparisons by sex, and by Indigenous statis. In Section 4, I outline how employment outcomes vary by education and the levels of income for those who are employed. In Section 5, I pull this together to provide an estimate of Indigenous Human Capital as of mid-2021. Section 6 provides some estimates of how this has changed in the last decade and some reasons for that, with Section 7 providing some concluding comments and outlining how these initial estimates can be built on to provide a more detailed picture of Aboriginal and Torres Strait Islander Human Capital in Australia.

2 Data and method

2.1 Census variables

The analysis in this paper is based largely on the 2021 Census, with comparisons also made with results from 2011 and 2016. Undertaken in August of each of those years, the Census includes information from a close to 100 per cent sample of the Australian population for the main variables of relevance for calculating the level of Human Capital for a relatively small sub-population. Specifically, to calculate the level of Human Capital for the Aboriginal and Torres Strait Islander population I make use of the following variables from the Census:

- Aboriginal and Torres Strait Islander status
- Age
- Sex
- High school completion
- Highest post-school qualifications
- Current student status
- Labour force status
- Personal income

2.2 Undercount adjustment

Excluding those that did not respond to the question, there were 812,700 Indigenous Australians counted in the 2021 Census in August. This is around 3.2 per cent of the Australian population who answered the Indigenous status question and 25.2 per cent higher than the count in 2016, which equates to an annual growth rate of 4.6 per cent.

Much of the analysis presented in the next sections involves estimating relationships between key Human Capital measures for individuals. For these calculations, there is no need to make adjustments for those missed from the Census. However, one of the ultimate aims of the paper is to estimate the aggregate level of Human Capital for the Aboriginal and Torres Strait Islander population (and for comparison purposes, the non-Indigenous population). To do this, it is necessary to adjust for the Indigenous (and non-Indigenous) population missing from the Census.

The main source of 'missingness' in the data is the 1.2 million in-scope census records that don't have an Indigenous status recorded. This could be because the respondent didn't answer that specific question (unit non-response) or because they didn't answer any questions and had a dummy record created for them (unit non-response). A second source of missingness is those who were in scope of the Census, but were missed from the count entirely. The final source of missingness is people who were overseas on the night of the Census, though this was quite small in 2021 due to the impact of the COVID-19 travel restrictions. It was a little larger for previous censuses.

After adjusting for undercount using the Post-Enumeration Survey or PES,[1] it is estimated that there were 983,300 Indigenous Australians as of June 30, 2021. The ABS also provides an age/sex specific undercount estimate from the PES, as well as an estimate of the (much smaller) undercount for the non-Indigenous population. The undercount adjustment is also available for the 2011 and 2016 Censuses.

We apply these undercount adjustments when I estimate the overall level of Human Capital in Australia for the Aboriginal and Torres Strait Islander population, though it should be noted that it is not possible to estimate the undercount separately by education, employment, or income.

2.3 Estimating identification change

One of the goals of this paper is to estimate how the level of Human Capital for the Aboriginal and Torres Strait Islander population has changed over the decade leading up to the 2021 Census. As described above, this was a period of very rapid growth in the population, with both intercensal periods witnessing a much faster growth of the Aboriginal and Torres Strait Islander population than the growth in the non-Indigenous population (despite the latter impacted by high rates of net inward international migration).

Part of the growth in Human Capital that I estimate is therefore driven by population growth. Although an excess of births over deaths explains some of this growth, a much larger part is due to identification change. I estimate this using the Australian Census Longitudinal Database (ACLD).[2] This is a linked dataset, whereby approximately 5 per cent of the sample enumerated

[1] https://www.abs.gov.au/statistics/people/population/2021-census-overcount-and-undercount/latest-release#key-statistics

[2] https://www.abs.gov.au/about/data-services/data-integration/integrated-data/australian-census-longitudinal-dataset-acld

in a particular census are linked to subsequent censuses using statistical techniques. I make use of the 2 of the 3 existing ACLD panels – 2011 (linked to 2016 Census) and 2016 (linked to 2021 Census).

2.4 Estimation method

Putting together the three sources of information described above, our baseline data is then three census datasets (one each for 2011, 2016, and 2021), with the number of people in each Indigenous status, sex, age, education, employment, and income combination. I also have the estimated difference between the census count and the population estimate for each age, sex, and Indigenous status combination. I also have a measure of identification change by age and a set of background characteristics, including education.

The approach to estimate Aboriginal and Torres Strait Islander Human Capital is based on the estimated income difference between those with a particular level of education and those with a baseline level, calculated separately by Indigenous status, sex, and age (using 5-year age cohorts). For simplicity, and balancing variation within education levels and sample size constraints, I use five levels of education:

- No Year 12 and no post-school qualifications (baseline).
- No Year 12, has post-school qualifications.
- Completed Year 12, but no post-school qualifications.
- Completed Year 12, has non-degree qualifications.
- Has a university degree.

The first step in the estimation of Human Capital is to estimate the per cent and number of Aboriginal and Torres Strait Islander and non-Indigenous Australians with each level of education, by sex, and by age. The percentages are based on Census counts, with the total number of people taking into account the age, sex, and Indigenous-status specific undercount mentioned earlier in this section.

Although it is not used in the final estimation of Human Capital, I calculate the per cent of each age, sex, and Indigenous-status group that were employed at the time of the Census. This is useful as an intermediate step to help understand variation in income across the groups.

There are 16 income groups in total for the 2021 Census. Average income for each of the age, sex, Indigenous status, and education groups is found by attributing a value of $0 for those in the negative and nil income groups, the midpoint for those whose income falls into the remaining income groups up to and including the penultimate income group, and a value of $4,000 per week for those in the last income group (which has a lower bound of $3,500 per week).

We then estimate an expected income stream between the age of 15 and 64 for each of the education categories, separately by age, sex, and Indigenous status. Yearly income is found by multiplying average weekly income from the previous step by 52. I assume the following education and income pathway for the five education groups:

- No Year 12 and no post-school qualifications.
    - Not a student from age 15.
- No Year 12, has post-school qualifications.

    - Student from age 15-16, not a student from age 17.
- Completed Year 12, but no post-school qualifications.
    - Student from aged 15-17, not a student from age 18.
- Completed Year 12, has non-degree qualifications.
    - Student from age 15-19, not a student from age 20.
- Has a university degree.
    - Student from age 15-21, not a student from age 22.

Income for students is based on observed data (for full-time students), calculated separately by five-year age cohorts, high school completion, and sex/Indigenous status.

Based on these education pathways, our main intermediate calculation is the expected lifetime income for the five education groupings, between the age of 15 and 64, separately by Indigenous status and sex. The ratio between these provides an indicative measure of the returns to different types of education by Indigenous status and sex.

The final estimation given in the paper is the level of Human Capital for the current population. This starts with the age, sex, and Indigenous-specific income premium for that education category as a measure of the individual's Human Capital. It assumes that from an individual's perspective the value of their Human Capital is measured by the additional income that they would expect to receive throughout their life with their current education, relative to what they would expect without completing Year 12 and/or without a qualification.

We focus on the returns to Human Capital between the age of 25 and 64 under the assumption that before the age of 25 people are still generating Human Capital and that from 65 years of age onward people's income are mostly from savings over their prime working years (including through compulsory superannuation), as well as the age pension.

For someone in the 25-to-29-year age category, their Human Capital is based on 40 years of income premiums. For those aged 30-to-34, their Human Capital is based on 35 years of remaining income premiums, and so forth until the last age group (60 to 64 years) whose Human Capital is based on five years of remaining income premiums. I multiply these expected income premiums by the estimated number of people in each education category by age, sex and Indigenous-status, giving us our overall measure of Human Capital. I then divide the estimated level of Human Capital by the total population aged 25 to 64 years to obtain a per person measure.

We recreate the above process for the 2011 and 2016 Censuses. The questions on sex, age, Aboriginal and Torres Strait Islander Status, education, and employment were broadly the same in those two collections. However, for 2011, there were far fewer income categories (12 in total), with the highest income category being only $2,000 or more per week (which I apply a value of $2,500 to in order to estimate average income). The 2016 Census has a greater number of income categories (15 in total), with the lower bound for the last category being $3,000 per week (we apply a value of $3,500 per week when estimating average). I adjust the income and Human Capital estimates for inflation for these previous years using the Consumer Price Index.

3 Education attainment by age, sex and Indigenous status

We begin our presentation of results with the per cent of each five-year age cohort by their level of education, by Aboriginal and Torres Strait Islander status and sex.

Figure 1a shows that between the ages of 25 and 59, Aboriginal and Torres Strait Islander males are more likely to be in the lowest education category (no Year 12, no qualifications) than Aboriginal and Torres Strait Islander females. For the 60-to-64 year group, percentages are more or less the same, with Aboriginal and Torres Strait Islander females having the highest percentage amongst those 65 years and over.

For both sexes, there is a much higher per cent in this lowest education category for the Aboriginal and Torres Strait Islander population compared to the non-Indigenous population, with the largest relative difference amongst those aged 35-to-34 for males, and 25-to-29 for females. For the latter group (those aged 25-to29), an Aboriginal and Torres Strait Islander female is 4.4 times as likely to have not completes Year 12 and not have any post-school qualifications as a non-Indigenous female.

Apart from the 65 plus age group, Aboriginal and Torres Strait Islander males and females are more likely to be in the No Year 12, with post-school qualification cohort than their non-Indigenous counterparts. The ratio is much greater for females compared to males, with an Indigenous female aged 30-to-34 years 2.7 times as likely to have not completed Year 12 but have a post-school qualification as a non-Indigenous female.

There is a cross-over point for the relative percentages that have completed Year 12 but do not have post-school qualifications. Prior to the 45-to-49 year age group, the Aboriginal and Torres Strait Islander population is more likely to be in that group, with males more likely than females (at least for the first two age categories). From the age of 45-to-49 and onwards, males and females have roughly equal percentages as each other, with the non-Indigenous population more likely to be in that category compared to the Aboriginal and Torres Strait Islander population.

There are quite different patterns across the four populations for the per cent of the respective population that has completed Year 12 and have a post-school qualification (Figure 1d). For Aboriginal and Torres Strait Islander males and females, the percentage declines across the age distribution, with a particularly sharp decline between the 45-to-49 age group and the 55-to-59 group. For most of the current age distribution, Aboriginal and Torres Strait Islander females are more likely to be in this education group relative to their male counterparts, though there is convergence and cross-over from the age of 50-to-54 years and beyond. For the non-Indigenous population, on the other hand, percentages are reasonably steady or even increasing between the 25-to-29 year age group and the 45-to-49 year group.

The final education category is those with a degree.[3] The per cent with a degree is quite stable across the age distribution for the Aboriginal and Torres Strait Islander population. There is a slight decline beyond the age of 45-to-49 years, but not anywhere near as steep a decline as there is for the non-Indigenous population (which starts a bit earlier, from the 40-to-44 year age group and onwards).

[3] There is a small per cent of all four populations that have a degree but report that they have not completed Year 12. This is a little more common at the upper end of the age distribution. However, I combine all those with a degree into a single group.

Females are much more likely to have a degree than males, and non-Indigenous Australians are much more likely to have a degree than Aboriginal and Torres Strait Islander Australians. This is particularly true amongst the young, with an Aboriginal and Torres Strait Islander male aged from 25-to-44 only one-fifth as likely to have a degree as a non-Indigenous male, and an Aboriginal and Torres Strait Islander female only one-quarter as likely in the first two age groups.

