

September 2020

The state of Aboriginal, Torres Strait Islander, Māori and Pacific Peoples research

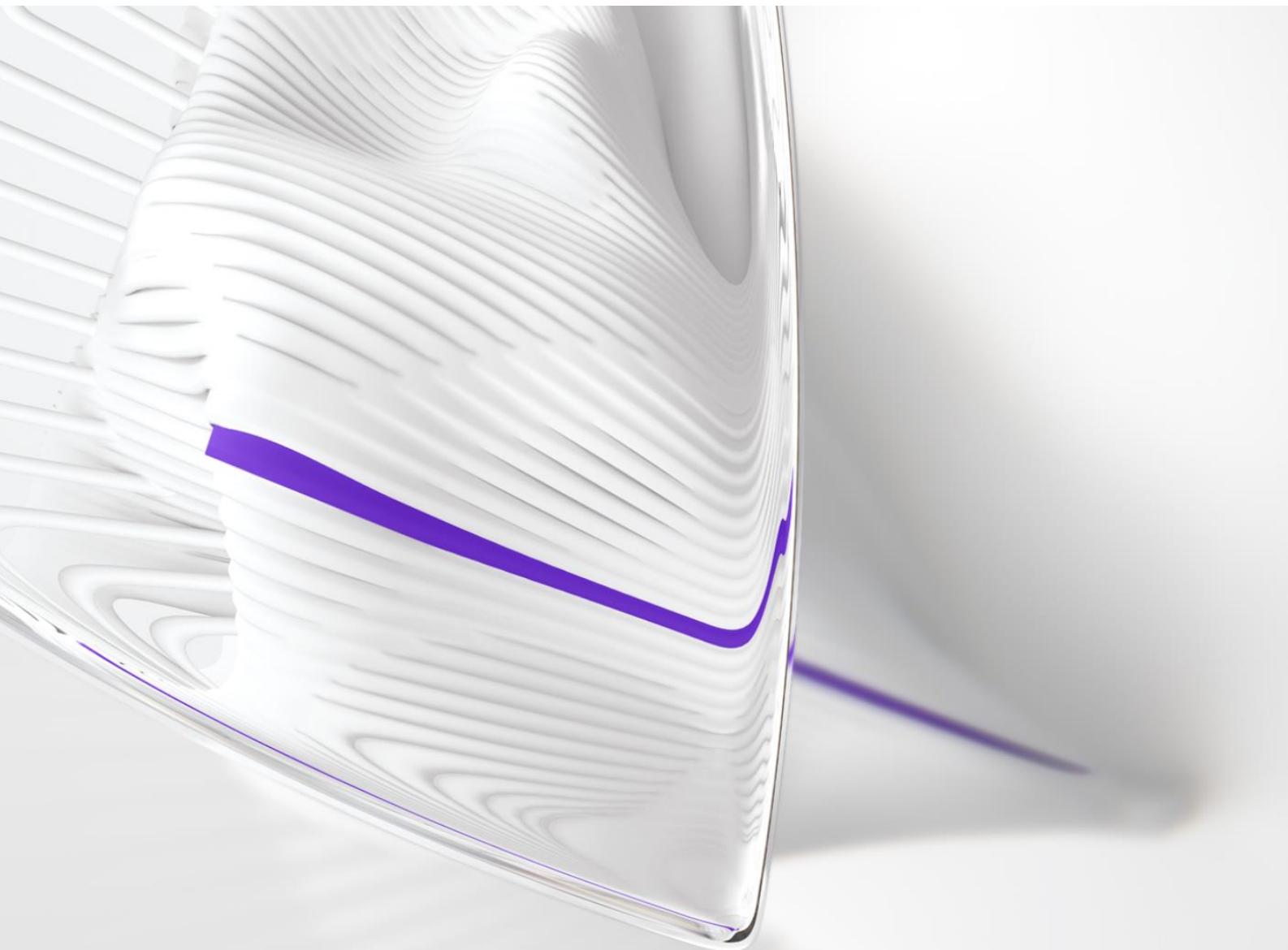


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Introduction

In 2019, the Australian and New Zealand Standard Research Classification (ANZSRC) was reviewed and the classification of research disciplines changed, creating new Field/Objective (6-digit), Group (4-digit), and Division (2-digit) Fields of Research (FoR) codes, released 30 June 2020. One of the major considerations of the review was whether the previous FoR classification of Aboriginal, Torres Strait Islander, Māori and Pacific Peoples research was sufficient or appropriate to broadly classify and analyse Indigenous research. After consultation, the Australian Research Council (ARC), Australian Bureau of Statistics, Stats NZ and the Ministry for Business, Innovation and Employment (MBIE) have jointly reviewed the ANZSRC. The review provided a comprehensive assessment of the research classification and revised it where appropriate to reflect current practice and changes in the sector. It highlighted several key findings which included:

- lack of visibility, and therefore recognition, of Aboriginal, Torres Strait Islander, Māori and Pacific Peoples research, impeding strategy, policy and funding decisions in this area.
- a reduced ability for people of Indigenous communities to identify and therefore access research and data that focuses on them.
- noteworthy growth in Indigenous Research and the previous classifications significantly under-represents the breadth and scope of emerging Aboriginal, Torres Strait Islander, Māori and Pacific Peoples research.

To address the key findings, the new FoR code classification includes a new Division (2-digit) of code titled “45 – Indigenous Studies” allowing for flexibility for Aboriginal, Torres Strait Islander, Māori and Pacific Peoples research to be captured. The classifying Groups (4-digit) codes are structured so that 20 groups now exist starting with a 45, with 18 of these groups organised such that 1) Aboriginal, Torres Strait Islander, 2) Māori and 3) Pacific Peoples research can be classified into one of the six areas below.

- *Culture, Language and History (4501, 4507, 4513)*
- *Education (4502, 4508, 4514)*
- *Environmental Knowledges (4503, 4509, 4515)*
- *Health and Wellbeing (4504, 4510, 4516)*
- *Society and Community (4505, 4511, 4518)*
- *Sciences (4506, 4512, 4517)*

The final two codes include Indigenous research otherwise not captured, “4519 – Indigenous Data, Methodologies and Global Indigenous Studies” and “4520 – Other Indigenous Studies”. Finally, a much wider range (320 in total) of Fields (6-digit) were designed to reflect the unique methodologies and approaches to Indigenous Research.

The aim of this report is to provide an overview of the current trends in Indigenous Research across the Australia, New Zealand and Pacific Region. We look at the academics, affiliate institutions and regions that are contributing largely to this body of work and in which journals this research is being published. We also consider the networks that exist between authors and institutions in Indigenous research. The report then evaluates how the new FoR classifications will perform in structuring Indigenous Research for assessment.

Citation analysis and bibliometric methodologies in research assessment

Every research paper can be considered a countable end product of research in its final and public form, citing the work of other researchers as an indicator of scientific impact. The term ‘citation analysis’ refers to the analysis of data derived from several references cited in various bibliographies and/or footnotes of academic publications.

Citation analysis has proved to be a powerful and popular method of examining and mapping intellectual impact at various levels, including that of a paper, individual researcher, faculty/department, institution or region. Citation analysis can be used across all academic content but generally holds more value when used within a specific area of research.

This report takes content from the Web of Science Core Collection™ topic search performed in August 2020, which included any **Article, Review, Meeting Abstract or Proceeding Paper** indexed in the Web of Science Core Collection with a publication date between 2010-2019. The search criteria included a topic search that comprises the title, abstract or keywords of each article. It should also be noted that this search took a very unadventurous approach to capturing Indigenous Research. After consultation with the Australian research sector, it was decided that a search criteria would be used that only captures research relevant to the new FoR codes rather using broader search terms (capturing more work) and then individually removing articles that are not within the intended scope for the new Indigenous FoR codes.

Topic = "Indigenous Australia" OR "Indigenous New Zealand" OR "Māori" OR "Aboriginal" OR "Torres Strait"

Publication Year = 2010-2019

Document Type = Article, Review, Meeting Abstract or Proceedings Paper

Country Region of at least one Author Affiliation = "Australia" OR "New Zealand"

Note: Records published outside of journals considered by the Australian Research Council (ARC) in the 2018 Excellence in Research for Australia (ERA) journal list were not considered in this report. Also, 21 records were removed manually as they focused on subject matter unrelated to the focus of research within this report e.g. 'Maori Potato Starch' or similar. This left a total of **8,427** publications in the dataset (see Appendix for a list of individual articles)

In 2019 around 66% of Indigenous Australians aged 20-24 years had attained Year 12 or equivalent compared to around 90% for non-Indigenous Australians.

– *Closing the Gap* report, Australian Government 2020

Metric definitions

The following metrics will be used throughout the report to help shape insight into the state of Indigenous Research across the Australian, New Zealand or Pacific Region.

Number of Web of Science documents

Total volume of publication is often an indication of the size of an organisation or region. In this report, volume output is the total number of articles, reviews, meeting abstracts or proceedings published from 2010-2019, unless otherwise specified.

Percentage of documents in top 1%

The % documents in top 1% indicator reflects the top one percent most cited documents in a given subject category, year and publication type divided by the total number of documents in a given set of documents, displayed as a percentage. A higher value is considered to be higher performance. A value of 1 for a set of documents indicates that one percent of the publications in that set are in the top one percent of the world regardless of subject, year and document type and would therefore be considered to be performing at the same level as world average.

A value above 1 indicates that more than one percent of papers in the set are in the top one percent of the world, and a value of less than 1 would indicate that less than one percent of the papers in the set are in the top one percent of the world. ***For this report we have normalised using the traditional FoR 2-Digit Divisions for subject areas unless otherwise specified.***

Percentage of documents in the top 10%

The % documents in top 10% indicator is the top ten percent most cited documents in a given subject category, year and publication type divided by the total number of documents in a given set of documents, displayed as a percentage. The % documents in top 10% is very similar to the % documents in top 1% simply with a threshold of 10 percent instead of one percent. ***For this report we have normalised using the traditional FoR 2-Digit Divisions for subject categories unless otherwise specified.***

Category Normalised Citation Impact (CNCI)

The Category Normalised Citation Impact of a document is calculated by dividing the actual count of citing items by the expected citation rate for documents with the same document type, year of publication and subject area. When a document is assigned to more than one subject area an average of the ratios of the actual to expected citations is used. The CNCI of a set of documents, for example the collected works of an institution or country/region, is the average of the CNCI values for all the documents in the set.

