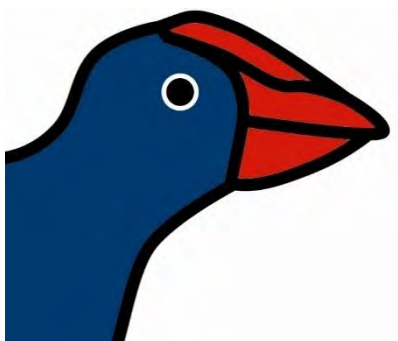


Fellowships Impact Evaluation 2020

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1. Executive Summary

Pūkeko Research was engaged by the Ministry of Business, Innovation and Employment (MBIE) to evaluate the impact of seven fellowship programmes funded from Vote Business, Science and Innovation. Four are funded through *Fellowships for Excellence*, whose purpose is 'to encourage the career development of the country's talented early and midcareer researchers'. Three are supported through the Health Research Fund, 'to support the career development of emerging health researchers, including Māori and Pacific health researchers undertaking post graduate research qualifications'.

The purpose of the evaluation is to answer three evaluative questions:

- to assess the effectiveness of the existing fellowship schemes individually against their work programme objectives,
- to assess the appropriateness of the fellowships portfolio as a whole and determine whether the current policy settings are appropriate; and
- to provide independent advice to MBIE on the impact of fellowships investments.

Pūkeko Research gathered the evidence using four approaches. A review of prior national and international evaluations examined methodology, findings and recommendations. Stakeholder interviews were held with 25 stakeholders from policy, agency, research institutions and interest groups. Surveys of postdoctoral fellows, the Fulbright Science and Innovation scheme and the Rutherford Cambridge Doctoral scholarships were developed and distributed. Finally, a survey of unsuccessful postdoctoral applicants was developed and distributed to provide counterfactual data.

We assessed the seven fellowship investments against their individual terms of reference and found that the fellowship schemes met their work programme objectives to a high degree. We determined the collective success of the seven fellowship investments against their overall policy objectives and found the overall portfolio is working well. A number of factors at the portfolio and individual fellowship level are identified for further consideration.

The impact of the fellowship schemes is felt most strongly by the eligible applicants, fellowship holders, their work teams and departments, their employers (especially, at the postdoctoral level, universities) and the network of international contacts developed by most of the successful applicants. The fellowships have the power to transform working lives, repatriate talented New Zealanders, bring new innovations to Aotearoa /New Zealand and spark further research.

The administering agencies, Royal Society Te Apārangi, the Health Research Council and Fulbright New Zealand have developed robust systems to ensure the best possible decisions are made. With high levels of competition for these fellowships, the process can be stressful for participants.

Many participants in this study noted that the fellowships are becoming increasingly responsive to embedded gender and ethnic disparities, increasing the proportion of women recipients in recent years, and this is borne out by the figures. There is a need to address the under-representation of Māori and Pacific researchers.

Improved Māori and Pacific participation may be achieved by broadening the focus further from academic to applied research, a focus on community leadership and responsiveness and valuing diverse experiences.

2. Key recommendations

Recommendations cover the three areas of the overall portfolio, individual fellowships and the policy context.

Portfolio

Delivery	MBIE and partner agencies should continue the investments, as the fellowships deliver clear benefits to New Zealand.
Inclusion	The impetus towards more inclusive approaches to research 'excellence' in the awarding of fellowships be continued. In particular it is recommended the fellowships recognise 'excellence' in the context of Māori and Pacific research paradigms.
Representation	Continued monitoring of portfolio fellowships (other than Māori and Pacific Health Fellowships), to ensure that Māori and Pacific researchers are fairly represented in the application and award of these fellowships. The intention is that the participation and success of these researchers will increase over time.
Evenness	MBIE and partner agencies consider ways to ensure that, over time, postdoctoral fellowships are awarded across the full range of research disciplines, to encourage and reward excellent research in all fields.
Applied research	Noting that most postdoctoral fellowships are held in the universities, MBIE consider ways to provide fellowships to support excellent research in applied settings, such as Crown Research Institutes and community research.
Continuity	The portfolio may add a general requirement for all fellowships held in Aotearoa/New Zealand that organisations hosting a fellowship must ensure that fellows have a viable pathway to permanent employment.

Fellowships for Excellence

Fulbright Science and Innovation awards	The award is operating well and delivering significant value to participants. Further work may examine how to increase Māori and Pacific involvement in the programme.
James Cook	The name, purpose and value of the James Cook Fellowship should be reviewed. Potential options include a less divisive name, a higher value and a clearer purpose in celebrating the work of top researchers.
Rutherford Discovery Fellowship	MBIE, RSNZ and tertiary organisations should work together to ensure that women, Māori and Pacific researchers are equitably represented in applications for this fellowship and that outcomes for these groups continue to improve. Due to significant competition, the majority (60%) of Rutherford Discovery Fellowships are awarded to researchers already in permanent positions. MBIE needs to consider this in light of the needs of the postdoctoral workforce. With large numbers of applicants and only ten fellowships per year, and taking into account the above recommendations, consider increasing recipient numbers to close gaps and reward additional talented research leaders.
Rutherford Foundation Fellowship	This fellowship meets its objectives in a space where employment opportunities are limited. There may be merit in increasing the number of fellowships.

Health Research Fund fellowships

Māori Health Fellowships	MBIE and the HRC to consider how to improve the status of these fellowships and ensure improved workforce outcomes for fellows completing the programmes.
Pacific Health Fellowships	MBIE and the HRC to consider how to improve the status of these fellowships and ensure improved workforce outcomes for fellows completing the programmes.
Sir Charles Hercus Fellowship	This is an effective fellowship for fostering health research and it should continue in its current format. MBIE should examine reasons for the very low number of Māori and Pacific fellows in this fellowship.