Figure 1 Education attainment by Aboriginal and Torres Strait Islander, age, and sex – 2021

Figure 1a No Year 12 and no post-school qualifications

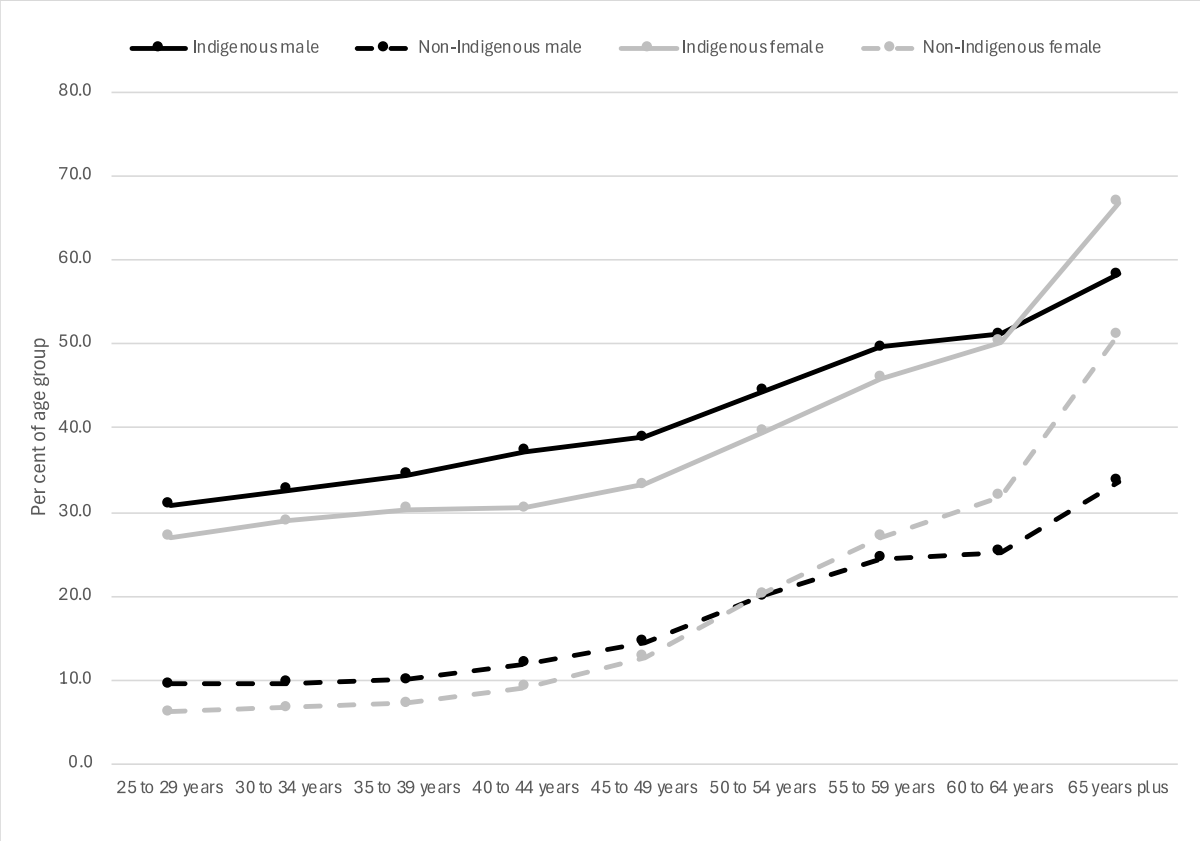


Figure 1b No Year 12, has post-school qualifications.

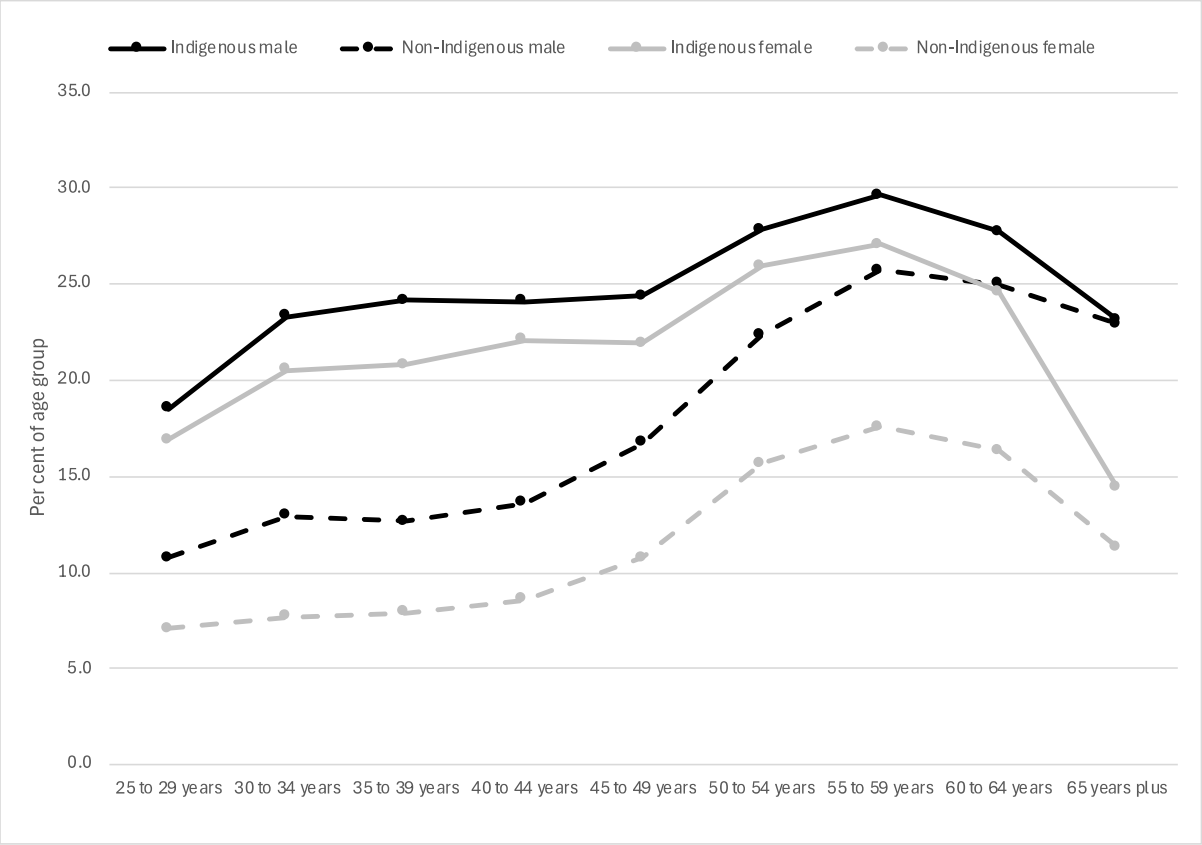


Figure 1c Completed Year 12, but no post-school qualifications.

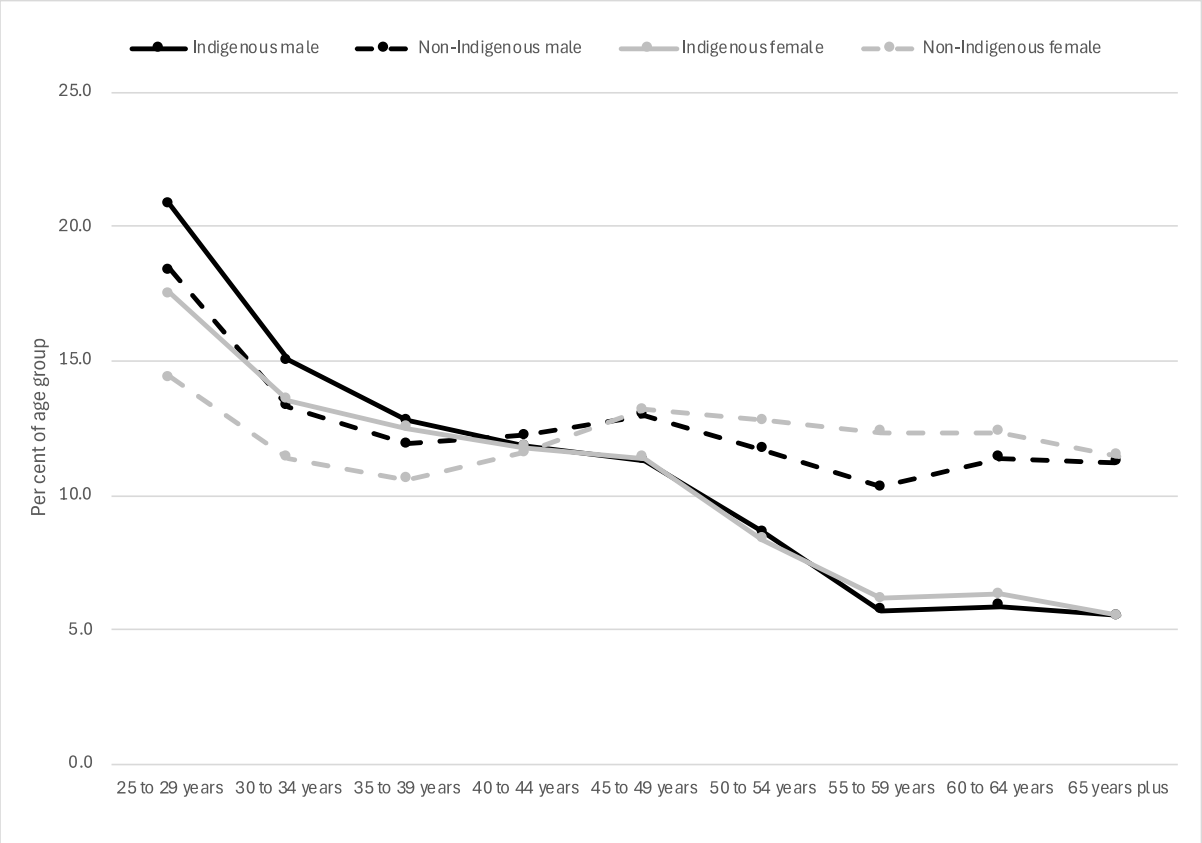


Figure 1d Completed Year 12, has non-degree qualifications.