CNCI is a valuable and unbiased indicator of impact irrespective of age, subject focus of document type. A CNCI value of 1 represents performance at par with world average, values above 1 are considered above average and values below 1 are considered below average. ***For this report we have normalised using the traditional FoR 2-Digit Divisions for subject areas unless otherwise specified.***

Percentage of International Collaborations

The % of international collaborations measured by co-authorships is the number of international Collaborations for an entity divided by the total number of documents for the same entity represented as a percentage. In assigning papers to Australia and New Zealand as a whole or to any of its component regions, this analysis employed whole counting, rather than fractional counting. That is, any nation, author, or institution listed on a given paper receives equal publication and citation credit, as opposed to any fractional-counting scheme that attempts to weigh specific levels of contribution.

“The term ‘Indigenous’ is problematic, in that it appears to collectivize many distinct populations whose experiences under imperialism have been vastly different”

– Linda Tuhiwai Smith, Decolonizing Methodologies: Research and Indigenous Peoples.

Percentage of documents in Q1 journals

The Journal Impact Factor quartile is the quotient of a journal's rank in the Web of Science category (X) and the total number of journals in the category (Y). A journal in Quartile 1 (Q1) has a percentile less than 0.25. The % of documents that appear in a journal of a particular Journal Impact Factor Quartile, is the ratio of documents appearing in this quartiles journal over the whole set (displayed as a percentage). **Note** that the % of documents or records published in Q1 journals is generally larger than 25% as top journals generally publish more records.

Percentage all open access documents

Open access status is provided across the Web of Science platform as a result of a partnership with ImpactStory, a not-for-profit organization that recently launched a knowledgebase of Open Access (OA) content. This knowledgebase makes it possible to discover and link to legal Gold or Bronze (free content at a publisher's website) and Green (e.g., author self-archived in a repository) OA versions. The % of Open Access Documents includes any document that can be found freely and legally through these means as a proportion of the total number of documents

Journal Impact Factor

The Journal Impact Factor™ is defined as all citations to the journal in the current JCR year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years.

The current state of Indigenous Research

Looking at the set of Indigenous Research produced across the Australian, New Zealand and Pacific region in the last 10 years, there are several stand out indicators. To begin with, the total proportion of research that is produced by the Australian and New Zealand region and is considered as directly related to Indigenous Research by this report, makes up just over 1% (**1.04%**) of the total output (Table 1). The proportion of research that is considered Indigenous does vary depending on the origin of the research (see Table 3).

Examining the citation impact, when normalising Indigenous Research across 2 Digit FoR codes, Indigenous Research has a significantly lower citation impact than global or regional baselines. Indigenous Research has a Category Normalised Citation Impact (CNCI) of **0.65** when the baseline CNCI for Australian and New Zealand research is more than twice that in the 2010-2019 period (**1.34**). This trend is also evident when looking at the percentage of documents in the top 1 or 10% of documents. Only **4.4%** of Indigenous Research is in the top 10% of documents globally whereas the region produces about **12.6%** of their research in the top 10%.

When reading through this report it is important to recognise that the proportion of research we consider to be ‘Indigenous Research’ is relatively small compared to all scholarly research. Further, as the citation impact indicators of Indigenous Research are generally lower than global averages, there should be a realignment of expectations in the report’s content of the bibliometric impact of this research. This report’s scope will look only at the citation impact of Indigenous Research, although the author recognises that there are many forms of impact from novel research, this report only considers and assesses citation impact.

Name	# of Docs	Times Cited	CNCI	% Docs Cited	% in Q1 Journals	% Docs in Top 1%	% Docs in Top 10%	% Inter Collab	% Open Acc Docs
INDIGENOUS RESEARCH	8427	61188	0.65	79.03	30.04	0.13	4.41	15.36	29.48
AUSTRALIA	5936	43647	0.67	78.37	28.95	0.10	4.82	15.26	30.88
NEW ZEALAND	2829	21355	0.63	81.23	34.88	0.25	4.03	25.42	27.08
ALL RECORDS	917901	1,4090669	1.34	75.84	53.34	1.78	12.61	47.29	29.71
AUSTRALIA	810865	12687120	1.36	75.74	53.88	1.84	12.94	47.62	30.16
NEW ZEALAND	127965	1961850	1.36	77.77	50.86	1.78	11.63	53.95	28.31
COMPARISON	1.04%	0.43%	0.69	3.19	23.30	1.65	8.20	31.93	0.23
AUSTRALIA									
Proportion / Delta	0.73%	0.34%	0.69	2.63	24.93	1.74	8.12	32.36	0.72
NEW ZEALAND									
Proportion / Delta	2.21%	1.09%	0.73	3.46	15.98	1.53	7.60	28.53	1.23

Table 1. Displays basic bibliometric indicators on two regions outputs across the Indigenous Research set and compares the volume and performance to all areas of research within each region. **Note** The ‘Number of Docs’ and ‘Times Cited’ comparisons are proportions whereas the rest are showing a change (red = down, green = up) from All Research to Indigenous Research.

Organisational breakdown

How do academic organisations compare in Indigenous Research?

Comparing organisations across the Australian and New Zealand region that produce Indigenous Research, there are 21 organisations that have contributed more than 200 documents to this research in the last 10 years (Table 2). The **University of Auckland**, **University of Sydney** and **University of Otago** have produced the largest portion of research by volume and have received more citations to their records than any other organisation. With regards to the bibliometric impact, **University of Waikato**, **Griffith University**, **James Cook University**, and **Monash University** have not only produced over 200 documents, but also, these institutes stand out as having the most impactful research with over **6.0%** of their documents in the top 10%, compared to a dataset average of **4.4%** (Figure 1). All also have a CNCI greater than **0.75** compared with a global baseline of **0.65**.

Although this area of research does not generally have a large international network, organisations based in **New Zealand** and the **University of Queensland** tend to collaborate more often with overseas entities. **Charles Darwin University** is the fourth biggest producer of this content (with **696** documents) but more fascinatingly, **CDU** is the most open with their research in this area, with almost **50%** of their documents freely and legally available to readers, without paid subscriptions (Table 2).



Figure 1. Displays total research output (x-axis) of academic organisations when publishing in Indigenous Research (2010-2019). Also displayed are the % of documents in the top 10% (y-axis) and the % of documents published in a Q1 journal (point radius). When assessing the volumes of research output at the institutional and/or national level, certain factors need to be considered, such as the publication practices and the field of research or focus for the institution or country.

Name	Country	# of Docs	Times Cited	CNCI	% Docs Cited	% in Q1 Journals	% Docs in Top 1%	% Docs in Top 10%	% Inter Collab	% Open Acc Docs
All Records (Indigenous Research)	8427	61188	0.65	79.03	30.04	0.13	4.41	15.36	29.48
University of Auckland	NEW ZEALAND	1064	9824	0.75	84.59	34.38	0.38	4.98	25.56	29.51
University of Sydney	AUSTRALIA	840	7377	0.74	79.29	30.61	0.12	5.48	19.76	40.36
University of Otago	NEW ZEALAND	827	8538	0.74	84.64	41.33	0.36	4.72	30.11	35.79
Charles Darwin University	AUSTRALIA	696	6812	0.77	84.34	37.10	0.14	5.32	13.07	47.70
University of Western Australia	AUSTRALIA	689	6332	0.76	80.84	34.17	0.15	5.52	12.48	38.32
University of Queensland	AUSTRALIA	634	5283	0.75	80.13	31.85	0.16	5.84	23.82	34.70
University of Melbourne	AUSTRALIA	571	5056	0.75	83.36	30.38	0.18	5.08	18.04	35.90
University of New South Wales Sydney	AUSTRALIA	559	4774	0.72	79.07	29.18	0.36	5.19	15.03	36.67
James Cook University	AUSTRALIA	466	4348	0.84	86.05	30.53	0.64	7.30	15.02	43.78
Australian National University	AUSTRALIA	414	2868	0.76	81.16	25.48	0.24	5.56	16.91	30.68
Flinders University South Australia	AUSTRALIA	370	2337	0.65	79.73	27.42	0.00	3.78	10.54	38.92
Monash University	AUSTRALIA	351	3006	0.94	83.48	33.59	0.57	7.98	16.81	34.19
Massey University	NEW ZEALAND	344	2273	0.63	81.98	41.82	0.29	4.36	26.45	28.49
University of Adelaide	AUSTRALIA	302	2474	0.70	78.48	33.08	0.33	5.30	17.88	33.77
University of South Australia	AUSTRALIA	281	2346	0.71	83.99	31.65	0.00	2.85	12.81	45.20
Curtin University	AUSTRALIA	278	2590	0.72	84.89	31.44	0.36	5.40	11.51	32.73
Griffith University	AUSTRALIA	254	2141	0.80	80.71	36.65	0.00	7.09	20.87	41.34
Victoria University Wellington	NEW ZEALAND	252	1548	0.63	80.95	25.00	0.00	4.37	28.57	21.43
University of Newcastle	AUSTRALIA	243	2132	0.63	76.13	25.62	0.00	4.12	13.99	41.98
University of Waikato	NEW ZEALAND	229	1392	0.78	80.79	29.46	0.87	6.11	23.14	28.38
Auckland University of Technology	NEW ZEALAND	223	1380	0.57	72.65	40.27	0.45	3.14	27.35	26.01
La Trobe University	AUSTRALIA	172	1054	0.72	72.09	29.79	0.00	8.72	13.95	29.07
Macquarie University	AUSTRALIA	165	1237	0.80	80.61	28.70	0.00	7.88	20.61	21.82
Western Sydney University	AUSTRALIA	148	872	0.61	85.14	19.83	0.00	2.03	23.65	44.59
University of Wollongong	AUSTRALIA	148	1101	0.68	79.73	31.93	0.00	4.73	8.78	42.57

Table 2. The number of documents published by each university (top 25 by volume) in Indigenous Research since 2010 in the Australia and New Zealand region and performance indicators on the dataset.