Policy

Role of fellowships	In the light of academic labour market issues described in Appendix C, MBIE should consider whether the fellowships portfolio should play a role in supporting job security for emerging researchers.
Engagement	In the light of the findings from this study, MBIE consider ways to improve postdoctoral opportunities for Māori and Pacific researchers to foster research leadership and opportunities.

3. Background

The Ministry of Business, Innovation and Employment engaged Pūkeko Research Ltd in late 2019 to evaluate a portfolio of seven fellowships funded from Vote Business, Science and Innovation. Four are funded through the *Fellowships for Excellence* fund, ‘to encourage the career development of the country’s talented early and midcareer researchers’. Three are funded by the Health Research Fund, ‘to support the career development of emerging health researchers, including Māori and Pacific health researchers undertaking post graduate research qualifications’. The total value of the portfolio is \$15.2 million per year. The aim of the evaluation was to:

- assess the effectiveness of the existing fellowship schemes individually against their work programme objectives,
- assess the appropriateness of the fellowships portfolio as a whole and determine whether the current policy settings are appropriate; and
- provide independent advice to MBIE on the impact of fellowships investments.

Table 1. Key information on the seven fellowships under review

Fellowship (admin)	Awards p.a.	Value p.a.	Terms	Duration	Eligibility
Appropriation: Fellowships for Excellence					
James Cook (RSNZ)	3	\$.72m	\$100,000 p.a. for salary support, \$10,000 for research expenses	2 years	Established scientists
Rutherford Discovery Fellowships (RSNZ)	10	\$8m	Min. \$70,000 p.a. to salary, \$60,000 research expenses, \$30,000 host organisation.	5 years	3-8 years postdoc
Rutherford Foundation (RSNZ)	5 + 2	\$1m	Postdoc stipend \$75,000 + \$10,000 research costs. PhD £13,900 allowance plus fees	2 or 3 years	0-4 years postdoctoral/ Doctoral students
Fulbright Science and Innovation (Fulbright NZ)	6 - 10	\$.658m	US\$40,000 plus \$NZ4,000 travel, possible second year funding at US\$30,000	1 or 2 years	Graduate students
Appropriation: Health Research Fund					
Sir Charles Hercus (HRC)	6 (variable)	± \$3m	Up to \$600,000 over four years	4 years	6-10 years postdoc
Māori Health (HRC)	3	± \$1.2m	\$100,000 research, neg. salary, \$5,000 tikanga and \$3,000 conference allowance	4 years	within 5 years postdoc
Pacific Health (HRC)	2	± \$.6m	\$105,000 research, neg. salary, \$2,500 conference allowance	4 years	within 5 years postdoc

Five research questions were developed to guide the evaluation of impact:

1. What impact have the fellowship investments had on people working in science, research and health?
2. What impact have the fellowship investments had on research outputs and new innovations?
3. What impact have the fellowship investments had on the science, health and research sectors?
4. What impact have the fellowship investments had on global connections, research links and partnerships for New Zealand?
5. What are the opportunity costs of the fellowship programmes in terms of output value?

4. Methodology

The evaluation was carried out between January and June 2020. It gathered data by analysing previous evaluations, interviewing stakeholders, surveying current and past holders of the seven fellowships and conducting a survey of unsuccessful candidates to provide a comparison.

Analysis of previous evaluations

This included 22 prior evaluations of fellowships in New Zealand and internationally. The review examined the methodology, findings and recommendations of each fellowship evaluation. Results are summarised in section five.

Interviews with stakeholders

26 stakeholders were interviewed who represented one or more of the following roles:

Agency staff/governance	10	Government Science Advisors	3
Universities	8	Pacific focus	3
Policy (various)	5	Early career focus	3
Māori focus	4	Crown Research Institutes	2

A stakeholder interview schedule explored the individual, institutional, science sectoral and international impacts of the fellowships and invited consideration of alternative uses of the funding. Interviews were carried out face-to-face or by Zoom.

Surveys of fellowship holders

Three surveys were created. A survey of postdoctoral fellows (Rutherford Discovery, Rutherford Innovation, James Cook, Sir James Hercus, Māori Health and Pacific Health fellowships); a survey of Rutherford Cambridge scholars (PhD) and a survey of Fulbright Innovation participants (Masters, PhD and non-degree). The overall response rate was a high 69.52%. Response rates by fellowship are noted in Appendix A.

Counterfactual survey

A counterfactual survey (HRC and RSNZ programmes only) sought responses from those who had applied for, but never received, one of the fellowships. In terms of the RSNZ fellowships, unsuccessful applicants were approximately matched by number, year and gender with successful applicants for each fellowship. The HRC developed a sample by emailing unsuccessful candidates and asking their permission to forward contact details to Pūkeko Research for inclusion in the survey. The response rate for the RSNZ fellowships was 29% and for the HRC fellowships 69% (49% overall).

Results analysis

The surveys were analysed using Qualtrics systems and Excel sheets, including the production of pivot tables to explore relationships. Results were combined to produce a portfolio view. An analysis of previous evaluations was completed. Stakeholder views were transcribed and summarised and, in addition, two reports, on Māori and Pacific stakeholders, were prepared. Qualitative data was

analysed using NVivo and reports were produced. The reports were considered in producing the evaluation and its recommendations.

5. Analysis of previous evaluations

Previous evaluations of fellowship schemes in New Zealand and overseas are positive about their contribution. See Appendix B for a more detailed discussion.