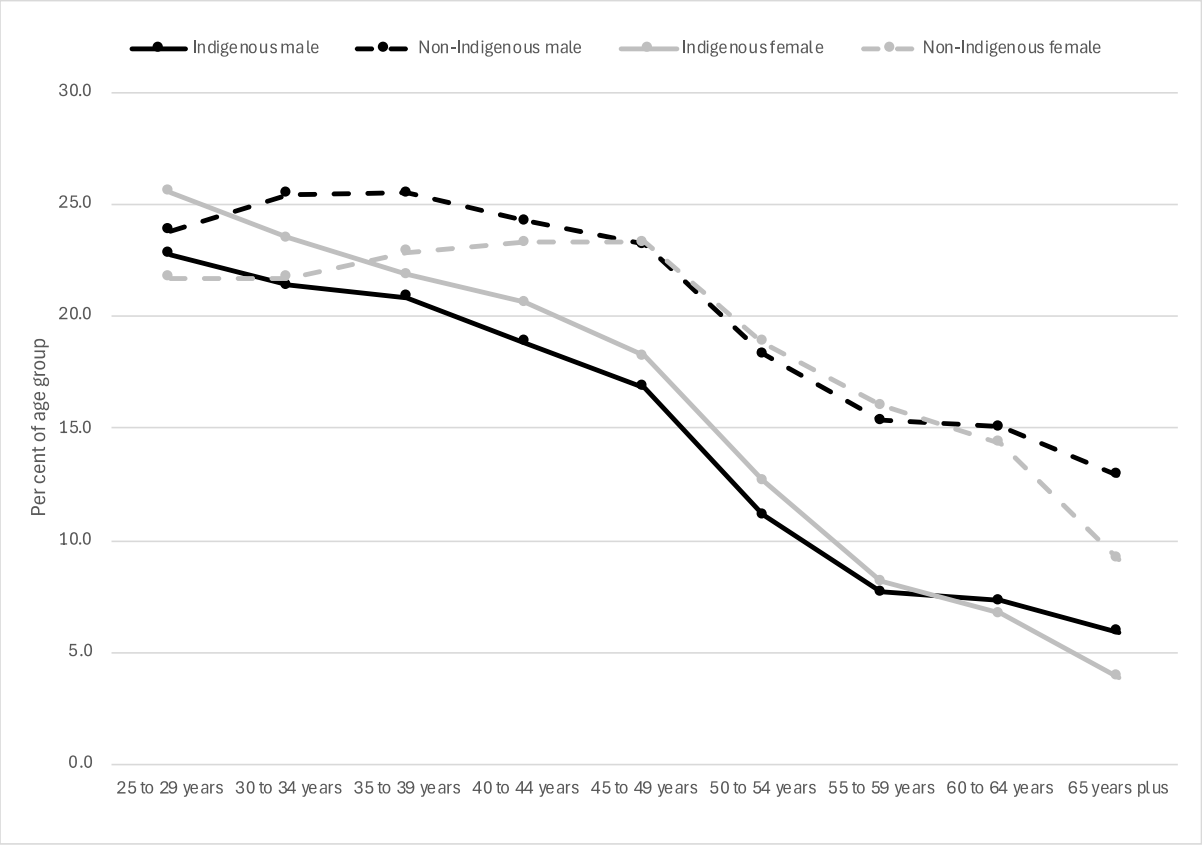
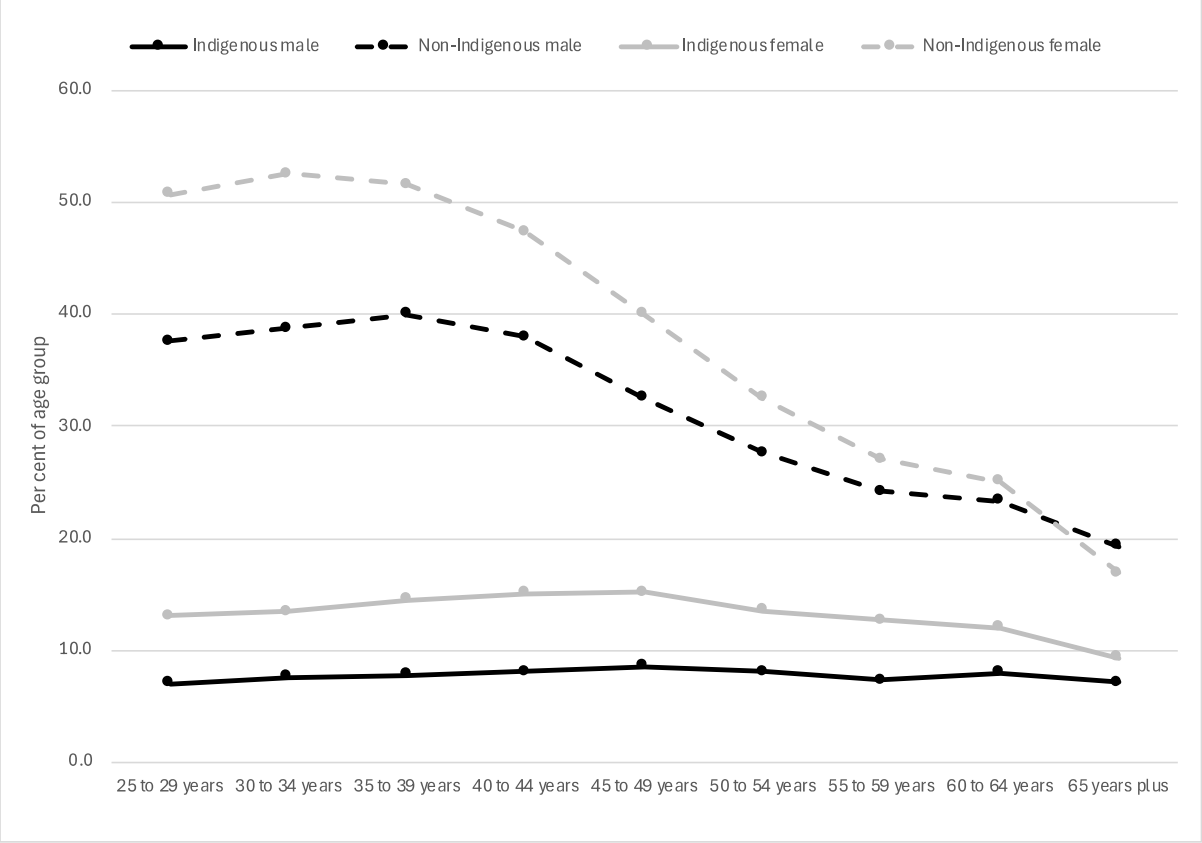


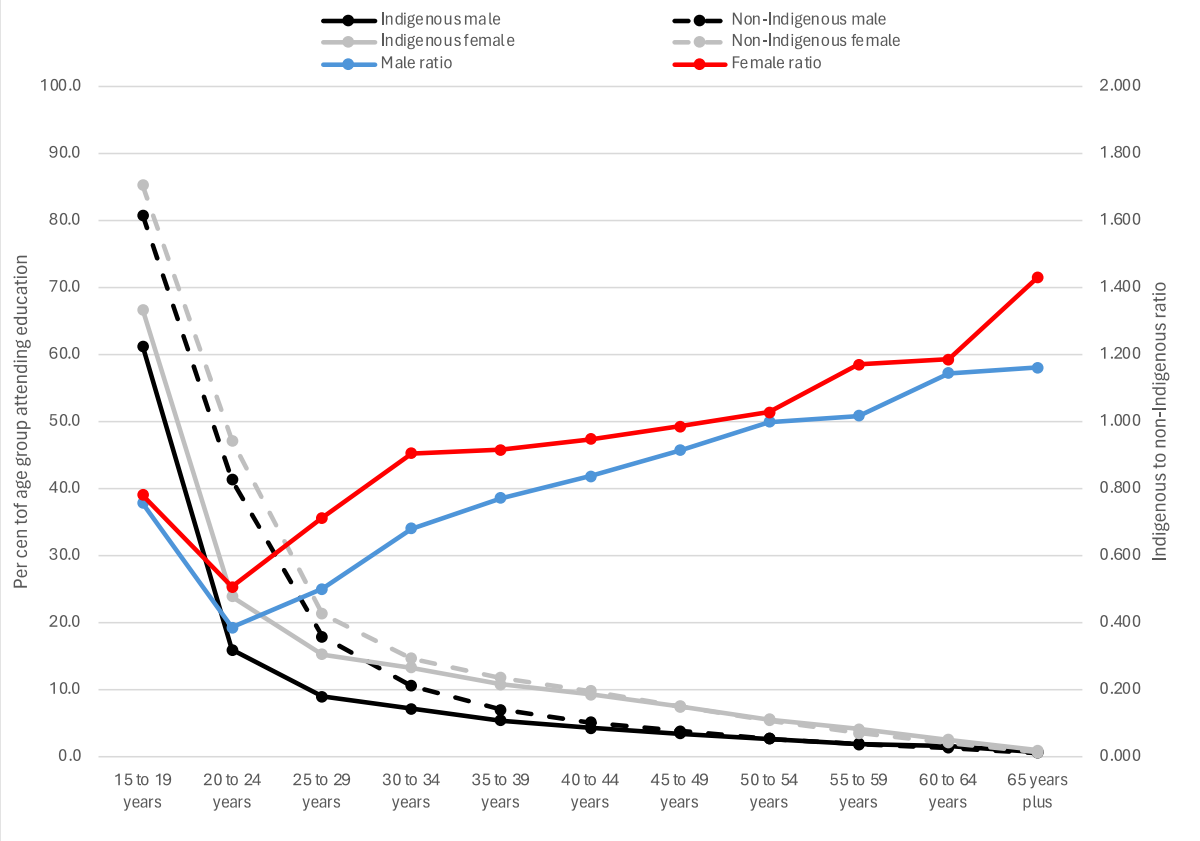
Figure 1e Has a university degree.



There is some converge between Aboriginal and Torres Strait Islander Australians and the rest of the population across the age distribution in terms of education attainment. As shown in Figure 2, this is partly because education participation is so much greater for the non-Indigenous population at the lower end of the age distribution, but also because at the upper end of the age distribution Aboriginal and Torres Strait Islander Australians are as likely to participate as non-Indigenous Australians, and for some of the age groups more likely to.

This is shown by the blue line (for males) and the red line (for females) in the figure, which gives the ratio of Aboriginal and Torres Strait Islander education participation to non-Indigenous participation by age. The cross-over point where the Indigenous population has equal and then higher levels of participation is around 45 years for females, and 50 years for males. While this participation later in life is likely to benefit the individuals undertaking that education, it is not only not at a high enough level to overcome the education disadvantage experienced earlier in the lifecourse, but also gives far fewer years for that education to lead to positive economic returns.

Figure 2 Education participation by Aboriginal and Torres Strait Islander status, age, and sex, and ratio between Indigenous and non-Indigenous participation – 2021



While there is variation across the age distribution, when we look across the working age population there are clear differences in education attainment by Aboriginal and Torres Strait Islander status, and by sex. Furthermore, these differences are shifting through time. Table 1 gives the per cent of the 25 to 64 year old population with each of the five levels of education, by Aboriginal and Torres Strait Islander status and sex. Because of the very different age distributions of the Indigenous and non-Indigenous population, and the patterns of education

attainment by age, it is difficult to compare the averages across such a wide age range. For this reason, I standardise the Aboriginal and Torres Strait Islander figures to represent what the level of education attainment would be if the population had the same age distribution (by five-year age cohort between 25 and 64) as the non-Indigenous population. The age standardisation is done separately for males and females.

For all for groups, there has been an increase in the per cent of the relevant population with a degree over the period, as well as the per cent of the population that has completed Year 12 and has a non-degree qualification. However, the increase of those with a degree was greatest for the non-Indigenous population, and greatest for females relative to males. The largest decline is the per cent of the population that has not completed Year 12 and does not have a qualification, with the decline greatest for the Aboriginal and Torres Strait Islander population, and for females.

Remembering that I have age standardised the Aboriginal and Torres Strait Islander population, we can see that there are still quite large gaps in education attainment. For males, an Aboriginal and Torres Strait Islander aged between 25 and 64 years is only 0.24 as likely in 2021 to have a degree as their non-Indigenous counterpart with the same age distribution. This has only increased from 0.22 in 2011. For females, the gap is a little smaller with an Aboriginal and Torres Strait Islander female aged between 25 and 64 years 0.33 as likely in 2021 to have a degree as a non-Indigenous female with the same age distribution, a slight increase from 0.31 in 2011.

Table 1 Level of education for those aged 25 to 64 years, by Indigenous status and sex, age standardised to the non-Indigenous population, 2011, 2016, and 2021

	No Year 12, no qual	No year 12, qual	Year 12, no qual	Year 12, qual	Degree
Aboriginal and Torres Strait Islander male					
2011	53.2	21.6	10.2	9.4	5.7
2016	44.4	24.4	11.1	13.3	6.7
2021	39.3	24.7	11.8	16.3	7.8
Change (2011 to 2021)	-13.9	3.2	1.7	6.9	2.1
Non-Indigenous male					
2011	21.7	20.7	14.0	18.1	25.5
2016	17.7	19.3	13.9	20.4	28.8
2021	15.2	17.0	12.9	21.7	33.3
Change (2011 to 2021)	-6.5	-3.7	-1.1	3.6	7.8
Aboriginal and Torres Strait Islander female					
2011	53.1	17.6	10.6	9.4	9.3
2016	42.2	21.1	11.5	13.8	11.4
2021	35.2	22.3	11.2	17.6	13.7
Change (2011 to 2021)	-17.9	4.7	0.6	8.2	4.4
Non-Indigenous female					
2011	26.6	11.6	15.0	16.6	30.1
2016	19.4	11.9	14.4	18.9	35.4
2021	14.5	11.2	12.3	20.4	41.6
Change (2011 to 2021)	-12.1	-0.5	-2.8	3.8	11.5

4 Employment and income by education

The previous section showed clearly that Aboriginal and Torres Strait Islander Australians have lower levels of education attainment than non-Indigenous Australians (albeit with a small amount of convergence through time). In this section, I look at the likely impact of this on economic outcomes by first considering the level of employment by education (and age, sex, and Indigenous status), and then turning to the level of income for those who are employed.

4.1 Employment

Figure 3 gives the per cent of each age group that were employed in the week preceding the Census, by Aboriginal and Torres Strait Islander status and sex. Results are presented separately by each of the five education categories. Before looking at the within-education differences, it is important to note that across the education groups, those with higher levels of education tend to have higher levels of employment.

Apart from those aged 65 years and over (an age group with a very low employment percentage), the first four figures show substantially higher levels of employment for males compared to females, and for the non-Indigenous population relative to the Aboriginal and Torres Strait Islander population.

The gap between the Aboriginal and Torres Strait Islander and non-Indigenous populations

narrow across the lower and middle part of the education distribution, but do not completely disappear. There is a smaller gap for those who have completed Year 12 compared to those without, and a narrower gap for those with a non-degree qualification compared to those without one. Interestingly, there is a wider gap for females for lower levels of education, but a wider gap for males for intermediate levels of education.