What do organisational co-authorship networks look like in Indigenous Research?

In this section we explore the relationships between institutions, and those organisations' authors that have affiliated themselves on Indigenous Research records. Simply considering the prevalence of co-authorship of organisations on these records, and displaying a high prevalence with a close proximity, we can immediately see organisations within each of the two nations (Australia and New Zealand) clustering separately, displaying a geographic divide (Figure 2).

It may be that there is an expected divide between the nations' academic organisations and the way they collaborate, particularly in Indigenous Research; however of the 600 most prominent relationships between these organisations, more than 50 of these relationships cross the Tasman Sea and exist between institutions based in distinct countries.

It is also clear that the organisations that are central to the networks that exist in Indigenous Research are **University of Sydney**, **James Cook University** and **Charles Darwin University**.

These universities appear at the 'heart' of the Australian body of Indigenous Research and seem to generally be at the centre of Indigenous Research's development. The same can be said for the **University of Auckland**, **University of Waikato** and **University of Otago** in the New Zealand. These universities seem to be at the centre of the Indigenous Research ecosystem of each of the corresponding countries (Figure 2).

There are several organisations outside of the university sector that appear to be an essential part of the Indigenous Research ecosystem. These include several research institutes, including the **Baker Heart and Diabetes Institute** and the **South Australian Health and Medical Research Institute (SAHMRI)**. There are also a few hospitals that are engrained in this network including **Auckland City Hospital** and **Starship Children's Hospital** in New Zealand and **Royal Children's Hospital Melbourne** and **Royal Brisbane & Woman's Hospital** in Australia.

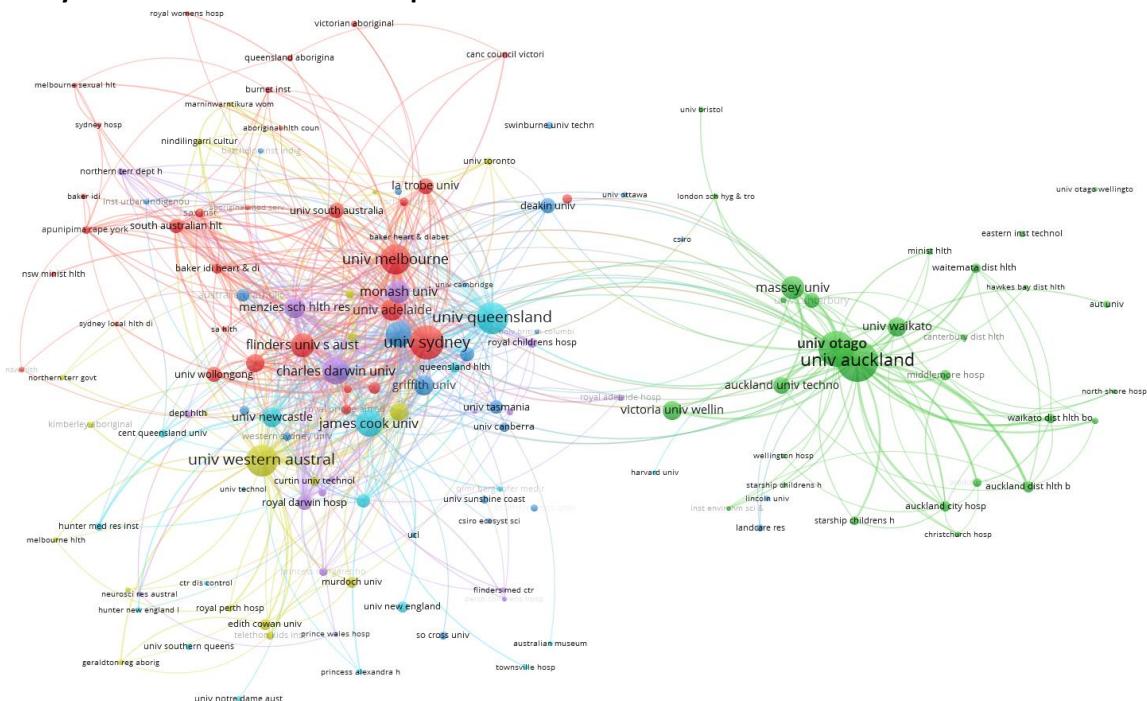


Figure 2. Displays the relationships between organisations in the Indigenous Research set of publications. An organisation must have been by-lined on at least 15 documents from the set to be displayed (leaving 142 organisations in total). Collaborative lines are drawn between the 600 most common organisational collaborations across the set of publications. Image produced using VoViewer 2020

How do the states perform in Indigenous Research?

Two of the major considerations for the development of the new Indigenous Fields of Research codes is that:

- there is noteworthy growth in Indigenous Research and
- the previous classifications significantly under-represented the breadth and scope of emerging Aboriginal, Torres Strait Islander, Māori and Pacific Peoples research.

It is true that in the last ten years, the volume of Indigenous Research produced in both Australia and New Zealand has almost doubled (Figure 3). **604** documents were produced in this set in 2010 and a total of **1155** were published in 2019 (**91%** increase). Australia has gone from **416** documents in 2010 to **814** documents in 2019 (**96%** increase) whereas New Zealand has gone from 211 documents published in 2010 to 391 documents in 2019 (**85%** increase). This can be compared to all research, where Australia has increased by **70%** and New Zealand by **45%**.

All states and regions of Australia and New Zealand contribute to Indigenous Research; however, the volume and impact of the research varies across each region. Even more variability exists in the proportion of the total scholarly output that has been dedicated to Indigenous Research from each region. New Zealand (considered as a region in of itself) has produced a larger number of research outputs in Indigenous Research than any one of the Australian states or territories. This may be a result of New Zealand having a larger Māori population than Aboriginal Australia. In the 2010-2019 period, **New Zealand** dedicated **2.21%** of its research outputs to Indigenous Research (Table 3). This proportion is larger than any of the Australian states or territories except for the **Northern Territory**, where **29.5%** of the population is Indigenous Australian, which in the same period dedicated **12.96%** of its research. The Northern Territory also makes this research freely and legally available to readers more often with **43.0%** of their outputs open access.

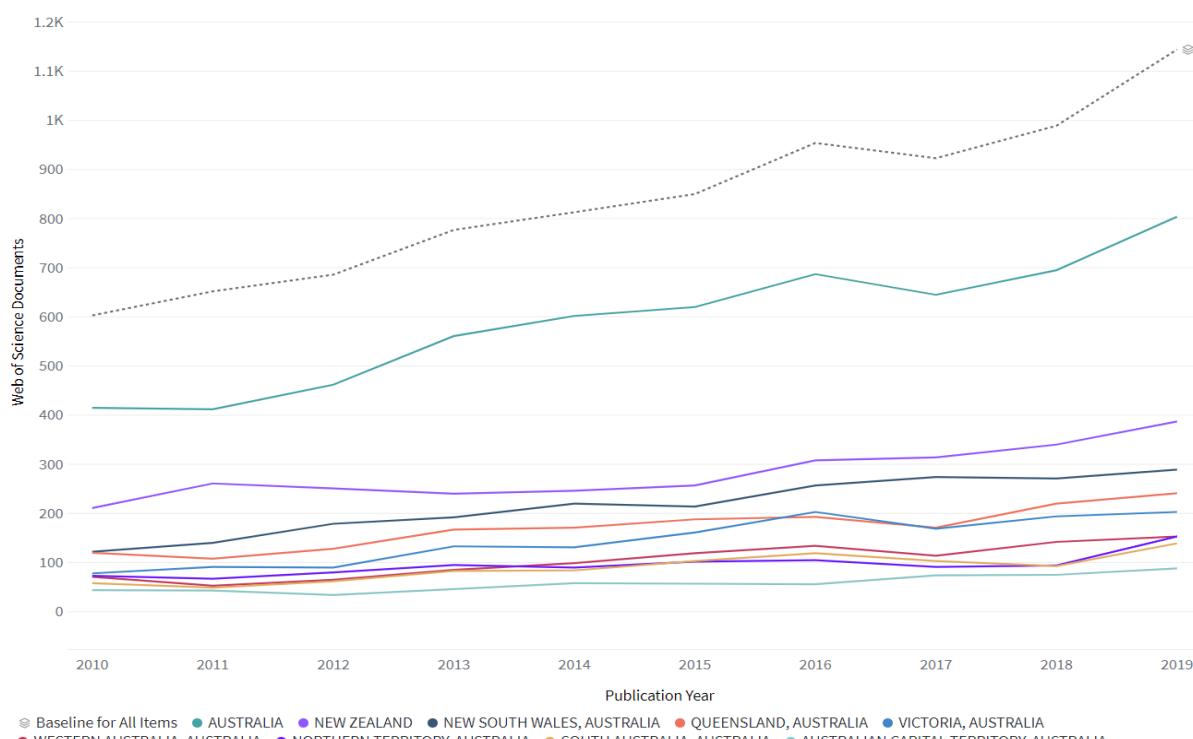


Figure 3. Displays the trend in number of documents in Indigenous Research produced across state and country regions in the 2010-2019 period.

State/Region	# of Docs	Times Cited	CNCI	% Docs in Top 10%	% Inter Collab	% Open Acc Docs	% Total Research	% Indigenous Population
NEW ZEALAND	2829	21355	0.63	4.03	25.42	27.08	2.21	16.5 (Māori)
NSW	2182	17126	0.70	5.13	16.59	33.78	0.75	3.5
QLD	1726	14639	0.75	5.97	18.83	37.43	1.04	4.6
VIC	1468	11550	0.75	5.65	17.57	33.11	0.57	0.9
WA	1043	8620	0.74	5.75	13.42	35.76	1.15	3.9
NT	960	9037	0.71	4.58	11.77	43.02	12.96	29.5
SA	911	6912	0.69	3.84	15.26	38.86	1.17	2.5
ACT	581	4332	0.77	5.85	17.04	30.46	1.01	1.9
TAS	155	1281	0.63	3.23	22.58	33.55	0.66	5.5

Table 3. The number of documents published by each region in Indigenous Research since 2010 and performance and proportion indicators on the set. Note The proportion of total research is taken in comparison to total research outputs published from each region according to Web of Science, and the proportion of Indigenous Population is taken from the 2016 Census (Aus) or 2018 Census (NZ).