New Zealand

Three of the fellowships in this portfolio have been previously evaluated. Brief findings are as follows:

The Rutherford Discovery Fellowship (2012).

It was functioning well.

The focus was on excellence rather than repatriation.

The 'leadership' goal was not well understood.

The eligibility range of 3-10 years postdoc was considered too large (and was subsequently reduced to 3-8 years)¹.

Sir Charles Hercus Fellowship (2016).

Nearly all advanced their research careers and gained further funding.

Most ran research teams, published their work, won prizes, trained others and supervised theses.

Difficulties: only half achieved a tenured position, an academic rather than practical or community research focus, limited access to ongoing funding and some institutional inflexibility².

James Cook Fellowship (2002).

Provided uninterrupted time for research, international opportunities, new areas of research, new collaborations, improved knowledge and skills and research momentum.

Made the most of researchers with strong track records³.

In addition, a survey of postdoctoral staff within the University of Auckland's Medical and Health faculty, carried out for MBIE⁴, noted:

91% were on temporary contracts

Mid-career fellowships were supported but should include subsequent full-time work

There is a need to focus on repatriation.

International

Evaluations of fellowships in the USA, UK, Canada and Australia were reviewed. Fellowships internationally received strong positive evaluations. Strengths noted frequently included:

Fellowships successfully produce the next generation of research/practice experts

¹ King, S (2012). Review of Rutherford Discovery Fellowships. Wellington: MSI

² <https://www.hrc.govt.nz/news-and-events/sir-charles-hercus-fellows-where-are-they-now>.

³ Deloitte (2007). An evaluation of support for people in research, science and technology. MoRST. Appendix IV p. 52

⁴ Faculty of Medical and Health Sciences, UA, in survey for MBIE (ND)

- Their success is based on a strategic focus and ongoing career development for fellows
- They boost research outputs
- They retain researchers in the nation where the fellowship is served
- They provide opportunities for individuals
- They provide funding certainty for key projects
- They are an efficient model of delivering research funds
- They may provide international opportunities for early-career researchers
- They may increase the attractiveness of research careers.

Potential or actual difficulties identified include:

- Barriers to using fellowships to repatriate talented people
- Limitations in fostering leadership skills (one solution given is systematic mentoring)
- Constraints in fostering workforce diversity and,
- An uncertain translation rate from fellowships into permanent employment.

6. Key findings – Portfolio

This section begins by highlighting the key successes and challenges of the portfolio, then considers a small number of factors in more detail. The findings are broadly similar to those of the international fellowships reviewed above, but also specific to this portfolio and current needs.

Success factors

Fellowships play a key role in fostering research success and promoting career progression. Recipients carry out extensive research programmes, develop research teams, improve research quality, win prizes and medals, access contestable research funds, support development in their field, foster a new generation of researchers, act as a ‘beacon of light’ for others and support a thriving system of research production. Stakeholders perceive, and survey participants demonstrate, that the fellowships overall:

- Deliver clear benefits to New Zealand
- Have a direct impact on New Zealand’s research capacity
- Identify and enhance research excellence
- Facilitate, to an extent, career pathways and stability
- Maintain quality career researchers in Aotearoa/ New Zealand
- Promote research leadership and funding
- Provide additional opportunities for study and/or research
- Bring about a range of opportunities for individuals, research groups and institutions
- Support academic reporting and publication
- Strengthen and develop international research linkages
- Provide value for money.

Specific results that demonstrate these themes from the portfolio are contained in the key findings of the fellowships (section 7 below).

Challenges

While the portfolio is successful, some challenges are described by stakeholders and survey participants. They mainly relate to the number and distribution of fellowships:

Not enough fellowships; many worthy recipients miss out
 Fellowships tend to be awarded in areas of existing research strength e.g. biological sciences and health, rather than spread across all areas of research
 Postdoctoral fellowships go mainly to university researchers
 Applied researchers in the health sector, Crown Research Institutes and community sectors rarely receive fellowships.
 Fellowships do not provide clear pathways to permanent positions
 They foster a career pathway of ongoing temporary research positions for some
 They do not foster ethnic and gender diversity and may confirm existing inequalities
 Māori and Pacific health fellows are undervalued and have poorer career outcomes
 Those attracting fellowships also, in many cases, attract prestigious research grants simultaneously, leading to clusters of well-funded research but also some gaps.

Career spectrum of the portfolio

The portfolio of fellowships spans the career spectrum from Masters student to late career researcher. There is no automatic progression from one fellowship to another and eligibility for one fellowship does not imply eligibility for others.

Table 2. Availability of the seven fellowships at different points on the research career spectrum

Masters	PhD	1-2 years postdoc	3-4-5 years postdoc	6-8 yrs postdoc	8-10 years postdoc	Later
Fulbright Innovation	Fulbright Innovation					
	Rutherford Cambridge	Rutherford Foundation	Rutherford Foundation			
		Māori Health	Māori Health			
		Pacific Health	Pacific Health			
			Rutherford Discovery	Rutherford Discovery		
				Sir Charles Hercus	Sir Charles Hercus	
						James Cook

The seven fellowships in this portfolio are not the only ones offered in Aotearoa/ New Zealand. Other fellowships are offered by agencies and organisations (including the HRC, Ngā Pae o te Māramatanga and others), tertiary institutions and through research contracts.

Distribution across disciplines

According to survey results, the fellowship portfolio distributes fellowships unevenly across disciplinary areas.

The Fulbright Innovation survey found:

- 130 awards distributed across 22 out of 38 coded fields of research
- The top four areas are engineering, biological sciences, health sciences and earth sciences
- The innovation focus of this award influences the disciplinary distribution.