The most complex relationship is demonstrated in Figure 3e (those with a Degree). For this education category, Aboriginal and Torres Strait Islander females have roughly equivalent levels of employment as Aboriginal and Torres Strait Islander males. Furthermore, at least up until the 40-to-44 year age group, Aboriginal and Torres Strait Islander females were more likely to be employed than their non-Indigenous counterparts.

Figure 3 Employment percentage by Aboriginal and Torres Strait Islander, age, and sex – 2021

Figure 3a No Year 12 and no post-school qualifications

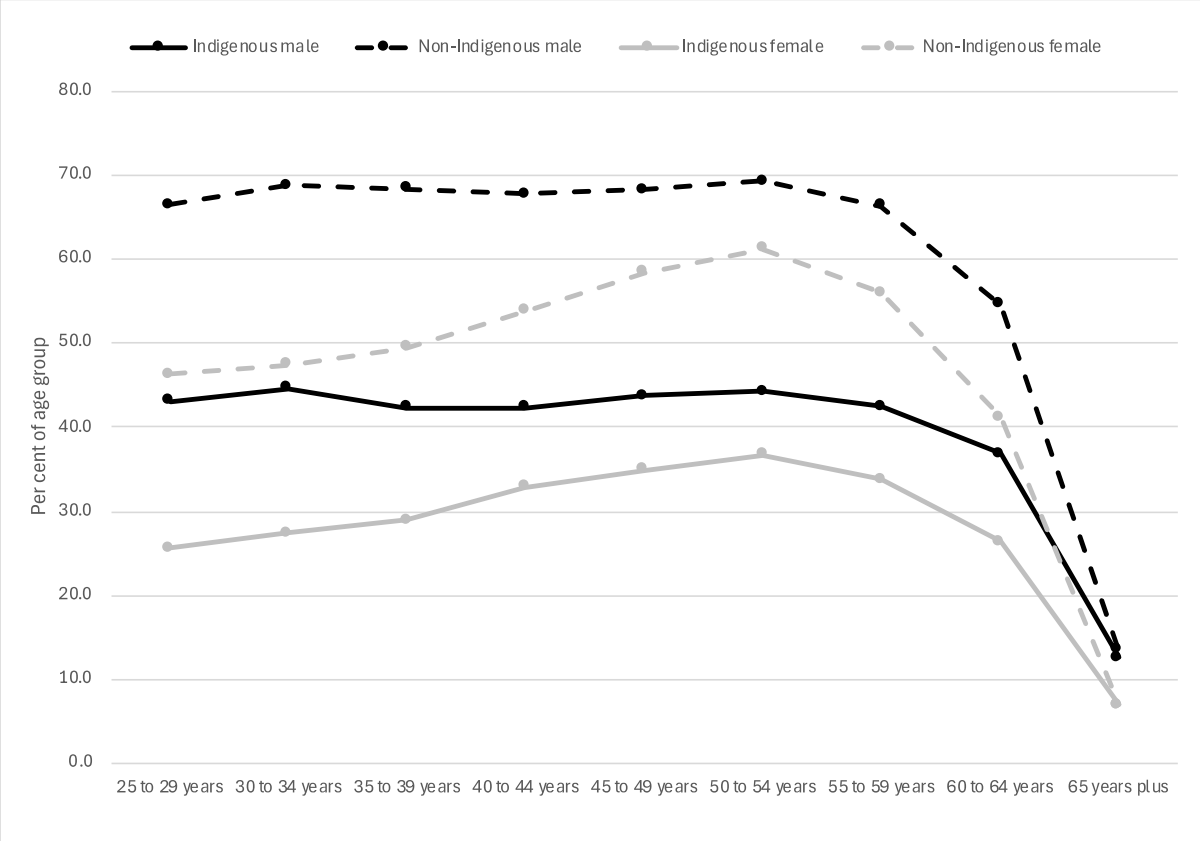


Figure 3b No Year 12, has post-school qualifications.

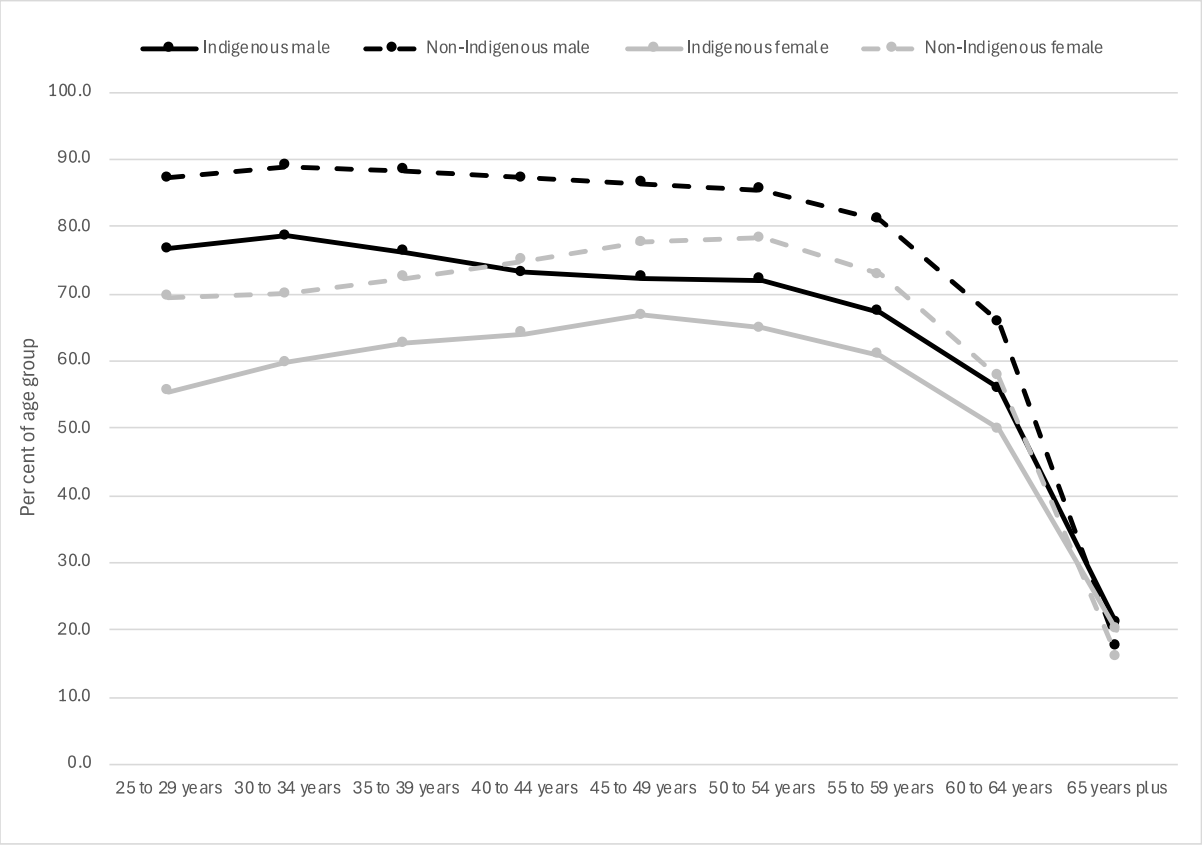


Figure 3c Completed Year 12, but no post-school qualifications.

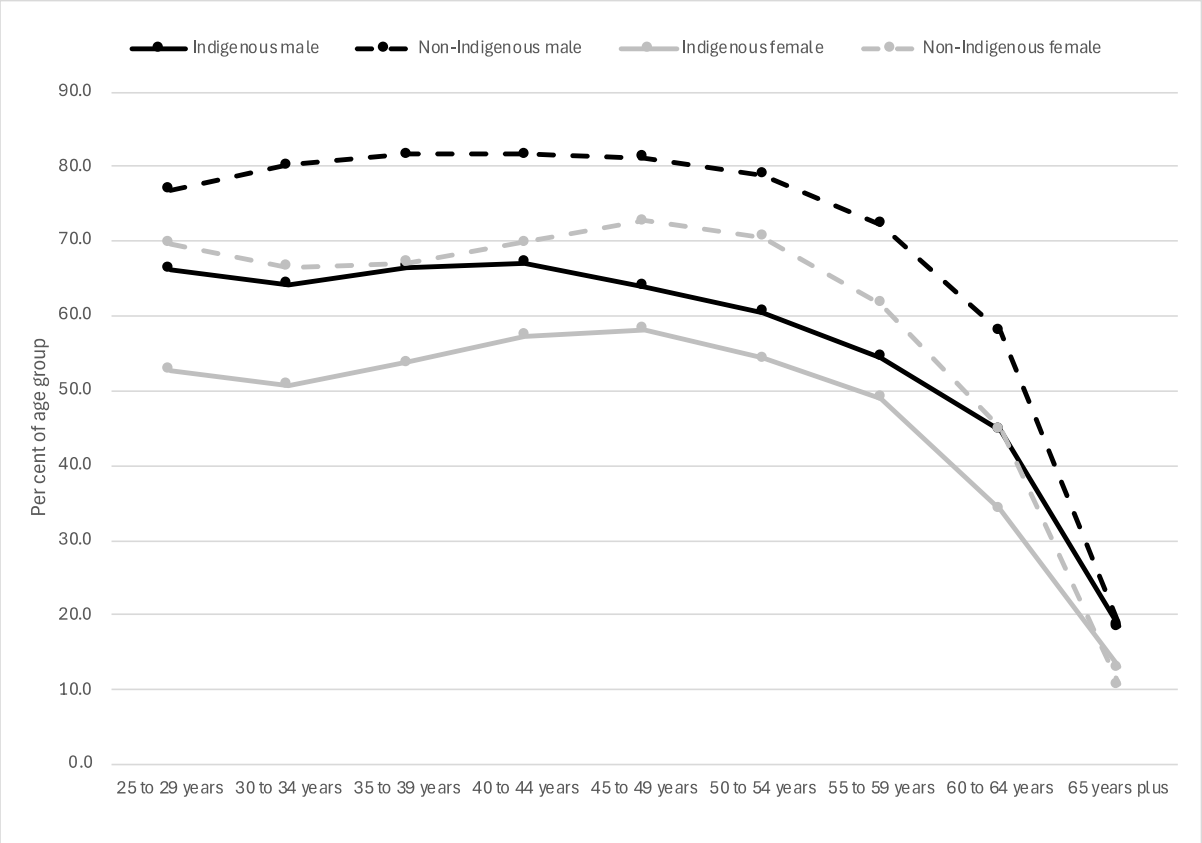


Figure 3d Completed Year 12, has non-degree qualifications.