When looking at the proportion of high impact research, generally New Zealand's Indigenous Research performs less well than the Australian states. A larger portion of the research produced by New Zealand in Indigenous Research tends to have a below average CNCI (between 0 – 0.5) than any of the Australian states (Figure 4). So, although New Zealand generally produces more Indigenous Research, it could be argued that the normalised citation metrics of this research are not generally performing as well as Australian regions publishing Indigenous related research.

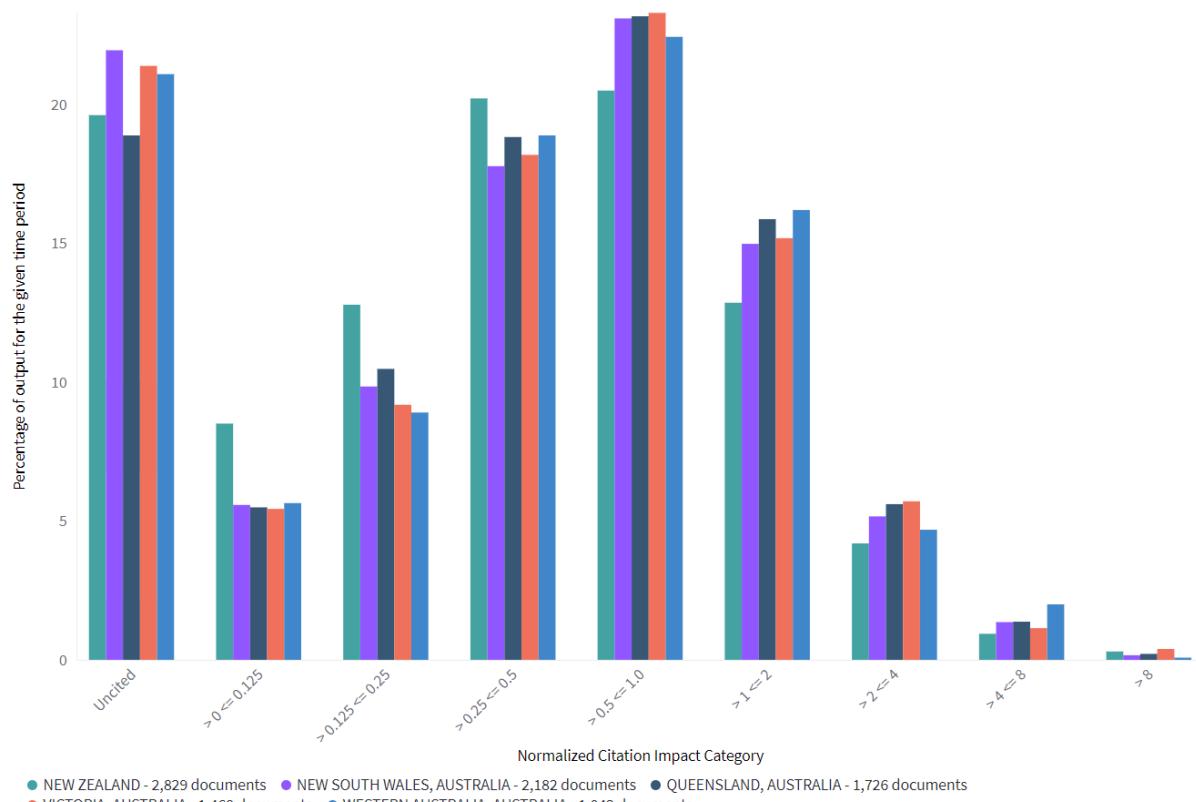


Figure 4. Displays the impact profile of each of the top 5 states or regions (by volume) in Indigenous Research. The proportion of research produced by each state is broken down into the percentage of the research is either 'Uncited' or falls into windows of Normalised Citation Impact.

Researcher breakdown

People in Australia and New Zealand publishing in Indigenous Research

There are 25 people based in Australia or New Zealand who have co-authored more than 35 documents within the dataset produced at the start of the report (Table 4). **Professor Alex Brown**, currently based at the **University of Adelaide** and the **South Australian Health and Medical Research Institute (SAHMRI)**, has contributed to the largest number of documents (84 in total). Of the top 25 researchers (by volume output) 12 of them are female and 13 of them male. Although this analysis considers documents across the course of researcher's careers, the **University of Western Australia** currently employs 4 of the top 25 researchers, while the **University of Auckland**, **University of Otago** and **University of Adelaide** currently each employ 3 of the top 25 (Table 4).

In general, when normalised across their categorised 2-Digit Divisions, the citation metrics of Indigenous research does not perform above average levels overall. There are two researchers in this group that stand out as having both a CNCI and a % of documents in the top 10% above the global averages, they are **Professor Jonathan Carapetis** of **University of Western Australia** and **Professor Nicola Dalbeth** of the **University of Auckland** (Figure 5).

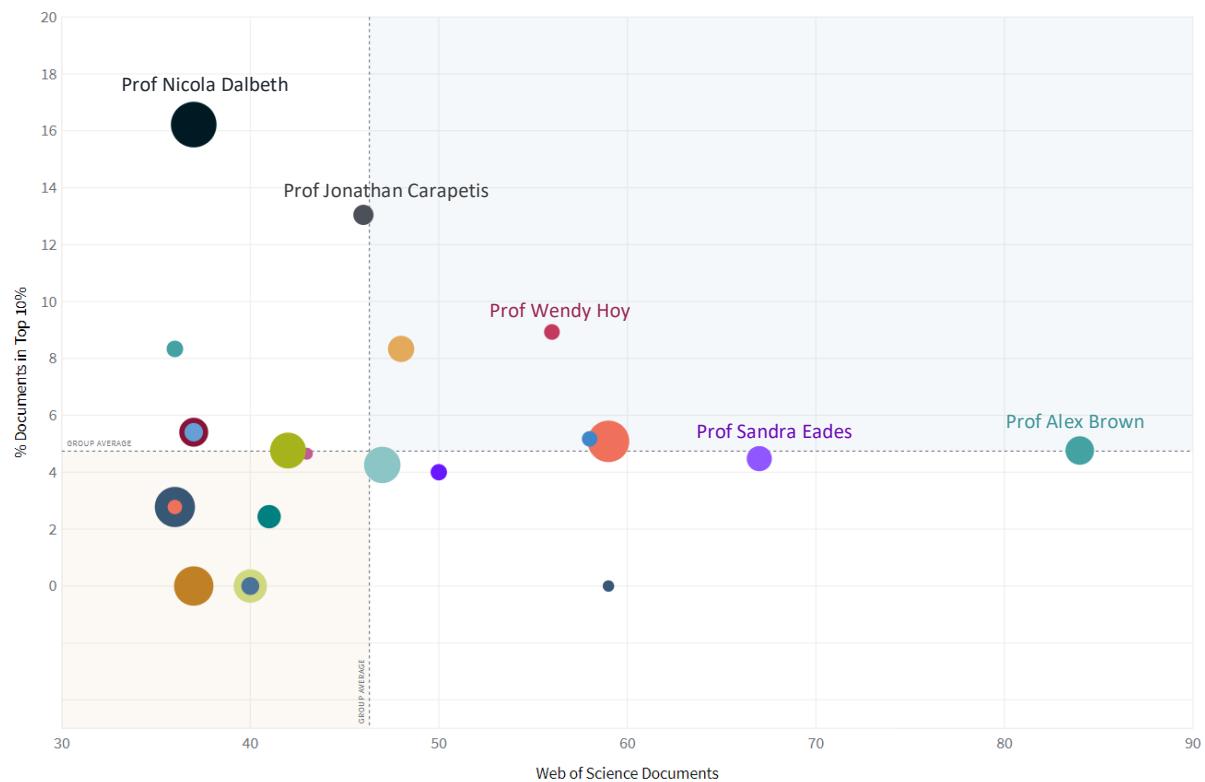


Figure 5. Displays total research output (x-axis) at Australian or New Zealand researchers when publishing in Indigenous Research (2010-2019). Also displayed are the total number of documents in the top 10% (y-axis) and the % of documents with an international collaborator (point radius). When assessing the volumes of research output at the institutional and/or national level, certain factors need to be considered, such as the publication practices and the field of research or focus for the institution or country.