The James Cook, Rutherford Discovery and Rutherford Foundation surveys found:

87 awards in 17 fields out of 38

There is a focus on biological sciences with 31/87 in biological and health sciences

There is a focus on the physical sciences

Until recently, the Rutherford Foundation granted fellowships only in STEM subjects

Only a small number held fellowships in the humanities and social sciences.

The Sir Charles Hercus, Māori Health and Pacific Health Fellowships all report a focus on health and biological sciences, as would be expected. Overall, more than half of the *postdoctoral* fellowships in the survey group were awarded in three areas: biological sciences, health sciences and health (other). See Table 3.

Table 3. Stated ANZSRC field codes for successful applicants, postdoctoral programmes (survey results n =144)

ANZSRC FoR and SEO divisions	James Cook	Rutherford Discovery	Rutherford Foundation	Hercus	Māori Health	Pacific Health	Grand Total
01 MATHEMATICAL SCIENCES	2	7		1	1		11
02 PHYSICAL SCIENCES	2	6	2				10
03 CHEMICAL SCIENCES		2	1	1			4
04 EARTH SCIENCES	2	5	1				8
05 ENVIRONMENTAL SCIENCES		1					1
06 BIOLOGICAL SCIENCES	5	17	3	7	1	1	34
07 AGRICULTURAL AND VET SCIENCES		1					1
08 INFORMATION / COMPUTING SCIENCES	1						1
09 ENGINEERING	2	2					4
11 MEDICAL AND HEALTH SCIENCES	1	4	1	19	3	2	30
13 EDUCATION		2					2
16 STUDIES IN HUMAN SOCIETY	2	1			1		4
17 PSYCHOLOGY AND COGNITIVE SCIENCES	1	5	1			2	9
18 LAW AND LEGAL STUDIES		2					2
20 LANGUAGE, COMMS, CULTURE		1					1
21 HISTORY AND ARCHAEOLOGY		1					1
92 HEALTH				3	6	4	13
94 LAW, POLITICS AND COMMUNITY					1		1
95 CULTURAL UNDERSTANDING					2	1	3
96 ENVIRONMENT		3				1	4
Totals	18	60	9	31	15	11	144

38% of unsuccessful applicants also reported their area of research was in the biological, health science and health fields. Five unsuccessful applicants (8.6%) reported engineering as their research field, the next largest group of unsuccessful applicants.

Diversity

There have been efforts across science systems in recent years to overcome gender and ethnic disparities and outcomes in the science research workforce, but these persist. A 2020 study reported a lifetime gender pay gap of around \$NZ400,000⁵. A 2019 report noted a pay gap for Māori

⁵ Brower, A and James, A (2020) Research performance and age explain less than half of the gender pay gap in New Zealand universities. <https://doi.org/10.1371/journal.pone.0226392>

across all agencies of 11.2%⁶. It is likely that gaps of pay and position in the overall research sector are produced by a range of factors, including the ‘accelerating’ effect of prestigious postdoctoral fellowships (as well as Fulbright and Rutherford postgraduate awards).

Women are increasingly likely to be successful fellowship applicants. From figures provided by the agencies, just over half of Sir Charles Hercus recipients are women; 24% of James Cook recipients are women (but 35% in past five years), 38% of Rutherford Discovery recipients are women (but 45% in past five years) and 41% of Rutherford Foundation recipients are women. Fulbright Science and Innovation awardees (2013-2019) are 43% female.

Of the five awards excluding Māori and Pacific Health fellowships, Māori make up between 2% and 8% of award recipients. There are very few Pacific recipients. Female and Māori rates as a total of successful applicants in the non-Māori and Pacific awards are summarised in Table 4.

Table 4. Proportion of successful fellows who are female or Māori excluding Māori or Pacific fellowships (source, agency data)

Fellowship	Years	Māori	Women	Total awarded
James Cook	2010 - 2019	1 (3%)	8 (24%)	34
Rutherford Discovery	2010- 2019	6 (6%)	39 (38%)	103
Rutherford Foundation	2010- 2020	2 (2%)	37 (41%)	91
Fulbright Innovation	2010-2019	7 (8%)	45 (49%)	91
Sir Charles Hercus	2010-2020	0 (0%)	25 (51%)	49

A concern was raised by all Māori stakeholders that, when successful, Māori fellowship recipients faced increased pressures and expectations from:

- Universities (to provide Māori liaison, advice and support well beyond the boundaries of their particular project and with no compensation)
- Māori communities (to provide leadership and foster success) and national and international research leadership (e.g. indigenous networks).

All of this on top of their own research work.

Despite this additional work and experience, Māori fellowship holders tend to have more difficulty in gaining permanent research or academic positions in New Zealand universities than other fellowship holders. Also, as Māori PhDs tend to be around a decade older than non-Māori, they have limited time to gain permanent positions.

Stakeholders also noted that Māori health ‘ring-fenced’ fellowships tend to be seen in the sector as of lower status than other fellowships, despite similar criteria. Māori fellows appear to be systematically disadvantaged in universities by a lack of Māori expertise, support, policy and practice. They note multiple factors in support of this view.

Pacific stakeholders discuss the ‘invisibility’ of Pacific researchers within institutions. While there are research grants and fellowships, many Pacific researchers move from project to project with little chance of a permanent position. One stakeholder noted: “They often feel there is a lot of promises but not a lot of action”.

⁶ Haar, J. M. (2019). Exploring the Ethnic Pay Gap in the Public Services: Voices from the Rito. Pou Mātāwaka, Wellington, New Zealand.

7. Key findings – Fellowships

This section explores key successes and challenges in each of the seven fellowships against their work programme objectives and generally.