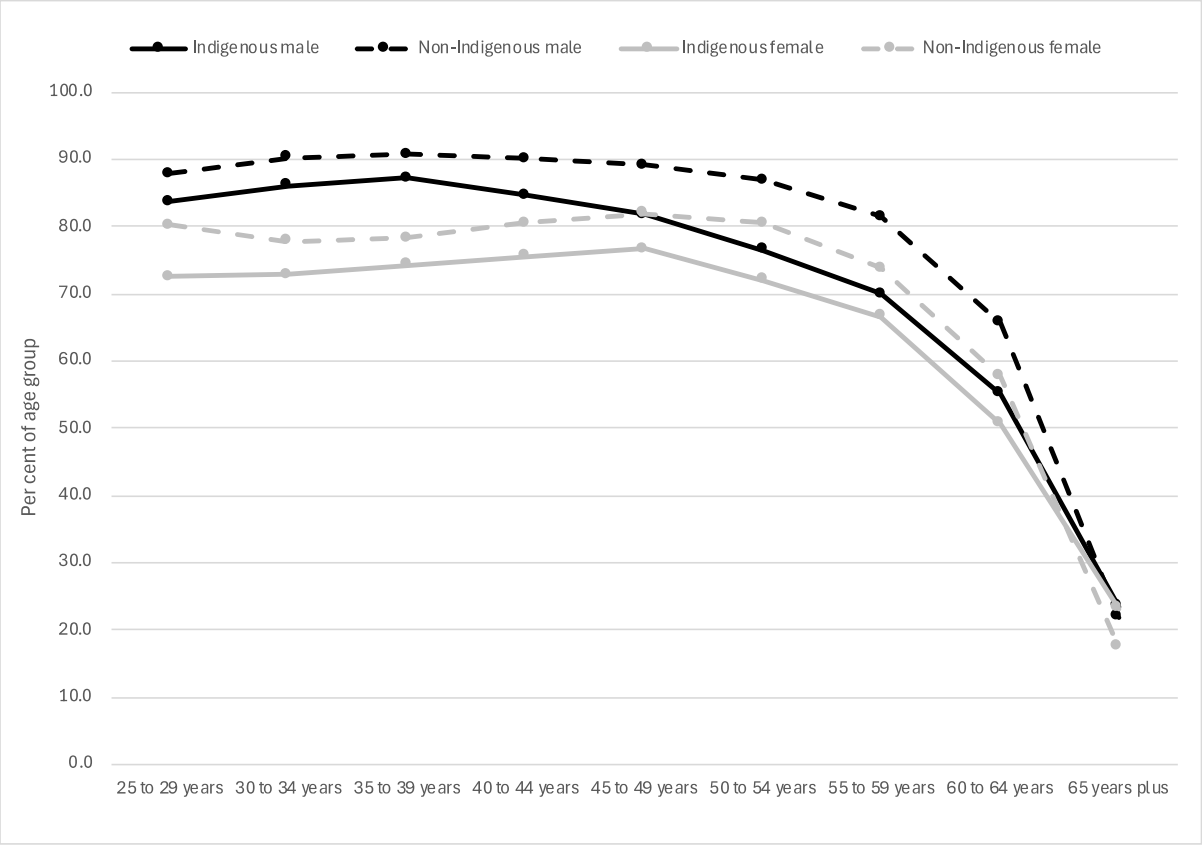
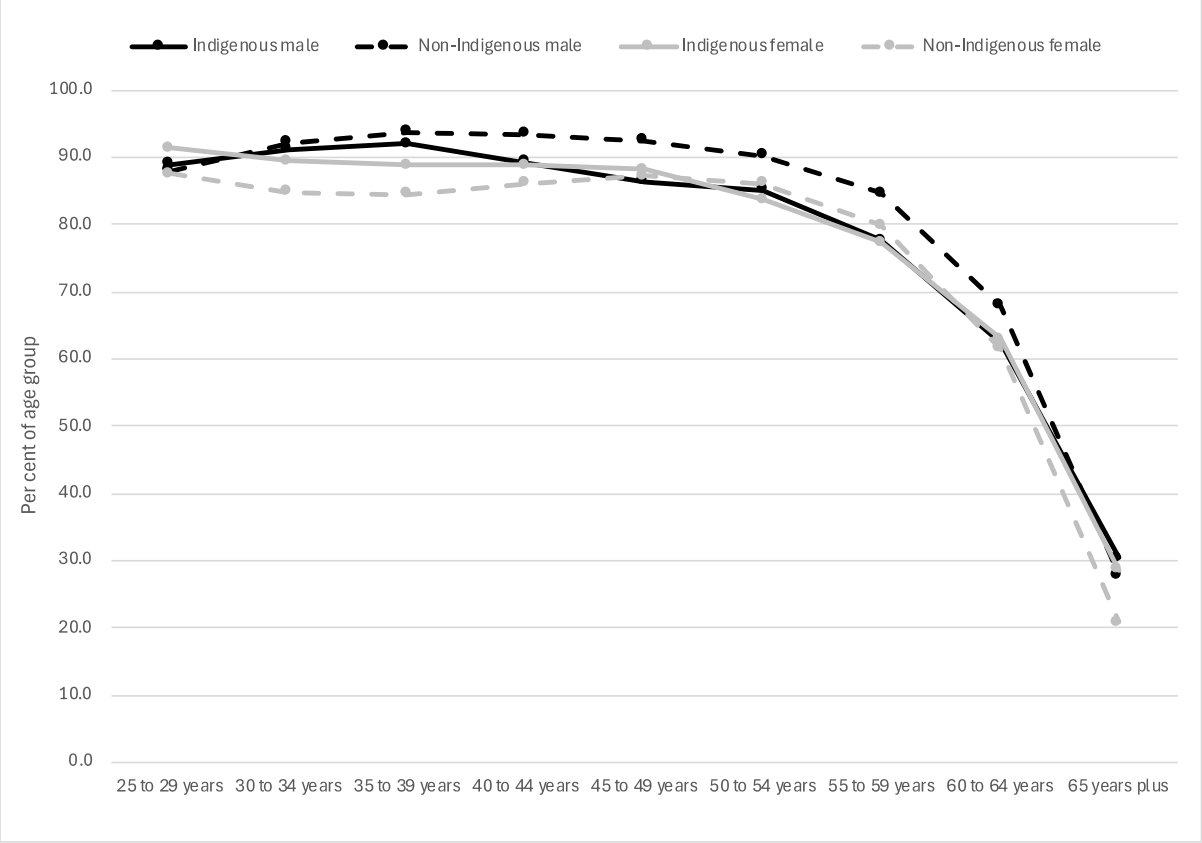


Figure 3e Has a university degree.



4.2 Income

Figure 4 gives average weekly income for those who are employed, presented again by education grouping, age, sex, and Aboriginal and Torres Strait Islander status. Average income is higher amongst those with higher levels of education. However, for these figures, there are much larger differences by sex, than there are by Aboriginal and Torres Strait Islander status or even age. Specifically, for all ages, education levels, and for both Aboriginal and Torres Strait Islanders and the non-Indigenous population, estimated average income is higher for males than females.

For males, income is consistently higher for non-Indigenous Australians compared to their Aboriginal and Torres Strait Islander counterparts. This is true for almost all ages for the first three education groups and for those aged 40 years and over for the last two education categories (those that have completed Year 12 and with either a degree or non-degree qualification). What is interesting is that apart from the first two education categories, for the younger cohorts (those aged 25-to-29) Aboriginal and Torres Strait Islander males that are employed have very similar incomes as their non-Indigenous counterparts.

The findings are slightly different for females compared to males. Within the education categories, and looking across the age distribution, there is very little difference in average income for Aboriginal and Torres Strait Islander females compared to their non-Indigenous counterparts. For the lowest education category, non-Indigenous females have a slightly higher income. However, for those that have completed Year 12 and have no qualification and for those with a degree, income levels are close to identical. Furthermore, amongst those that have a non-degree qualification, Aboriginal and Torres Strait Islander females actually have a higher average income than their non-Indigenous counterparts.

Figure 4 Average weekly income for those employed by Aboriginal and Torres Strait Islander, age, and sex – 2021

Figure 4a No Year 12 and no post-school qualifications

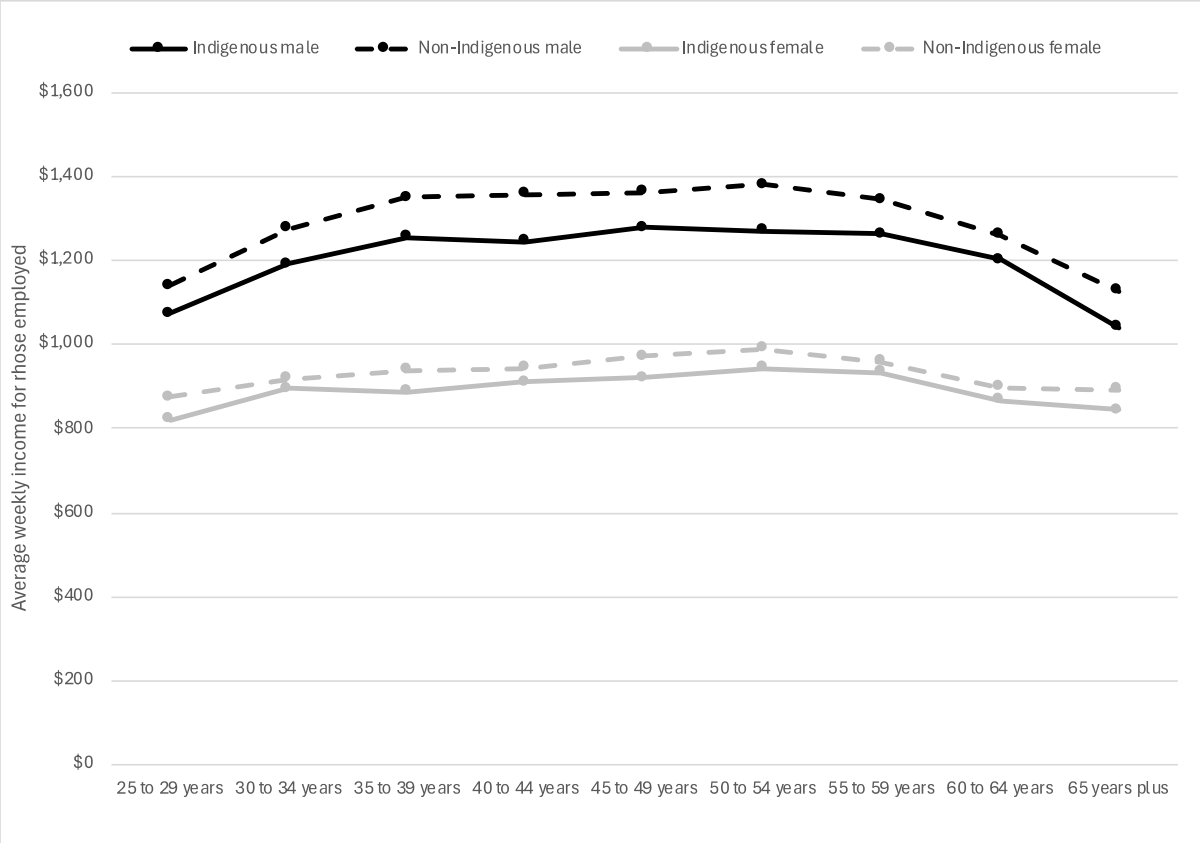


Figure 4b No Year 12, has post-school qualifications.

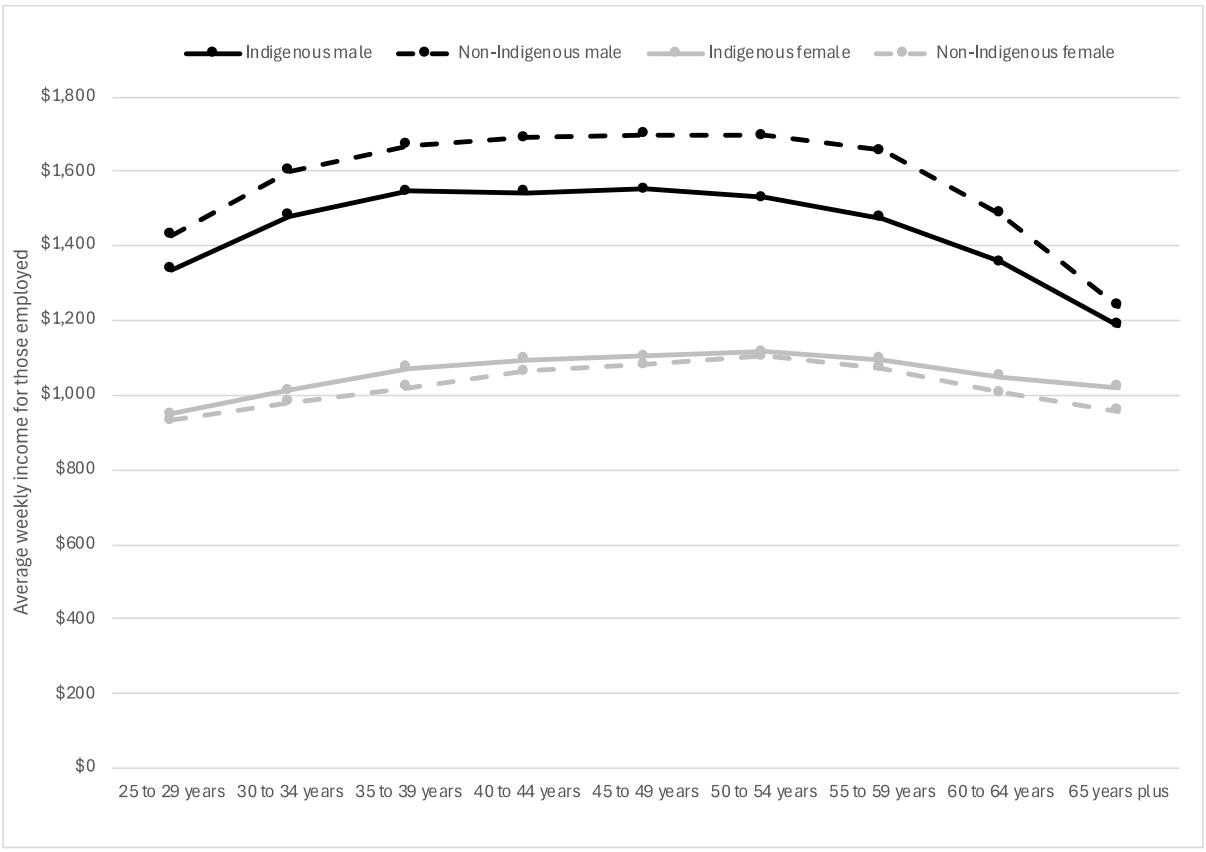


Figure 4c Completed Year 12, but no post-school qualifications.