Name	Institution	# of Docs	Times Cited	CNCI	% Docs Cited	% in Q1 Journals	% Docs in Top 1%	% Docs in Top 10%	% Inter Collab	% Open Acc Docs
All Records	8427	61188	0.65	79.03	30.04	0.13	4.41	15.36	29.48
Brown, Alex	<i>University of Adelaide/SAHMRI</i>	84	1015	0.87	90.48	36.14	0.00	4.76	23.81	59.52
Eades, Sandra	<i>University of Melbourne</i>	67	851	0.78	89.55	40.32	0.00	4.48	19.40	64.18
Ward, James	<i>SAHMRI</i>	59	546	0.54	89.83	21.82	0.00	0.00	1.69	47.46
Blakely, Tony	<i>University of Otago</i>	59	973	0.98	96.61	67.35	0.00	5.08	40.68	49.15
Bailie, Ross	<i>University of Sydney</i>	58	739	0.86	94.83	26.92	0.00	5.17	6.90	70.69
Hoy, Wendy E.	<i>University of Queensland</i>	56	394	0.76	69.64	12.73	0.00	8.93	7.14	39.29
Thompson, Sandra	<i>University of Western Australia</i>	50	706	0.79	88.00	36.17	0.00	4.00	8.00	64.00
Sibley, Chris G.	<i>University of Auckland</i>	48	514	0.80	91.67	40.00	0.00	8.33	20.83	14.58
Sarfati, Diana	<i>University of Otago</i>	47	620	0.79	91.49	47.22	0.00	4.26	34.04	40.43
Carapetis, Jonathan R.	<i>University of Western Australia</i>	46	853	1.69	95.65	48.89	2.17	13.04	13.04	52.17
Katzenellenbogen, Judith	<i>University of Western Australia</i>	43	350	0.80	76.74	39.53	0.00	4.65	2.33	44.19
Kerse, Ngaire	<i>University of Auckland</i>	42	343	0.54	88.10	36.67	0.00	4.76	33.33	38.10
Garvey, Gail	<i>Charles Darwin University</i>	41	170	0.59	85.37	45.71	0.00	2.44	17.07	41.46
Guy, Rebecca J.	<i>University of New South Wales</i>	40	470	0.67	95.00	23.08	0.00	0.00	0.00	37.50
Lawrenson, Ross	<i>University of Waikato</i>	40	318	0.64	95.00	35.71	0.00	0.00	30.00	45.00
Atkinson, David	<i>University of Western Australia</i>	40	348	0.55	72.50	33.33	0.00	0.00	10.00	52.50
Clough, Alan R.	<i>James Cook University</i>	37	295	0.74	83.78	25.00	0.00	5.41	24.32	64.86
Brimblecombe, Julie	<i>Monash University</i>	37	297	0.71	89.19	27.27	0.00	5.41	10.81	70.27
Jamieson, Lisa	<i>University of Adelaide</i>	37	226	0.33	78.38	31.43	0.00	0.00	37.84	43.24
Dalbeth, Nicola	<i>University of Auckland</i>	37	696	1.15	83.78	57.14	0.00	16.22	45.95	54.05
Kildea, Sue	<i>University of Queensland</i>	36	428	0.92	80.56	61.76	0.00	8.33	8.33	33.33
Rumbold, Alice R.	<i>University of Adelaide</i>	36	334	0.73	86.11	41.18	0.00	2.78	0.00	33.33
Baker, Michael G.	<i>University of Otago</i>	36	457	0.70	88.89	50.00	0.00	2.78	38.89	27.78
Thomas, David P.	<i>Charles Darwin University</i>	36	296	0.68	91.67	55.56	0.00	2.78	5.56	52.78
Tsey, Komla	<i>James Cook University</i>	35	422	0.87	94.29	6.90	0.00	2.86	8.57	54.29

Table 4. The number of documents published by Australian or New Zealand based authors (top 25 by volume) in Indigenous Research since 2010 and performance indicators on the set of documents. **Note:** the number of publications and publication metrics are not based on each person's entire list of publications but are limited to those that appear in the original set of 8427 publications.

What do author networks look like for people publishing in Indigenous Research?

Here we explore the researcher and co-author relationships between the people producing Indigenous Research. Simply considering the prevalence of co-authorship on these records, and displaying a high prevalence with a close proximity, we can see (similarly to the organisation clusters on Page 10) that researchers are clustered by location.

There are two distinct clusters, each with researchers based in the two nations (Australia and New Zealand) clustering separately, demonstrating a geographic divide (Figure 6). It may be that there is an expected divide between academics based in each nation the influences the way they collaborate, particularly in Indigenous Research. However, of the 2000 most prominent collaborative relationships between these academics, 48 co-author relationships exist across the Tasman Sea within the top 325 authors. Unlike the organisational clusters, here we are able to see clustering of research at a group level and many of the names that appear in the top 25 researchers (Table 4) seem to be largely connected within their research group and at the centre of their own research group's ecosystem.

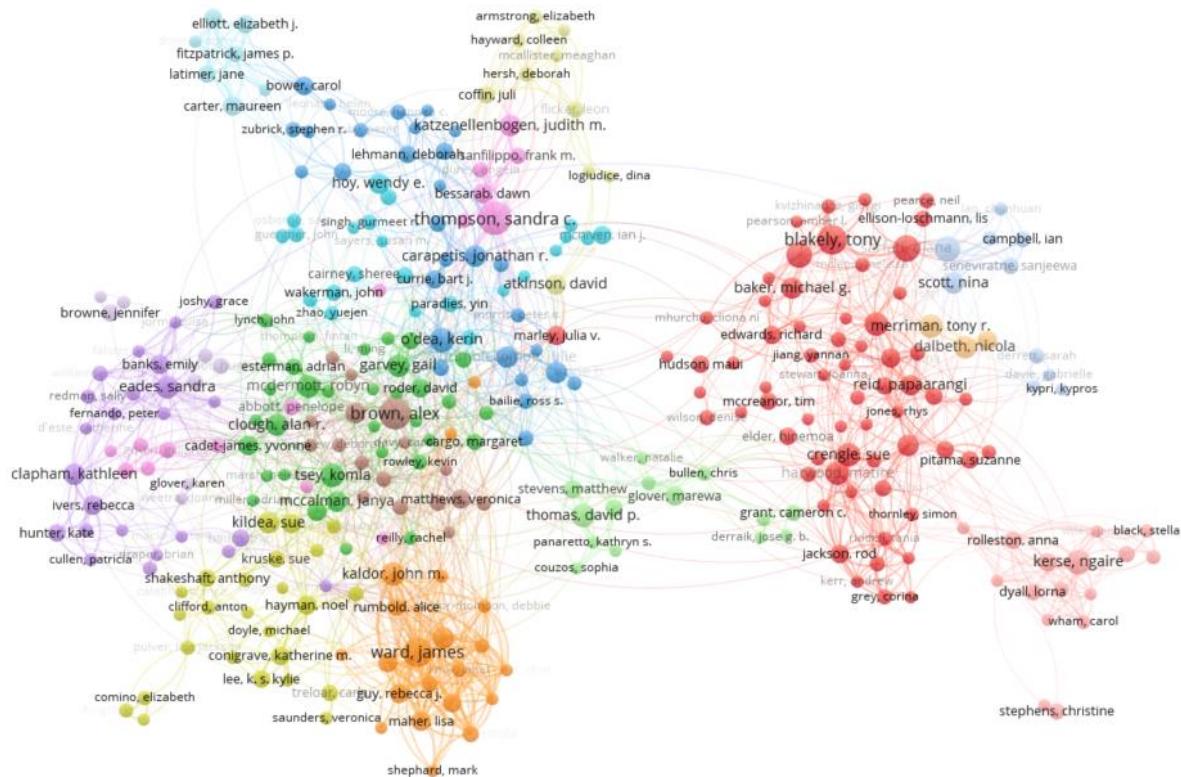


Figure 6. Displays the relationships between academics in the Indigenous Research set of publications. An academic must have been an author on at least 10 documents from the set to be displayed and must be co-author to at least one other author within the set (leaving 325 academics in total). Collaborative lines are drawn between the 2000 most common collaborators across the set of publications. Image produced using VoSviewer 2020

Which fields of research are publishing Indigenous Research?

There are a number of different methodologies used to classify research into ‘Subject Areas’. As presented in the introduction to this document, the Australian and New Zealand Governments use a schema known as Field of Research (FoR) codes to classify research outputs. Traditionally (ANZSRC 2008) this classification is done across thousands of academic journals by mapping a journal output into one or more 2-digit ‘Divisions’ or 4-digit ‘Groups’. This section of the report looks only at the research traditionally classified in a 4-Digit FoR code based on their journal of publication. It also could look to guide interested parties into how these outputs should be mapped into the updated schema and the 20 newly developed 4-Digit Groups aimed specifically at Indigenous Research.

Most of this body of research has been published in the ANZSRC 2008 “11 based” FoR codes including **1117 Public Health & Health Services**, **1103 Clinical Sciences** and **1110 Nursing**. (Table 5). It is however apparent that Australian and New Zealand based Indigenous research performs much higher in the 20 or 21 based FoR codes (ANZSRC 2020) than the global average in the areas of **2103 Historical Studies**, **2003 Cultural Studies** and **2004 Linguistics** (Figure 7).