James Cook Research Fellowship

The terms of reference of the James Cook Fellowships⁷ note that the fellowships are intended to be prestigious and are to be awarded to very experienced researchers who have received national and international recognition in their area of scientific research including social sciences. It is expected that a major piece of research will be produced over the two-year term (extendable to three years) of the fellowship in an institution of their choosing, whether in New Zealand or overseas. Three awards are made each year.

The previous evaluation found that the fellowship provided space and time for research and made the most of senior researchers. The current study also notes the effectiveness of the fellowship in promoting research opportunities. The findings overall were positive.

The terms of the fellowship are met in practice. All fellows responding to the survey, except one, were full professors working in universities at the time of award, and two thirds continued in that position, with small numbers taking up new positions or being promoted (e.g. to Distinguished Professor) and one retiring.

Most recipients noted that the James Cook Fellowship did not aid their career progression to a great degree, due to their already senior positions. On the other hand, most noted it significantly boosted their research work and outputs.

A number of recipients noted that the fellowship award should be three years in length, and also be more flexible to meet diverse needs. While there is the potential to extend the length of the fellowship to three years currently, this does not include additional funding and no extensions have occurred for more than five years.

The fellows collectively amassed an impressive array of medals and awards, including top honours. They published many books, journal articles and conference papers during and after their fellowship.

Under the work programme, the fellows are required to present their work, and its relevance to society, to the New Zealand public (in plain language) at some point during their tenure. Their work was shared with a wide range of agencies and sectors, including industry, policymakers, community groups and the health sector. Work was most likely to be shared within the academic world and with other researchers.

The name of the award was criticised by stakeholders and quite sharply by one recipient, who noted it was an “embarrassment” on the CV. There is strong backing for a name change, suggestions included ‘Kupe’ or ‘Tupaia’⁸.

⁷ These were established in 1995/96 by subsuming two pre-existing fellowships, the Hodge Fellowship - awarded for research in the social sciences - and the James Cook Fellowship for science in New Zealand and the Pacific states. The two emphases on social science and the Pacific continue.

⁸ All interviews and surveys were completed before the Black Lives Matter protests arose in late May, so views were not influenced by contemporary events.

The value of the award is \$100,000 per year, plus a small amount for expenses. Many stakeholders and some recipients noted that this was no longer enough to ensure fellows could be released from their teaching and other duties. The amount available is less than for some other fellowships.

The recipient group is the least socially diverse of the seven fellowships and most likely to be pākeha and male. This may reflect past structures of disadvantage in academic life. Four participants in the survey reported Māori involvement in their research, and two reported Pacific involvement. Five reported a topic distinct or relevant to Pacific knowledge, people or resources.

Rutherford Discovery Fellowship

The terms of reference of this scheme are to “develop future leaders” in NZ science and innovation and “assist with the retention and repatriation of New Zealand’s talented early- to mid-career researchers”. The term of this fellowship is five years.

The scheme is highly successful in selecting excellent researchers and in the goal of developing future leaders. Stakeholders call the fellowship “very significant”, “the stratosphere”, “freedom” (*from* institutional constraints and *to* concentrate on research), note that it “maintains status in a pressured environment” and is “a route to fast track and promotion”. Fellows also attract other funding options simultaneously, with many holding Marsden or other research grants.

The scheme does maintain high quality New Zealand researchers in New Zealand. Less than 3% of those surveyed went overseas after completing the fellowship. Also, 15 awards (18%) in the 2010-17 period went to applicants repatriating from overseas. Stakeholders noted that repatriation of New Zealanders was an important goal of the programme. If not repatriated within a certain timeframe, there was a risk that top researchers would put down roots in other countries.

Most survey participants (64%) were in a permanent academic or research position when awarded the fellowship, with 25% in temporary academic positions and 11% doing contract research. All except two who have completed the fellowship (21) were promoted (11) or took up a new position (8). Some were promoted while still continuing the fellowship.

Stakeholders noted that the high level of competition for these fellowships has meant that, in effect, they tend to be awarded towards the upper time limit of eight years. They believe there is an effective ‘gap’ in the MBIE portfolio as a result. However, data shows these fellowships are awarded across the timespan.

Most survey participants (91%) stated that the fellowship facilitated or accelerated their career pathway. Reasons cited for career gains include: ability to run own research project and attract other research funding; opportunities for leadership and an acknowledgement of research authority; and time off from other work to concentrate on a research project. However, two participants stated the fellowship impeded or slowed their progress, while three believed it had made no difference.

Rutherford Discovery fellows have seen their work used by community partners, policymakers, industry groups and in the health sector. Nearly all fellows work in the university sector. There was concern by some stakeholders that it is virtually impossible for Crown Research Institutes, or those organisations pursuing more practice-oriented research, to host Rutherford Discovery fellows.

Stakeholders and recipients question the funding model of the fellowship, which does not include institutional overheads. Fellows report they are considered a ‘burden’ on their departmental

funding, salary support is too low and many are forced to maintain some teaching duties. Some fellows feel they are not given enough support to negotiate a fair package to meet both fellowship and university expectations.

Between 2010 and 2019 the fellowship awardees were 38% women and 6% Māori. This is an under-representation of both groups, with the 2018 Census indicating women are 51.5% and Māori 16.5% of the population. Scholarship metrics data indicates that the under-representation occurs at the sector level, and in those who make a fellowship application. For example, in the past five years (2015-20), the proportion of women fellows has exceeded the proportion of women applicants in each year (in one year exceeding 50% of awards). As this fellowship has an accelerator effect on careers, actual inequities at the sector level may exacerbate future disparities of pay and position, or 'widening the gap'.