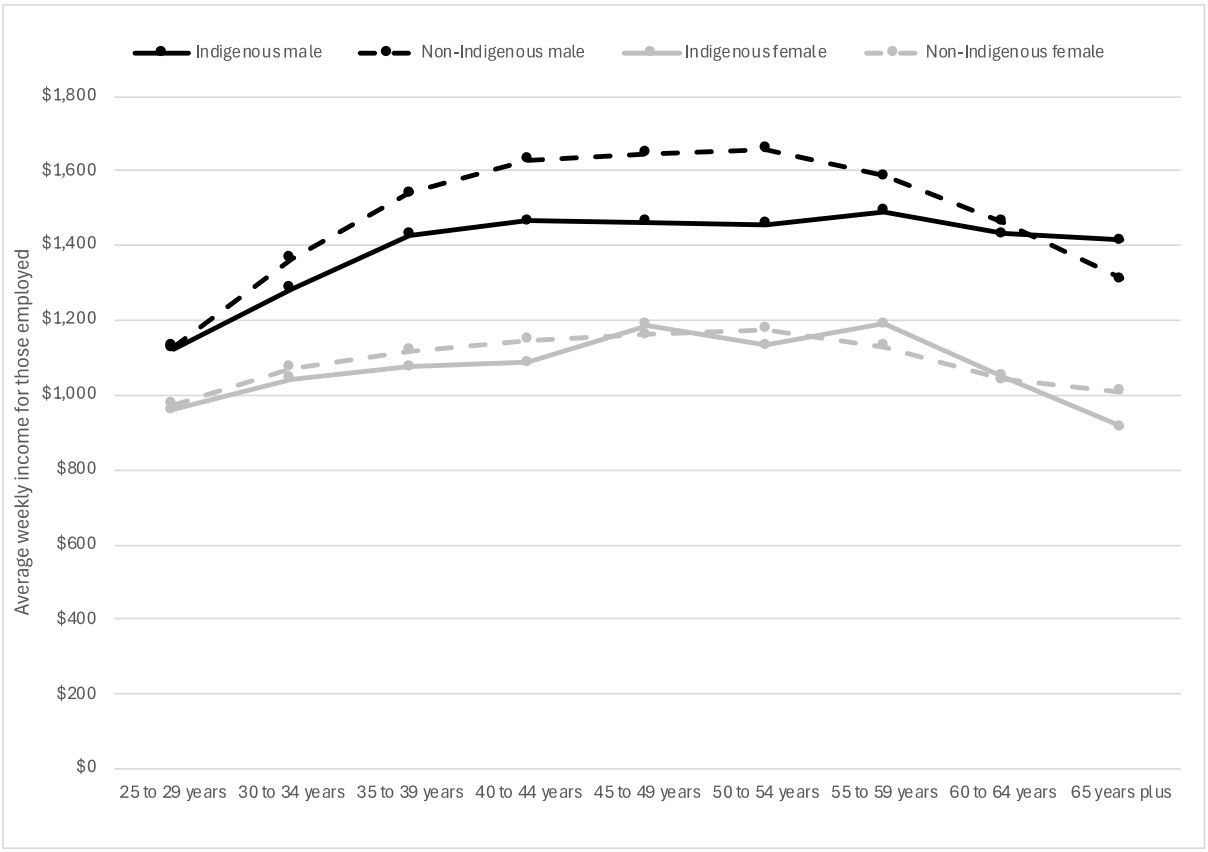


Figure 4d Completed Year 12, has non-degree qualifications.

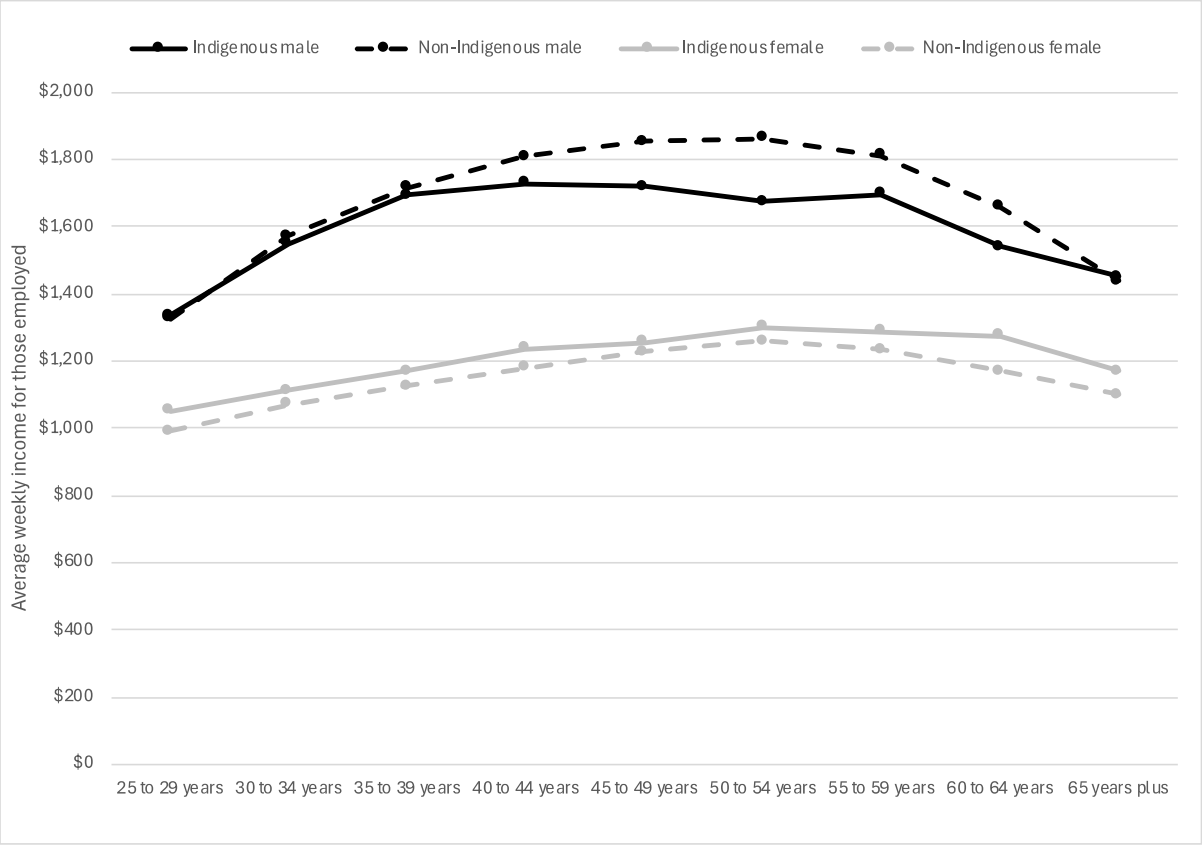
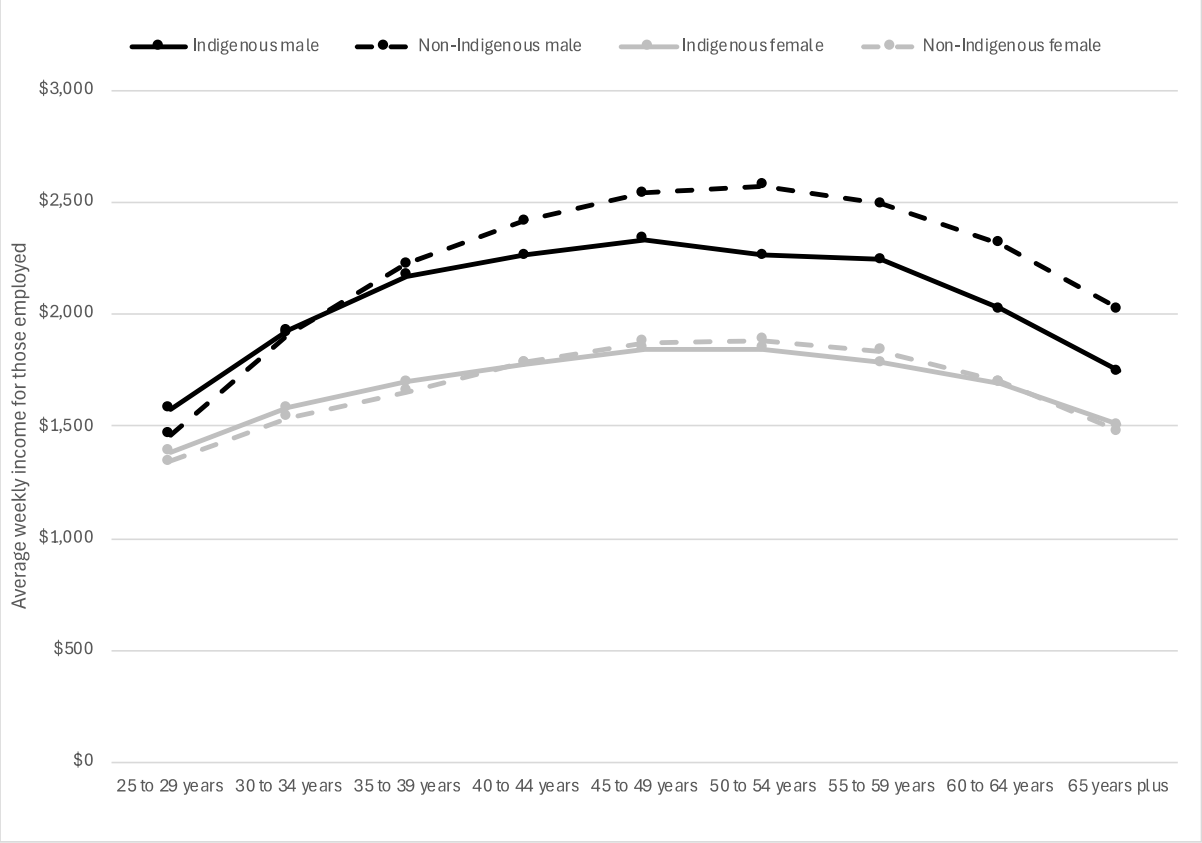


Figure 4e Has a university degree.



5 Income benefits of education and measuring Human Capital

The information summarised in Figures 1, 3, and 4 provide the key building blocks for our estimate of Aboriginal and Torres Strait Islander Human Capital. I am then able to create an estimated lifetime income stream for different levels of education, as well as what that implies for the level of Human Capital for the population.

Table 2 provides the 2021-based lifetime income streams, implied by the figures presented above, and taking into account the opportunity cost of studying (the difference between income for students and what the person's income would be if they were not studying). I also provide the ratio of lifetime income for each of the education categories, relative to its comparison.

For those who have no Year 12 and post-school qualifications, as well as those who have completed Year 12 but have no post-school qualifications, the comparison education category is those that have not completed Year 12 and have no post-school qualifications. For those that have completed Year 12 and have a non-degree qualification and for those that have a university degree, the comparison education category is those who have completed Year 12 but have no post-school qualifications.

The first section of the table confirms the results from the previous figures. However, when I sum across the lifecourse, and take into account the opportunity cost of studying, some very interesting patterns emerge. First, the income premium for non-degree qualifications appears to be a little higher for Aboriginal and Torres Strait Islander males compared to females, but the income premium for a degree qualification appears higher for females. This is interesting because it reflects the attainment patterns in Section 3, implying that within the Aboriginal and Torres Strait Islander population there is some response to Human Capital incentives.