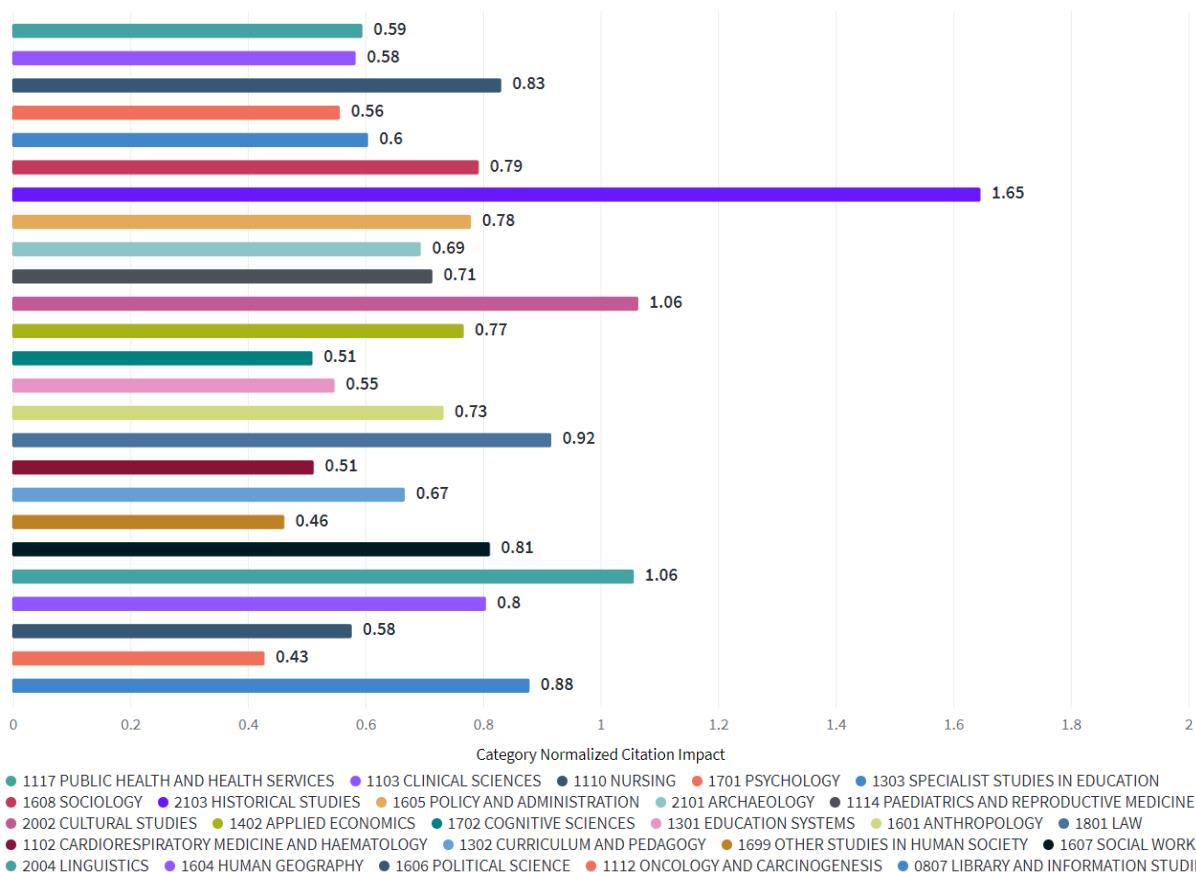


Figure 7. Displays the top ANZSRC 2008 4-Digit Field of Research codes publishing Indigenous Research by volume. The bar graph shows the CNCI when this research is normalised across the year of publication, article type and 4-Digit FoR code.

Name	# of Docs	Times Cited	CNCI	% Docs Cited	% in Q1 Journals	% Docs in Top 1%	% Docs in Top 10%	% Inter Collab	% Open Acc Docs
All Records (4 Digit FoR Code)	6940	49948	0.72	78.49	29.01	0.17	6.07	14.96	30.75
1117 PUBLIC HEALTH AND HEALTH SERVICES	2917	25563	0.59	81.62	28.30	0.07	2.98	16.08	46.11
1103 CLINICAL SCIENCES	1287	10855	0.58	74.28	28.24	0.08	4.04	18.57	30.92
1110 NURSING	588	3949	0.83	78.74	28.60	0.00	5.61	9.69	56.29
1701 PSYCHOLOGY	564	4020	0.56	79.08	35.60	0.18	3.37	16.49	19.50
1303 SPECIALIST STUDIES IN EDUCATION	493	2629	0.60	78.90	14.06	0.20	2.43	9.33	23.94
1608 SOCIOLOGY	492	3306	0.79	84.15	35.77	0.00	5.08	9.76	28.46
2103 HISTORICAL STUDIES	489	1671	1.65	67.48	8.20	1.02	16.56	6.34	6.75
1605 POLICY AND ADMINISTRATION	433	3171	0.78	87.99	7.24	0.00	4.62	9.01	38.11
2101 ARCHAEOLOGY	417	2051	0.69	75.06	17.59	0.00	4.32	16.79	11.75
1114 PAEDIATRICS AND REPRODUCTIVE MEDICINE	311	3082	0.71	87.46	27.27	0.00	4.50	20.26	29.58
2002 CULTURAL STUDIES	310	1316	1.06	72.58	19.35	0.00	8.39	5.16	12.58
1402 APPLIED ECONOMICS	293	2442	0.77	89.08	10.31	0.00	4.10	11.95	40.27
1702 COGNITIVE SCIENCES	271	2104	0.51	84.13	24.75	0.00	2.21	16.24	12.55
1301 EDUCATION SYSTEMS	256	1035	0.55	76.56	21.88	0.00	1.56	8.59	17.19
1601 ANTHROPOLOGY	241	1357	0.73	79.25	17.49	0.00	4.56	7.88	15.35
1801 LAW	228	862	0.92	69.74	23.53	0.44	6.14	8.77	16.67
1102 CARDIORESPIRATORY MEDICINE & HAEMATOLOGY	222	1656	0.51	69.37	22.64	0.00	2.25	20.27	23.87
1302 CURRICULUM AND PEDAGOGY	217	1063	0.67	76.96	29.17	0.00	2.30	14.29	31.34
1699 OTHER STUDIES IN HUMAN SOCIETY	203	650	0.46	69.46	2.72	0.00	1.48	5.91	13.30
1607 SOCIAL WORK	174	1023	0.81	82.18	40.15	0.00	5.17	12.07	13.22
2004 LINGUISTICS	162	853	1.06	83.33	17.65	0.00	6.17	15.43	17.90
1604 HUMAN GEOGRAPHY	159	1451	0.80	87.42	56.15	0.00	5.03	19.50	19.50
1606 POLITICAL SCIENCE	153	716	0.58	77.78	27.37	0.00	3.92	7.84	13.07
1112 ONCOLOGY AND CARCINOGENESIS	122	776	0.43	61.48	32.74	0.00	0.82	21.31	29.51
0807 LIBRARY AND INFORMATION STUDIES	111	916	0.88	82.88	1.06	0.00	6.31	7.21	72.97

Table 5. The number of documents published in each traditional ANZSRC 2008 Field of Research code (top 25 by volume) in Indigenous Research since 2010 and performance indicators on the set of documents. **Note:** Documents are counted across multiple 4 Digit FoR codes if the journal is mapped to multiple codes.

Which journals are publishing Indigenous Research?

The academic publishing landscape is undergoing major changes. Publishers are rapidly making the transition from print to electronic format, while business models are also being turned upside down. Since the early 1990s licensing of electronic resources has been common, although an important trend is developing: Open Access.

In Open Access publishing a journal article is made available free to all on the web by the publisher at the time of publication. Generally, open journals are funded by the author who pays an article processing charge on the article's acceptance, thereby shifting the fees from the reader (or institution supporting the reader) to the researcher (or the funding agency supporting the researcher). Here we look at the current trends in Indigenous Research and the links with academic publishing in general.

Two journals have published over 150 articles meeting our search criteria relating to Indigenous Research. These two journals are **New Zealand Medical Journal** and **Australian and New Zealand Journal of Public Health** (Figure 8). Of the top 10 journals (by volume outputs) that have produced this research, **Medical Journal of Australia** has the highest Impact Factor = **6.11**. The only journal of the top 20 that has a greater than average Category Normalised Citation Impact to Indigenous Research when normalised across classical 2-Digit FoR Divisions is **Australian Archaeology**.

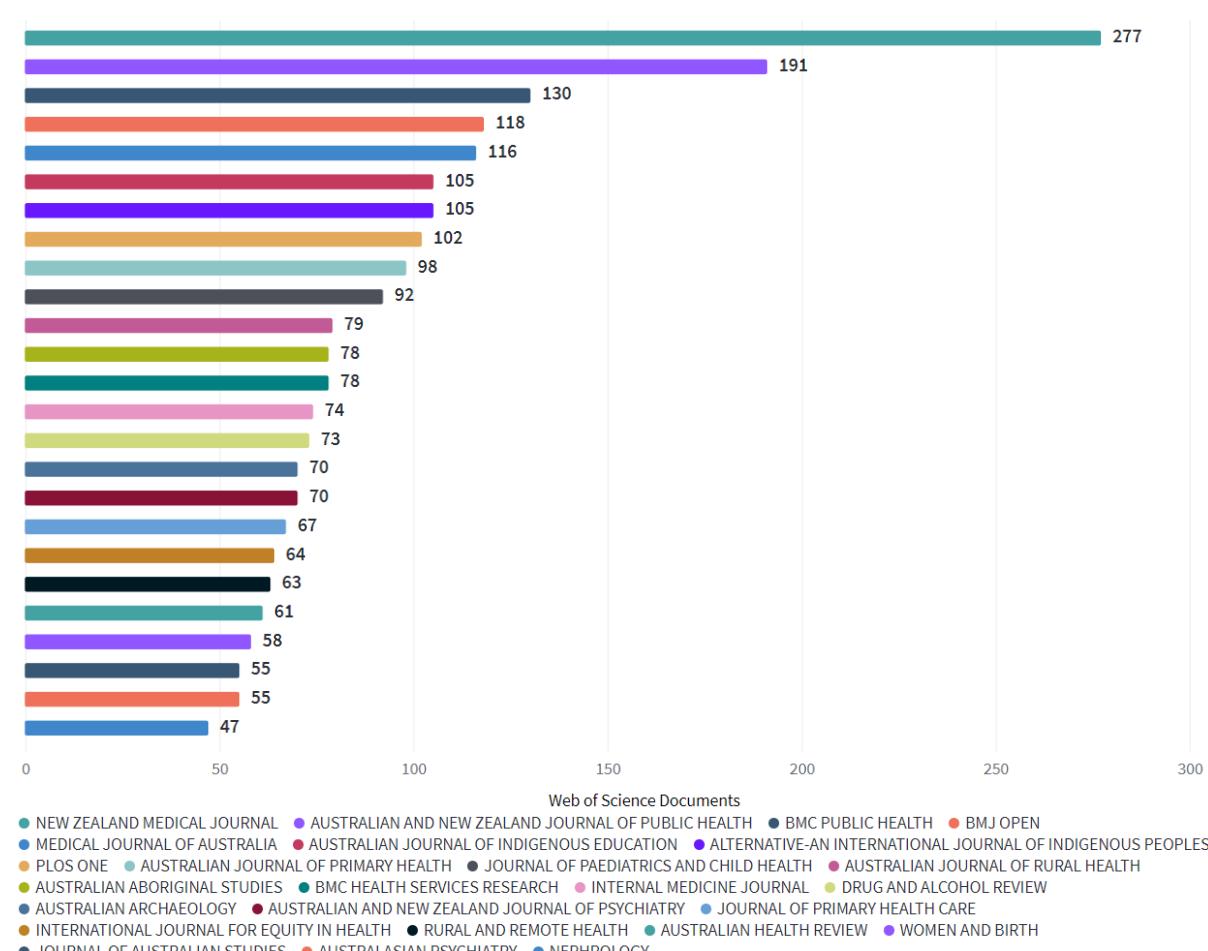


Figure 8. Displays the number of records being published in Indigenous Research in the top 25 journals (by volume) from 2010 - 2019.