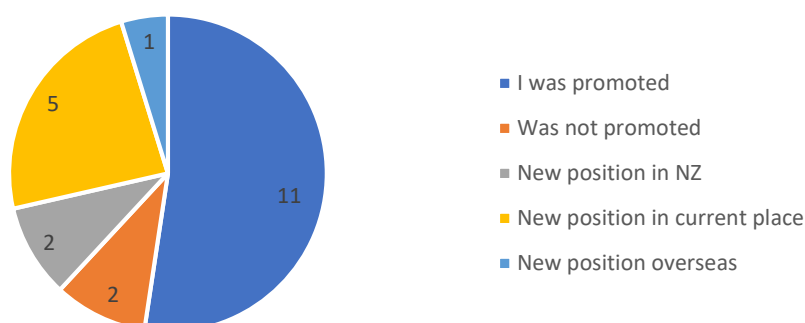
Recent changes in the eligibility criteria for the fellowship take into account childcare responsibilities, a change that will improve opportunities for women:

Eligibility may also be extended to take into account any career interruptions experienced due to being the primary caregiver for young children born since their PhD was awarded. If the applicant is the primary caregiver of a dependent child, the applicant is able to extend the period of eligibility by two years per child. The extension of two years per dependent child is inclusive of any periods of parental leave. There is no maximum identified.

The counterfactual study of unsuccessful candidates confirmed the acceleration effect of the Rutherford Discovery Fellowship. The survey of unsuccessful candidates found they were slightly less likely to be permanent academic staff on application and were more likely to be working in research positions rather than academic ones (e.g. in Crown Research Institutes). Two thirds of this group were not able to carry out the research project for which they applied for the fellowship.

All successful applicants who responded to the question about their current employment held good positions subsequent to the fellowship, as shown in Figure 1.

Figure 1. Position six months after Rutherford Discovery Fellowship is complete (n=9)



A number of those surveyed raised the question of whether the fellowship was awarded on the basis of the person's track record, or the research programme, or both. Stakeholders involved in the selection noted that it was at the end of the process, the "heartbreaking" point at which the final twenty had to be turned into the successful ten, that all selection issues are on the table.

Rutherford Foundation Fellowships

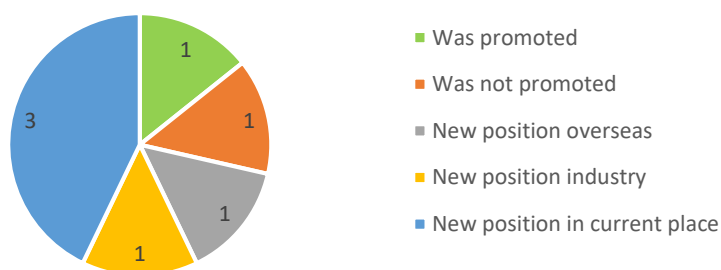
In 2019, the objectives of these fellowships were broadened to include all discipline areas. For the purposes of this study, the Rutherford Foundation Fellowships operated under the older terms of

reference: “The Rutherford Foundation New Zealand Postdoctoral Fellowships aim to build human capability in science, technology, engineering and mathematics by providing early career support for New Zealand’s brightest and most promising researchers”.

This category also includes the [Rutherford Cambridge Doctoral Scholarships](#). Due to sampling issues, survey data was only collected on three scholars, and one was unable to even commence their scholarship, as a supervisor was not found for them at Cambridge University. There is therefore not enough data to evaluate the impact of these programme.

Survey participants were positive about the effect of the fellowship on their career, roles, advancement and opportunities. They all believed that the fellowship facilitated or accelerated their career. Compared to the other fellowships, there were diverse outcomes. Within six months of completion, their position is shown in Figure 2. Eight of the nine are in research positions as follows: three lecturers, one senior lecturer, two scientists and two post-doctoral fellows.

Figure 2. Employment of those who had completed the Rutherford Foundation Fellowship – six months later



Only two participants noted that their research addressed a topic that is distinct or relevant to Māori knowledge, people, or resources. Three noted the results of their research may deliver benefits to Māori, and six stated no benefit to Māori. Only one participant noted ‘some’ Māori engagement in the study, while eight reported no such involvement.

Only one participant noted that their research addressed a topic that is distinct or relevant to Pacific knowledge, people, or resources. Three noted that the results of their study ‘may’ deliver benefit to Pacific people, while six noted no such impact. There was no Pacific engagement sought as part of the study. None of the studies were shaped by a Pacific world view.

Unsuccessful candidates for this fellowship tended (4/7) to move into temporary research roles. Two continued in existing positions and one moved into a local authority position.

Fulbright Science and Innovation Graduate Awards

The terms of reference state: “Fulbright Science and Innovation Graduate Awards are for promising New Zealand graduate students to undertake postgraduate study or research at US institutions in fields related to science and innovation”. The award is for one year but may be extended to two years.

Fulbright New Zealand uses the global strength of the Fulbright name to negotiate positions for its Masters, PhD or student researchers at top universities in the United States, and also to reduce the costs of enrolment in many cases.

This programme is highly valued by its participants for the study opportunities and many other connections, benefits and experiences that it brings. The professional value of the awards lies primarily in new knowledge, new contacts and new professional competencies, as well as knowledge

of the USA and career opportunities. The programme requires participants to return to New Zealand at the end of the award, which often means foregoing additional opportunities in the USA.

Of those completing, 26 took up a non-research position, 17 took up a research position in industry and 15 each took further study or have yet to complete. Many stories of successful technological innovation were shared by participants. They also liked the ongoing support of Fulbright New Zealand.

The programme is very gender equitable, with just over half of recipients over the past five years being women.