The other interesting finding though is that the income premium for all education categories is higher for the Aboriginal and Torres Strait Islander population compared to the non-Indigenous population. This is true for both males and females. In part this reflects the relatively low baseline for the Aboriginal and Torres Strait Islander population. However, this is not the only explanation, particularly for Aboriginal and Torres Strait Islander females with those in that group with a degree qualification having a higher estimated lifetime income than a non-Indigenous female.

Table 2 Estimated lifetime income by education, Aboriginal and Torres Strait Islander, and sex – 2021

	Indigenous male	Non-Indigenous male	Indigenous female	Non-Indigenous female
Lifetime income				
No Year 12 and no post-school qualifications	$1,720,886	$2,325,484	$1,355,430	$1,537,237
No Year 12, has post-school qualifications.	$2,766,350	$3,341,084	$1,940,440	$2,008,629
Completed Year 12, but no post-school qualifications.	$2,329,423	$2,835,763	$1,784,251	$1,927,620
Completed Year 12, has non-degree qualifications.	$3,101,380	$3,439,186	$2,253,581	$2,225,277
Has a university degree.	$4,054,060	$4,438,566	$3,304,807	$3,244,667
Income ratio relative to baseline education				
No Year 12, has post-school qualifications.	1.61	1.44	1.43	1.31
Completed Year 12, but no post-school qualifications.	1.35	1.22	1.32	1.25
Completed Year 12, has non-degree qualifications.	1.33	1.21	1.26	1.15
Has a university degree.	1.74	1.57	1.85	1.68

Using the data summarised in Table 2, and the distribution of the education attainment of the relevant populations, I can now create an estimate of the level of Human Capital as of 2021. For Aboriginal and Torres Strait Islander males, this equates to around $80.8 billion. For females, I estimate a total level of Human Capital of $76.0 billion. The way to interpret this is that the level of education held by the current Aboriginal and Torres Strait Islander population relates to an additional $156.8 billion in future income before that population reaches retirement age.

Per adult aged 25-to-64, the level of Aboriginal and Torres Strait Islander Human Capital is around 59.3 per cent of the non-Indigenous Human Capital for males ($458,645 per person compared to $773,792) and 63.1 per cent of the level for females ($392,715 compared to $622,650).

6 Comparisons through time

After adjusting for inflation using the CPI, the estimated level of Human Capital held by the Aboriginal and Torres Strait Islander population in 2011 was around $30.7 billion for males and $28.8 billion for females. Comparing this with the 2021 estimates in the previous section, this suggests a more than doubling in the level of Aboriginal and Torres Strait Islander Human Capital between 2011 and 2021. In this section, I look at what explains this very rapid growth.

6.1 Population growth

The first component is the growth in the overall size of the Indigenous population aged 25 to 64. In 2011 the ABS estimates that there were 132,486 Aboriginal and Torres Strait Islander males aged 25 to 64, and 140,145 Aboriginal and Torres Strait Islander females. By 2021, this had increased to 207,615 and 214,351, growth rates of 56.7 and 52.9 per cent respectively. As there were no births into this cohort, and negligible international migration, this very rapid

population growth is mostly due to changing patterns of identification, as well as improvements in enumeration and estimation.

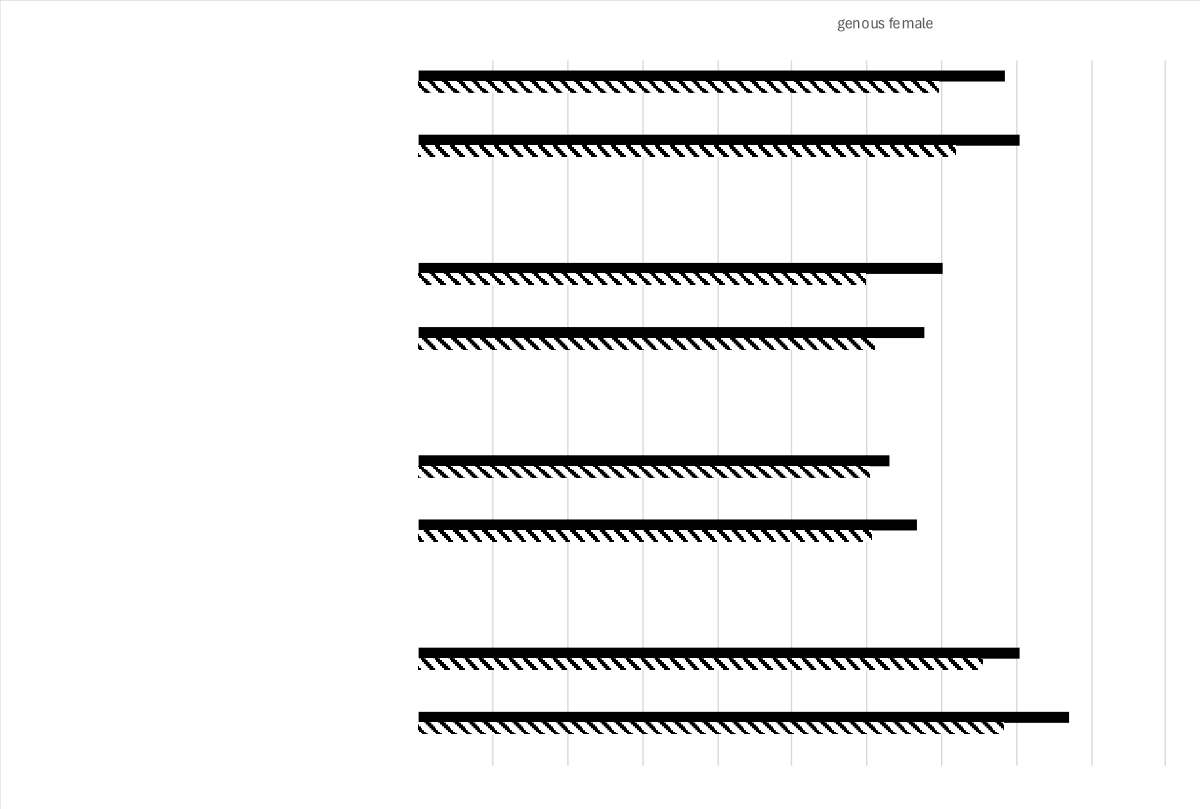
Abstracting from this population growth, the growth in Human Capital per person is slightly less than the overall growth in Human Capital – from $293,582 to $458,645 for males, and from $245,437 to $392,715 for females. This still represents a 56 and 60 per cent increase (respectively) though, so population growth is only one of the explanations.

Indeed, there has been some convergence in the level of Aboriginal and Torres Strait Islander Human Capital per person relative to the non-Indigenous population over the period. In 2011, Indigenous males had 52.5 per cent of the level of Human Capital (per in-scope person), rising to 59.3 per cent in 2021. For females, the increase was a little less, rising from 59.2 to 63.1 per cent.

6.2 Income premiums

A second part of the explanation is that the estimated income premium by education increased for the Aboriginal and Torres Strait Islander population over the decade, at least at the upper end of the education distribution. We can see this in Figure 5, with the income premium for a degree increasing from 1.61 to 1.74 for males, and from 1.78 to 1.85 for females.

Figure 5 Estimated lifetime income premiums by education, Aboriginal and Torres Strait Islander status, and sex – 2011 and 2021



There a number of potential reasons for the growth in the income premium over the period. Mechanically, it could be because incomes at the lower part of the education distribution declined, or it could be because income at the top of the education distribution increased. Here, the story is a little different for males and females, at least when it comes to the

estimated differences in lifetime income for those with a degree compared to the baseline level of education (completed Year 12, but no qualifications). For males, expected lifetime income for someone with a degree increased by 15.1 per cent between 2011 and 2021 for an Aboriginal and Torres Strait Islander male, compared to 8.9 per cent for a non-Indigenous male over the same period. For those that complete Year 12 only, the increase is 6.4 per cent for Aboriginal and Torres Strait Islander males and 5.1 per cent for non-Indigenous males. That is, Aboriginal and Torres Strait Islander male lifetime income premiums grew relative to their non-Indigenous counterparts because of a relatively rapid convergence at the top of the education distribution.

For females, there was a 14.6 per cent increase in estimated lifetime income for the Aboriginal and Torres Strait Islander population with a degree between 2011 and 2021, compared to 13.7 per cent for non-Indigenous females. For those that complete Year 12 only, on the other hand, the growth in income for Aboriginal and Torres Strait Islander females was 10.1 per cent, less than the 12.8 per cent growth for the non-Indigenous population. So, Aboriginal and Torres Strait Islander female lifetime income premiums grew relative to their non-Indigenous counterparts because of a divergence at the bottom of the education distribution.

The above discussion explains the mechanics of the relative growth in the income premiums by education for the Aboriginal and Torres Strait Islander population. However, it doesn't tell us much about the causal mechanisms. Here, Census data, and in particular aggregate Census data, is less useful. I will return to some of the potential explanations outside of Census data in the concluding section. One potential explanation that Census is well placed to shed light on though is the relative distribution of people across different fields of study, how those fields of study vary by income, and how that is changing through time.

The following table gives summary statistics for the field of qualification for a person's highest qualification for those aged 25-to-64 years, with a degree in 2021. The first section of the table gives the per cent of the relevant population in that category, and the second part gives the average income. Compared to their non-Indigenous counterparts, an Aboriginal and Torres Strait Islander graduate is more likely to have their highest qualification in education or society and culture, but less likely to have their highest qualification in information technology or engineering (and related technologies). This is true for both males and females.

Looking at the bottom part of the table, the two fields with the lowest relative share of Aboriginal and Torres Strait Islander graduates are those with the highest average income (for the total population). Indeed, if you look at the five fields of study where the average income for those with that type of a degree is greater than the total average income for all those with a degree, 46.1 per cent of Aboriginal and Torres Strait Islander males have those qualifications compared to 67.6 per cent of non-Indigenous males. Using the same calculation, 36.5 per cent of Aboriginal and Torres Strait Islander females have that field of study, compared to 51.4 per cent of non-Indigenous females.

This partly explains why non-Indigenous males with a degree have a higher lifetime income than an Aboriginal and Torres Strait Islander male. But why then is lifetime income for Aboriginal and Torres Strait Islander females with a degree slightly higher than for non-Indigenous females? Here the second part of the table is instructive as well. For all but three of the fields of study, an Aboriginal and Torres Strait Islander female has a higher average income than a non-Indigenous female. And only one of those fields where Indigenous income is lower (health) has a relatively high share of graduates. Within a field of study, it would appear

that an Aboriginal and Torres Strait Islander female has a higher income than their non-Indigenous counterparts.

Table 3 Industry of highest qualification for those with a degree (aged 25 to 64) and associated average income, by Aboriginal and Torres Strait Islander status and sex, 2021

Field of highest qualification	Male		Female		Total
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	
	Per cent of relevant population				
Natural and Physical Sciences	6.05	6.80	2.61	5.67	6.14
Information Technology	4.07	11.27	0.47	3.30	6.71
Engineering and Related Technologies	6.72	16.13	0.52	2.93	8.59
Architecture and Building	2.15	2.95	0.62	1.53	2.14
Agriculture, Environmental and Related	2.50	1.80	1.07	1.24	1.49
Health	13.77	9.40	23.64	20.90	15.96
Education	17.22	6.47	31.17	17.61	12.90
Management and Commerce	19.40	27.81	11.23	22.78	24.87
Society and Culture	20.48	12.09	22.85	17.41	15.16
Creative Arts	7.52	4.78	5.75	6.20	5.59
Food, Hospitality and Personal Services	0.13	0.50	0.07	0.44	0.46
	Average income				
Natural and Physical Sciences	$1,679	$1,926	$1,340	$1,397	$1,649
Information Technology	$1,893	$2,032	$1,505	$1,458	$1,872
Engineering and Related Technologies	$2,273	$2,162	$1,944	$1,575	$2,050
Architecture and Building	$1,969	$2,051	$1,581	$1,427	$1,798
Agriculture, Environmental and Related	$1,727	$1,805	$1,371	$1,361	$1,594
Health	$1,946	$2,311	$1,529	$1,580	$1,765
Education	$1,785	$1,817	$1,482	$1,412	$1,502
Management and Commerce	$2,166	$2,124	$1,793	$1,537	$1,820
Society and Culture	$1,737	$1,986	$1,517	$1,500	$1,667
Creative Arts	$1,243	$1,447	$1,234	$1,215	$1,300
Food, Hospitality and Personal Services	$1,438	$1,184	$608	$908	$1,037
Total	$1,860	$2,042	$1,519	$1,482	$1,723

Table 3 explains some of the point in time differences. Because the fields of study in the Census have changed a little through time, it is a little difficult to perfectly capture the through time dynamics. However, one of the reasons for the relative increase in education premiums for Aboriginal and Torres Strait Islander males is that there has been a convergence in the income premium for their fields of study.