There are several journals that publish many Australian and New Zealand Indigenous related research (over 75 documents in the set) that are entirely Open Access, including **BMC Public Health**, **BMC Open**, **PLoS One**, and **BMC Health Services Research**. These journals make 100% of their published records freely and legally available online (Gold Open Access). Other journals including **Medical Journal of Australia** and **Australian and New Zealand Journal of Public Health** make more than 50% of this research sets content freely and legally accessible (Table 6).

Name	# of Docs	Times Cited	CNCI	% Docs Cited	Journal Quartile	Journal Impact Factor	% Open Acc Docs
NEW ZEALAND MEDICAL JOURNAL	277	1520	0.36	85.92	n/n	n/a	0.00
AUST AND NZ JOURNAL OF PUBLIC HEALTH	191	1565	0.71	88.48	Q2	2.08	53.40
BMC PUBLIC HEALTH	130	1441	0.59	92.31	Q2	2.52	100.00
BMJ OPEN	118	749	0.55	76.27	Q2	2.50	100.00
MEDICAL JOURNAL OF AUSTRALIA	116	1751	0.89	96.55	Q1	6.11	50.86
AUST JOURNAL OF INDIGENOUS EDUCATION	105	375	0.37	74.29	n/a	n/a	7.62
ALTERNATIVE AN INTER J OF INDIGENOUS PEOPLES	105	418	0.92	75.24	n/a	n/a	10.48
PLOS ONE	102	1194	0.49	87.25	Q2	2.74	100.00
AUSTRALIAN JOURNAL OF PRIMARY HEALTH	98	439	0.36	75.51	Q4	0.98	19.39
JOURNAL OF PAEDIATRICS AND CHILD HEALTH	92	884	0.51	93.48	Q3	1.71	4.35
AUSTRALIAN JOURNAL OF RURAL HEALTH	79	431	0.40	81.01	Q2	1.46	15.19
AUSTRALIAN ABORIGINAL STUDIES	78	191	0.46	61.54	Q4	0.52	0.00
BMC HEALTH SERVICES RESEARCH	78	763	0.66	84.62	Q3	1.99	100.00
INTERNAL MEDICINE JOURNAL	74	392	0.59	58.11	Q3	1.68	8.11
DRUG AND ALCOHOL REVIEW	73	336	0.47	45.21	Q2	2.47	5.48
AUSTRALIAN ARCHAEOLOGY	70	362	1.35	78.57	Q3	0.78	4.29
AUST AND NZ JOURNAL OF PSYCHIATRY	70	449	0.43	28.57	Q1	4.66	2.86
JOURNAL OF PRIMARY HEALTH CARE	67	370	0.38	100.00	n/a	n/a	100.00
INTERNATIONAL JOURNAL FOR EQUITY IN HEALTH	64	565	0.88	82.81	Q1	2.60	100.00
RURAL AND REMOTE HEALTH	63	426	0.53	80.95	Q4	1.15	100.00
AUSTRALIAN HEALTH REVIEW	61	474	0.82	91.80	Q4	1.32	37.70
WOMEN AND BIRTH	58	203	0.44	50.00	Q1	2.31	6.90
JOURNAL OF AUSTRALIAN STUDIES	55	152	0.10	67.27	Q2	0.55	1.82
AUSTRALASIAN PSYCHIATRY	55	210	0.27	81.82	Q4	1.03	5.45
NEPHROLOGY	47	117	0.86	44.68	Q3	1.75	8.51

Table 6. The number of documents published by each journal (top 25 by volume) in Indigenous Research since 2010 and performance indicators on the set. **Note** A 'Journal Impact Factor' and 'Quartile' metric is not available where the journal is not indexed in either the Science Citation Expanded or the Social Science Citation Index (denoted with a 'n/a').

The new field of research schema for Indigenous Research

Topic level mapping of articles in Indigenous Research

Indigenous Research from across the Australian and New Zealand Region is published across many journals and research areas. There are, however, very few journals that publish Indigenous related research from the Australian and New Zealand region exclusively. Therefore, when categorising this body of research, a schema based simply at a journal level is not appropriate.

Using multiple details of each article, one can make an accurate estimation of where each of the 8427 articles in this body of research will be remapped into the new ANZSRC 2020 Fields of Research (see Appendix for individual articles mapping). The updated FoR mapping for each document has been produced based on the journal of publication, the title of the article and the Author Address locations. Based on this approach, the volumes of research in the new categories show that most of the Indigenous Research is published in the area of **Health and Wellbeing**, followed by **Society and Community**, which is then followed by **Culture Language and History** (Table 7).

Code	Name	# of Docs
45	<i>Indigenous Studies</i>	454
4501	<i>Aboriginal and Torres Strait Islander culture, language and history</i>	985
4502	<i>Aboriginal and Torres Strait Islander education</i>	351
4503	<i>Aboriginal and Torres Strait Islander environmental knowledges and management</i>	255
4504	<i>Aboriginal and Torres Strait Islander health and wellbeing</i>	2807
4505	<i>Aboriginal and Torres Strait Islander peoples, society and community</i>	1208
4506	<i>Aboriginal and Torres Strait Islander sciences</i>	13
4507	<i>Te ahurea, reo me te hītori o te Māori (Māori culture, language and history)</i>	347
4508	<i>Mātauranga Māori (Māori education)</i>	158
4509	<i>Ngā mātauranga taiao o te Māori (Māori environmental knowledges)</i>	146
4510	<i>Te hauora me te oranga o te Māori (Māori health and wellbeing)</i>	1192
4511	<i>Ngā tāngata, te porihanga me ngā hapori o te Māori (Māori peoples, society and community)</i>	508
4512	<i>Ngā pūtaiao Māori (Māori sciences)</i>	3

Table 7. The number of documents estimated to be categorised into each of the new ANZSRC 2020 Indigenous FoR codes from the original set of 8427 publications.

Furthermore, considering the individual topics mentioned in the records and their co-occurrences in the keywords section of each article we can determine two things:

- 1) the proximity of these topics to others
- 2) the frequency of the occurrences of the keywords across the set.

Basically, this sets up a topic network of Indigenous Research. This approach could also be used to map research at an article level into more defined categories like the new FoR code schema generated recently. It can be seen from this type of analysis that keywords like **Indigenous**, **Australia**, **Māori**, and **Aboriginal** are at the heart of the topic map. This is largely because these keywords were used to create the set. More interestingly, moving around the periphery of the topic cluster (Figure 9), one can see the topics emerging organically from the records. Starting from the top right of the cluster we see words relating to both environmental development (**biodiversity**, **climate change** and **conservation**) but also the history of Indigenous populations (**settlement**, **archaeology**, and **heritage**).

Moving further around the cluster, we move into social aspects of Indigenous Research (**politics**, **culture**, and **education**). This moves further into society and community with keywords like **youth**, **home**, and **experience** becoming emergent. From the bottom of the keyword cluster around the left-hand side we start to see health related terms emerging. From the bottom we see the social and society-based keywords develop into population health and epidemiological references (**screening**, **drug**, **mental-health**, and **primary-care**). From here the final quadrant (top-left) of keywords is dominated by the terms related to more acute instances of health including **diagnosis**, **hypertension**, **pneumonia** and **infections**.

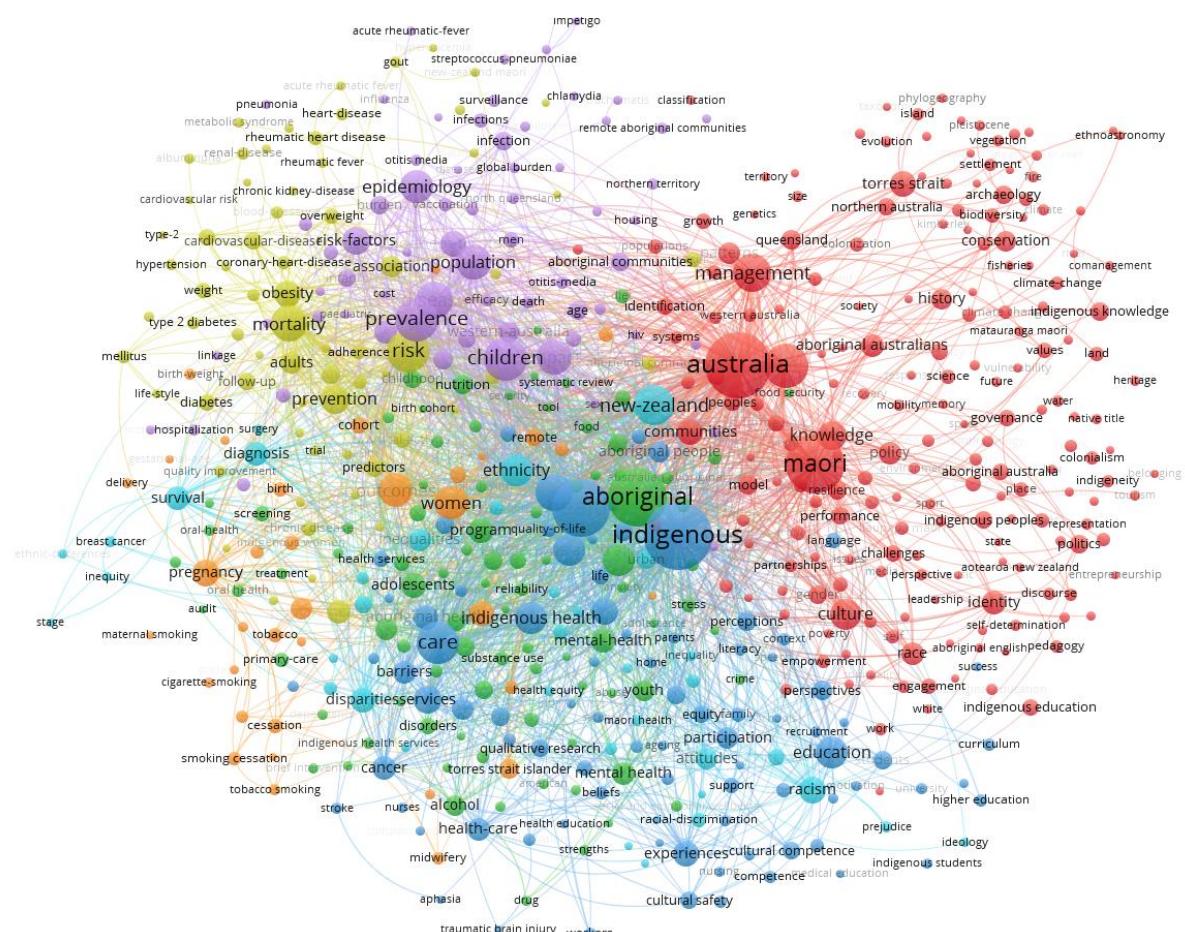


Figure 9. Displays the relationships between topics in the 'Keywords' section of each record in the Indigenous Research set. A Keyword must have at least 15 occurrences across the set to be displayed. (leaving 575 topics in total). Co-occurrence lines are drawn between the 2000 most common links between topics mentioned on the same publication. Image produced using VoSviewer 2020