Although the programme had 8% Māori participation, only 4% of survey participants believed their study would deliver benefits to Māori and 4% to Pacific people. A number of participants focused on other diverse communities, including indigenous communities, environmentally threatened communities, children (vulnerable), diversity (generally), those with rare diseases, gender, ethnicity (unspecified), poor communities and others.

Survey participants noted a wide array of prizes and grants won on the award and in New Zealand. Their listed array of engagements while on the award also demonstrates the wide range of experiences that could not have been matched in New Zealand.

Only one stakeholder discussed the Fulbright scheme, and that person emphasised its importance to New Zealand, in providing additional graduate options for top students. That person also mentioned the importance of the name 'Fulbright' in building other support and options around the graduates.

Sir Charles Hercus Fellowship

The Sir Charles Hercus Fellowship is a postdoctoral programme aimed at building health research capacity. It is a four-year programme, and selection is based more on the capacity of the researchers than the research project. The positions are held within New Zealand universities, hospitals or other research institutions. There are strict eligibility criteria:

Applicants should be New Zealand citizens or hold New Zealand residency at the time of application.

Applicants must have held a PhD or an equivalent degree for six to ten years on the application date. Exceptions for time spent outside the research environment will be considered (e.g. time taken for maternity or paternity leave, or illness). The applicant's track record is assessed relative to opportunity.

Applicants who have been awarded more than one HRC Project grant as First Named Investigator, or equivalent support (value/term), and established academics, e.g., Associate Professors and Professors, regardless of number of years post-PhD, are not eligible.

Researchers employed in full-time, permanent academic roles at the time of application are not eligible to apply.

Successful applicants will usually be involved full-time in research. The HRC will however consider applicants wishing to undertake part-time research. In this case, applicants must be involved in research for a minimum of 0.5 FTE.

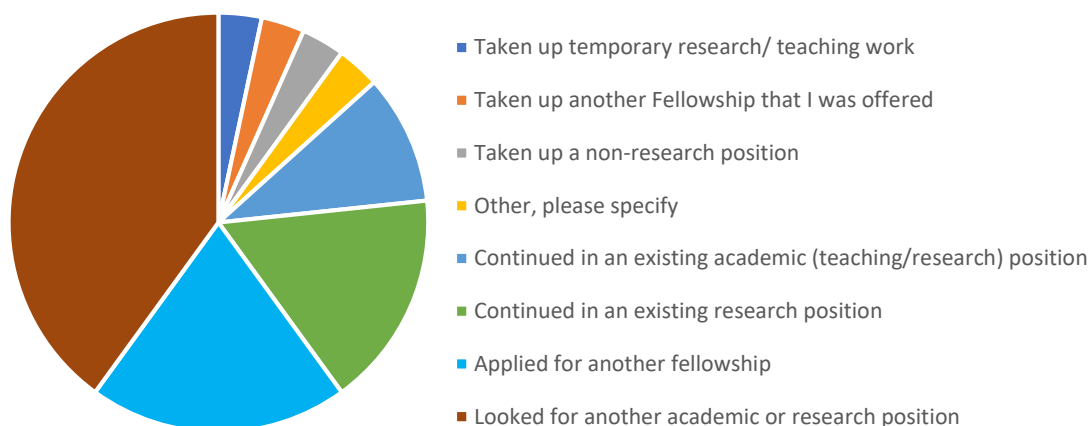
The University of Auckland survey referred to above (see footnote 4) notes that 91% of the postdocs surveyed worked on temporary contracts (see Appendix C for a brief policy discussion of the ECR working environment). The Hercus Fellowship provides an opportunity to develop research leadership skills and career development and to move towards permanent positions.

In the participant's survey, 20% were in permanent positions and 80% in temporary work when awarded the Hercus (n=30). By the time they responded to the survey, one was a professor, ten associate professors, ten were senior lecturers and eight senior research fellows. Participants were not asked which of these positions were permanent. The HRC has subsequently announced a new 2020 contestable 'Consolidator Grant' to be held post-Hercus for two years to provide ongoing opportunities for those who do not go from the fellowship into permanent positions.

Outputs included books, many journal articles and conference presentations and other forms of output. Work was primarily shared with others in the field, groups and individuals and in the health sector. International collaboration included conference attendance and presentations, networking opportunities and joint funding applications.

Nearly all participants (93%) said the fellowship facilitated or accelerated their career. When asked what they would have done if they had not been awarded the Hercus, they gave a diverse range of responses (see Figure 3).

Figure 3. What survey participants would have done if they had not been awarded a Hercus Fellowship.



The 'other' response came from an individual who had been employed in a 'soft-funded' research organisation that was changing direction. They noted the Hercus 'saved' them, offering the relative stability of a permanent university research position.

Most of the unsuccessful Hercus candidates in the counterfactual survey (twelve in total) remained in existing research positions (seven) or existing academic positions (two). Two took up other positions. All of these positions were contract or temporary work. By the time of the survey, around half had found academic positions as Senior Lecturers or Associate Professors. The counterfactual group were therefore only slightly less successful in career terms than the Hercus recipients.

Women make up 52% of Hercus recipients and also the majority of applicants. The Hercus is a relatively women-friendly fellowship, offering extended periods of tenure to take parental leave into account, and also part-time options.

There have been no Māori recipients of this fellowship since 2010. It may be that Māori applicants are channelled into the Māori Health Fellowship which may provide a better chance of success. But the upshot is that few Hercus researchers engage with Māori communities through their research or

deliver benefits to Māori. Also, an acknowledged need for leadership in Māori health research is perhaps not being fulfilled through this fellowship.