In 2011 (Table 4) there were four fields of study where the average income is greater than the total average income for all those with a degree. Only, 27.2 per cent of Aboriginal and Torres Strait Islander males had those qualifications compared to 53.5 per cent of non-Indigenous males. Between 2011 and 2021, there was an 18.9 percentage point increase in this measure

for Indigenous males, compared to a 14.1 percentage point increase for non-Indigenous males. For females, on the other hand, there were roughly equal increases for Indigenous and non-Indigenous females of around 26 percentage points (10.7 to 36.5 per cent for Aboriginal and Torres Strait Islander females and 25.7 to 51.4 per cent for non-Indigenous females).

Table 4 Industry of highest qualification for those with a degree (aged 25 to 64) and associated average income, by Aboriginal and Torres Strait Islander status and sex, 2011

Field of highest qualification	Male		Female		Total
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	
	Per cent of relevant population				
Natural and Physical Sciences	5.30	8.19	2.39	6.18	7.07
Information Technology	3.46	9.25	0.34	2.55	2.87
Engineering and Related Technologies	5.06	15.31	0.24	2.18	4.30
Architecture and Building	1.54	2.80	0.34	1.25	1.08
Agriculture, Environmental and Related Studies	3.25	2.20	1.15	1.31	0.96
Health	12.54	8.82	20.71	20.48	8.60
Education	21.19	8.96	35.58	21.65	0.17
Management and Commerce	17.13	26.13	9.77	19.74	0.13
Society and Culture	23.35	14.10	24.08	18.79	0.06
Creative Arts	7.18	4.04	5.39	5.64	0.01
Food, Hospitality and Personal Services	0.00	0.21	0.00	0.24	0.00
Mixed Field Programmes	0.00	0.00	0.00	0.00	0.00
	Average income				
Natural and Physical Sciences	$1,357	$1,529	$996	$1,037	$1,293
Information Technology	$1,400	$1,529	$1,752	$1,134	$1,429
Engineering and Related Technologies	$1,862	$1,712	$1,436	$1,158	$1,630
Architecture and Building	$1,389	$1,595	$1,169	$1,072	$1,410
Agriculture, Environmental and Related Studies	$1,211	$1,383	$1,041	$998	$1,221
Health	$1,435	$1,767	$1,104	$1,134	$1,299
Education	$1,354	$1,393	$1,106	$1,048	$1,135
Management and Commerce	$1,599	$1,655	$1,291	$1,169	$1,422
Society and Culture	$1,296	$1,503	$1,123	$1,079	$1,240
Creative Arts	$928	$1,105	$820	$867	$955
Food, Hospitality and Personal Services	$0	$954	$0	$710	$813
Mixed Field Programmes	$0	$995	$0	$771	$876
Total	$1,377	$1,575	$1,112	$1,088	$1,307

6.3 Education increase, including identification change

The final reason for an increase in Aboriginal and Torres Strait Islander Human Capital is the increase in education levels for the population. I showed this earlier in Table 1 with a

comparison of the average education levels (age standardised) for Aboriginal and Torres Strait Islander males and females across the three censuses.

One of the aspects of measuring Human Capital is that the levels of education for the younger part of the age distribution has a much greater impact on the level of human capital than the levels for the older part of the age distribution. This is for the simple reason that the younger part of the age distribution has more years in the working age population to come across which they are able to reap the returns from their educational investment. Although Human Capital can depreciate, this tends to occur only if not used (Dinerstein et al. 2022).

In 2011, the estimated per cent of Aboriginal and Torres Strait Islander males aged 25 to 29 with a degree was 4.0 per cent. By 2021, this had increased to 7.1 per cent. For females, the increase was from 7.8 to 13.1 per cent. There was a growth in education for the non-Indigenous population as well, but it was not as rapid, at least in relative terms. For non-Indigenous males, the per cent with a degree increased from 29.8 to 37.6 per cent. For females, the increase was from 40.8 to 50.7 per cent.

The growth in education for the Aboriginal and Torres Strait Islander population between 2011 and 2021 was therefore in part due to more Aboriginal and Torres Strait Islander Australians obtaining an education over the period. However, it is also due in part to patterns of identification change, whereby those who are newly identified as being Aboriginal or Torres Strait Islander had relatively high levels of education to start with.

Identification change alone does not explain changes in education levels. However, over recent periods those who are newly identified as being Indigenous have a higher level of education than those who were identified as Indigenous in the baseline period. Using the Australian Census Longitudinal Database, it is estimated that there was a net inflow into the Aboriginal and Torres Strait Islander population of 16.4 per cent between 2016 and 2021, on top of a similar growth between 2011 and 2016 (Campbell et al. 2018).

Between 2016 and 2021, according to the ACLD a relatively high proportion of those people that changed their status from non-Indigenous to Indigenous had high levels of education at baseline. Focusing on those aged 15 years and over in 2016, there was a net identification change observed in the ACLD of 19.4 per cent for those with a degree in 2016, compared to 15.1 per cent for those without a degree.

The effect of identification change shouldn't be overstated. It is true that those who changed their status from non-Indigenous to Indigenous between 2016 and 2021 (sometimes referred to as the 'newly Indigenous') were more likely to have a degree than those who were identified as Indigenous in both periods (the 'always Indigenous'). However, those who changed their status from Indigenous to non-Indigenous over the same period (the 'formerly Indigenous') were also more likely to have a degree. It is just that there are more people who changed their status from non-Indigenous to Indigenous than vice-versa.

We can quantify the role of identification change in explaining the increase in the measured level of education for the Aboriginal and Torres Strait Islander population using the ACLD, by comparing the change in education levels for different subsets of the population that identified as being Aboriginal or Torres Strait Islander at some point in the 2016 and 2021 Censuses. I focus on the population aged 25 to 59 years in 2016 as they will be of prime working age during both census periods.

For the population identified as Aboriginal and Torres Strait Islander in 2016, 10.4 per cent had

a degree qualification in 2016. For this same group, 12.1 per cent had a degree qualification in 2021. This represents the improvement in education in the absence of identification change. If we look at those who identified as being Aboriginal and Torres Strait Islander in 2021, 12.5 per cent had a degree in 2021. Comparing these three data points, for those aged 25 to 59 in 2016, there was a 2.1 percentage point increase in having a degree when you compare the Aboriginal and Torres Strait Islander population as identified in 2016 with the Aboriginal and Torres Strait Islander population as identified in 2021, with 82.4 per cent of the growth over the period due to changes in education for the same individuals, and 17.6 per cent due to identification change.

Putting this another way, part but far from all of the growth in Aboriginal and Torres Strait Islander Human Capital between 2011 and 2021 was due to those with relatively high levels of Human Capital to start with changing their Indigenous status (or having it changed on their behalf across subsequent censuses), rather than just a growth in the level of Human Capital for those that always identified as being Indigenous.

7 Concluding comments

This paper provides an initial estimate of Aboriginal and Torres Strait Islander Human Capital and examines how it has changed over time. The analysis is based on data from the 2011, 2016 and 2021 Censuses and estimates the level of Indigenous Human Capital by calculating and comparing the lifetime income streams associated with different levels of education. It finds that while Aboriginal and Torres Strait Islander Australians generally have lower levels of education than non-Indigenous Australians, the returns to education, in terms of income, appear to be higher for Indigenous Australians.

The relatively high measured returns to education for Indigenous populations have been documented previously, both in Australia (for example Biddle 2006) and elsewhere (for example Goldmann and Racine (2021) in Canada and Keo et al. (2019) in the US). However, the attainment data shows that the Aboriginal and Torres Strait Islander population has much lower levels of education than the non-Indigenous population. Given the returns are as high or even higher, this strongly implies that there are non-economic costs of education for the Aboriginal and Torres Strait Islander population above and beyond those experienced by the non-Indigenous population.

The paper also explores changes in Human Capital over the past decade, highlighting significant growth due to both population increase and improved educational attainment. The results show a convergence in the level of Human Capital between Indigenous and non-Indigenous populations, although substantial gaps remain. Part, though not all of this growth is due to changes in identification patterns, with estimates from the Australians Census Longitudinal Database showing that those who changed their status from non-Indigenous to Indigenous had a higher level of education to start with than those who were always identified as Indigenous.

There are a number of potential avenues to extend the current paper. First, subject to sample size constraints, it would be possible to disaggregate Aboriginal and Torres Strait Islander Human Capital beyond the male/female split within this paper. An obvious alternative split would be to estimate Human Capital separately by some measure of geography (for example, remoteness). Another potential extension would be to use a more disaggregated level of education, particularly as the number of Aboriginal and Torres Strait Islander Australians with a postgraduate degree continue to increase.

A third suggested extension would be to make use of individual-level data, allowing for a more explicit test of whether the relationship between education and income is different for Aboriginal and Torres Strait Islander Australians compared to non-Indigenous Australians, whether the relationship within the Indigenous population has changed through time, and whether there are other control variables that might explain some of these differences. As more and more administrative data becomes available, it may become feasible to control for measures of cognitive and non-cognitive ability, something that has been missing from extant analysis due to a lack of available data.

The paper consciously takes an economic approach to understanding Indigenous education outcomes. However, it is recognised right up front that the Aboriginal and Torres Strait Islander community sees education as much more than a means to a higher income or to improved employment prospects. These are no doubt important, and a complete model of Aboriginal and Torres Strait Islander Human Capital would recognise the need for education to improve wellbeing, community development, culture, and language. However, this paper also shows that if these other broader benefits of education can be realised and the costs minimised, then there are also large potential economic returns.

References

Becker, G. S. (1964). Human Capital: a theoretical analysis with special reference to education, New York: Columbia University Press.

Becker, G. S. (1994). Human Capital revisited. Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (3rd Edition), The university of Chicago press: 15-28.

Biddle, N., 2018. Human capital development and indigenous peoples. Routledge.

Biddle, N., 2006. Does it pay for Indigenous youth to go to school?: variation in the predicted economic benefits of high school. Australian Journal of Labour Economics, 9(2), pp.173-199.

Brian, K., 2007. OECD Insights Human Capital How what you know shapes your life: How what you know shapes your life. OECD publishing.

Campbell, P., Biddle, N., & Paradies, Y. (2018). Indigenous identification and transitions in Australia: Exploring new findings from a linked micro-dataset. Population, 73(4), 771–796

Dinerstein, M., Megalokonomou, R. and Yannelis, C., 2022. Human capital depreciation and returns to experience. American Economic Review, 112(11), pp.3725-3762.

Fogarty, W., & Kral, I. (2011). 'Learning Spaces: Youth, Literacy and New Media in Remote Indigenous Australia.' CAEPR Working Paper No. 68/2010. Centre for Aboriginal Economic Policy Research, ANU College of Arts & Social Sciences, The Australian National University.

Griffin, L. and Trudgett, M., 2018. 'Everybody's talkin'at me: A review of literature about deficit discourse and deficit thinking in relation to Indigenous Australian learners.' *Journal of Australian Indigenous Issues,* 21(3), pp.2-19.

Goldmann, G. and Racine, A., 2021. "Show me the money": The returns to education for Indigenous Canadians. Canadian Studies in Population, 48(2), pp.293-313.

Herbert, J., 2012. "Ceaselessly circling the centre" Historical contextualization of indigenous education within Australia. History of Education Review, 41(2), pp.91-103.

Hughes, J., Turnbull, C., King, J., and Smith, L., (2023) 'How do Indigenous high school students, their parents/carers and Aurora alumni define 'success' in education? Reporting on the results of qualitative interviews and participatory diagramming' *RISE Paper Series* Aurora Foundation

Keo, C., Peterson, A. and West, K., 2019. Returns to higher education for American Indian and Alaska Native students. Journal of American Indian Education, 58(1), pp.7-38.

Sarra, C. (2011). Strong and Smart – Towards a Pedagogy for Emancipation: Education for First Peoples.