Bibliographic coupling and co-citation analysis for clustering articles in Indigenous Research

'Bibliographic coupling' occurs when two articles reference a common third article in their references. Two articles are said to be bibliographically coupled if they cite one or more documents in common. The coupling strength can be determined by the number of references that the two records share.

Using a minimum number of shared references of three, the largest group of records within the Indigenous Research set that are connected by bibliographic coupling is 4845 records in total (Figure 10). The analysis reveals articles related to acute health (*light blue*) clustering near to epidemiological or population health studies (*dark blue*). The small cluster of articles at the top of Figure 10 in dark blue relate to arthritis or gout in the Māori community specifically.

Moving around the analysis shows clusters largely relating to mental health (*red*), society and education (*purple*) and ecology and the environment (*green*). Finally, the large portion of publications left in the set generally relate to Indigenous Research in archaeology, culture and history (*yellow*). Similarly, bibliographic coupling could be performed at a journal level, or on the authors contributing to the research. This could then be used to find relationships of clusters within any set of research, but this is outside the scope of this report.

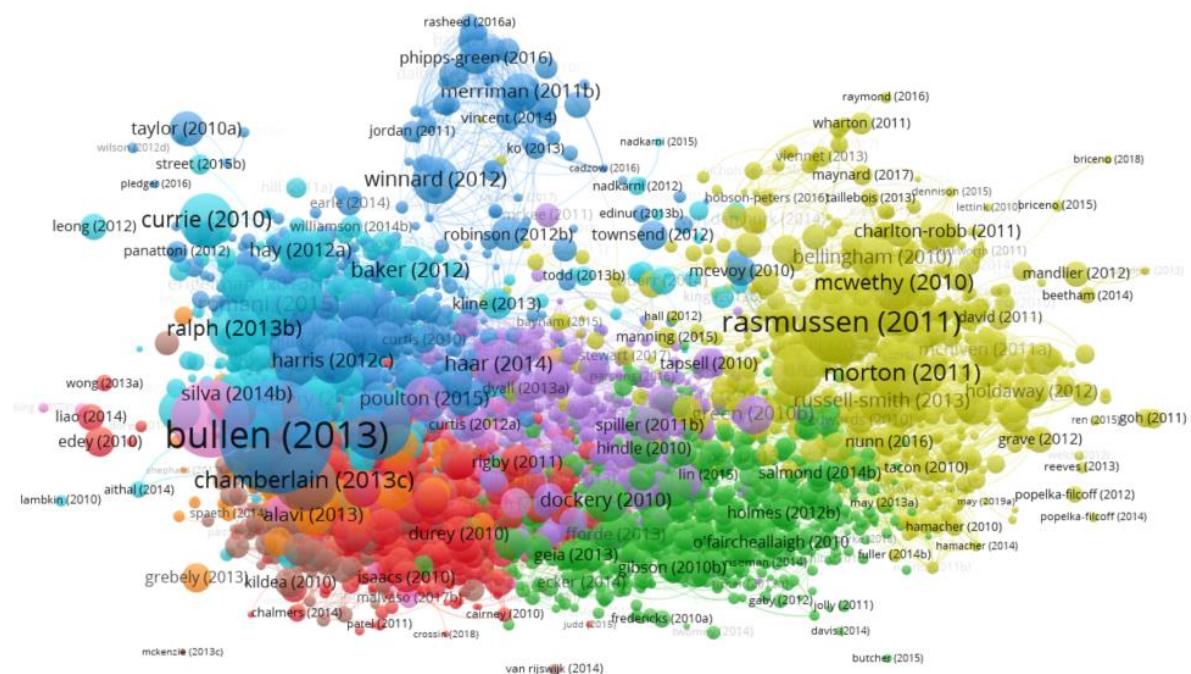


Figure 10. 4845 Indigenous Research related articles visualised using bibliographic coupling. The proximity of the documents and colour clusters reveals the strength of the bibliographic coupling between articles. The point radius for each record is reflective of the total number of times it has been cited. Image produced using VoSviewer 2020

Where bibliographic coupling looks for links between two research articles, (or journals, or people) that both cite the same document, co-citation analysis looks for links between two research articles (or journals or people) that are both cited by the same document. Performing co-citation analysis on the original set of documents obviously looks to a second set of documents that are one citation generation earlier than the set of records analysed throughout this report.

Using a citation threshold of at least 10 citations, the largest set of connected records is 2058 documents. The most cited work by the original set of Indigenous Research is a book published in

1999 and titled *Decolonizing Methodologies: Research and Indigenous Peoples*, by Linda Tuhiwai Smith. This book has been cited a total 343 times by the original 8427 articles. Further to this, the republished version of the same book in 2012 is the 4th most cited reference in the set (137 citations in total). These two references can be seen at the centre of the co-citation mapping as two large overlaid circles in the centre of the co-citation analysis (Figure 11).

Similarly to the bibliographic coupling analysis, there is a small set of records relating to arthritis (*pink*) clustered near to public health related records (*dark blue*). Other records pertaining to both areas of acute health issues (cardiovascular etc.) and epidemiological studies or public health studies are clustered near to one another (*orange*, *light blue*, *green* and *brown*). Issues then relating to social fairness, nursing and employment equality are clustered in yellow. Moving further around the co-citation analysis, documents pertaining to education and societies tend to cluster together (*red*) with a bordering cluster concerning the history and archaeology of Indigenous societies (*purple*) found somewhat removed from the core clustering.

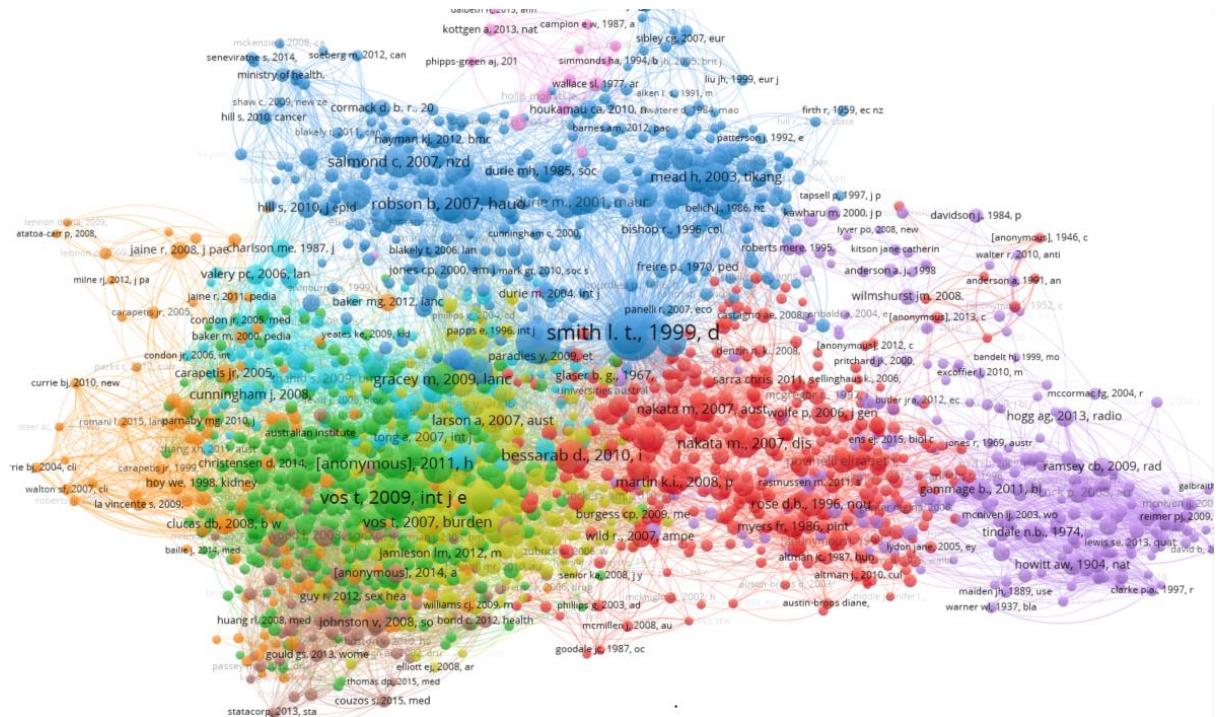


Figure 11. 2058 records that have been cited by records in Indigenous Research, visualised using co-citation analysis. The proximity of the documents and colour clusters reveals the strength of the co-citation coupling between articles. The point radius for each record is reflective of the total number of times it has been cited. Image produced using VoSviewer 2020

Summary

We hope you have found the information here to be insightful and of practical use. By delivering reliable data on research performance and complementing it with baseline statistics for benchmarking against peers and inspirational peers, Clarivate enables research leaders like you to make confident and informed decisions.

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Document expiry date: September 10, 2021

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