Māori Health Fellowships

The Māori Health Fellowships are part of a suite of funding options offered by the HRC relating to Māori. Three named fellowships were offered each year (now four) and are held for a four-year term. They are named after prominent Māori health workers. There is also an unnamed fellowship. Eligibility is broad: a New Zealander of Māori descent with a PhD or equivalent, up to five years postdoctoral experience and a proven track record of research in the area of Māori health development.

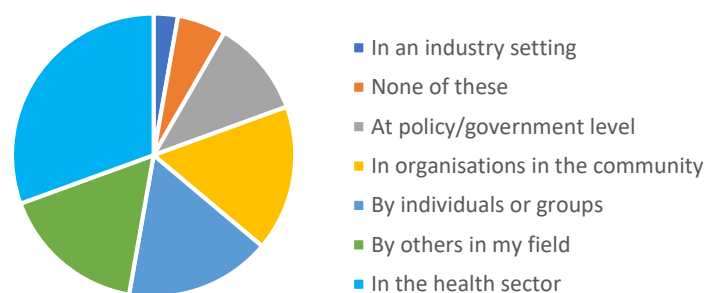
Fourteen survey participants noted their successful applications were in the areas of indigenous or public health, cultural understanding, law, human society, and medical, biological and mathematical sciences.

Most recipients reported they worked by themselves or in small groups, reversing the usual trend in health research to work in large research groups or laboratories. All reported that top research tasks included linking with communities and engaging with Māori. Other research tasks specified were: Advancing kaupapa Māori methodology and scholarship; governance roles; reviewing applications and articles; assessing funding applications; mentoring and supervising community-based researchers and students (PhD and postdoc).

This supports the stakeholder view that Māori fellows were required, along with the normal work of the fellowship, to take on wider roles to support te ao Māori in the institutional setting. Also, fellowship holders report a range of responsibilities to Māori communities. A third area of reporting responsibility is to the health sector, where their views are often sought.

Three participants had received awards for their research or teaching work. The participants also reported their work was widely applied across sectors, as shown in Figure 4:

Figure 4. Sectors where Māori Health Fellowship work has been used by others.



In most of the other fellowships reviewed here, participants placed conference participation and attendance at the top of the list of their global connectivity. The Māori Health survey participants placed these third and fourth, with international networking opportunities and sharing of cultural practice methodologies in first and second places.

Only two of the survey participants had permanent positions at the commencement of the fellowship. Within six months of completing the fellowship most were promoted or in new positions, but only five were in permanent academic positions, three of these within a university.

One person blamed their disability for spending “significant periods unable to get an appropriate position”, despite winning awards for their work. This person believed that the fellowship had impeded their career pathway.

Most (83%) of survey participants thought their career had been facilitated or accelerated by the fellowship. There were high levels of career satisfaction among most participants in terms of ability to pursue research (4.2/5) and opportunities (4.1/5), but only moderate levels relating to position and seniority (3.6/5).

In qualitative comments, some participants felt the fellowship had provided more research opportunities, while others found a successful fellowship did not lead to career advancement. One noted that they were required to give up a tenured position to take on the fellowship.

Pacific Health Fellowships

The terms of reference of Pacific Health Fellowships require recipients to be of New Zealand residency/citizenship and of indigenous Pacific descent. They must have a PhD and a track record in the area of Pacific health development and less than five years postdoctoral experience.

Ten survey participants reported gaining fellowships in the fields of environment, cultural understanding, public health, psychology, medical health and biological sciences. All held their fellowships in Aotearoa/New Zealand, and one worked also in Hawaii.

They worked by themselves, within a section or department or with an informal team.

Key roles included developing new collaborations, mentoring others, seeking further research funding and training students and junior staff.

New skills included writing for publication, engaging in the publication process, engaging with the research community and working on their own.

Their fellowship research was being used primarily by the health sector and others in the same field.

They gained significant international experience by attending conferences and presenting papers and sharing cultural practice methodologies.

Most (80%) of fellows noted that the fellowship facilitated or accelerated their career pathway. Only one fellow was in a permanent academic position prior to receiving the fellowship. Once the fellowship was complete, half took on new positions, one was promoted and another raised funds to maintain a position.

Most Pacific fellows are satisfied (rather than very satisfied) with their position, work environment and ability to pursue research. Some are dissatisfied with opportunities and personal and professional support.

Currently three have academic positions (senior lecturers), one is in practice (clinical psychologist) and six are senior research officers (non-permanent positions). Many of those in non-permanent

positions are still able to forge an ongoing working life, but without the stability and advancement of a career path.

Asked if they would change anything about the fellowship, one fellow noted: “Formalising a commitment from the various institutions regarding advancement pathways for successful research candidates related to the chosen career path, especially for Māori and Pacific academics”. A number of others made similar comments.

Overall, the Pacific fellows rate the effects of the fellowship on their working lives as positive, with some lesser scores about opportunities and advancement.

All of the research projects under this heading were expected to deliver benefits to Pacific people, and in about half of cases, to Māori as well. All noted substantive Pacific involvement in the study from inception to delivery, and all except one noted a Pacific world view shaped the study.

8. Appendices

A. Response rates to surveys

Table 5. Numbers invited, completions and response rates for fellows' surveys.

Fellowship	Invitations (n)	Completions (n)	Response rate %
James Cook	27	19	70.37
Rutherford Discovery	82	63	76.83
Rutherford Foundation	20	13	65.00
Fulbright Innovation	177	138	77.97
Sir Charles Hercus	45	31	68.89
Māori Health	20	15	75.00
Pacific Health	19	10	52.63
Total	390	289	69.52 (average)

Table 6. Numbers invited, completions and response rates for surveys of unsuccessful applicants

Fellowship	Invitations (n)	Completions (n)	Response rate %
James Cook	12	2	16.67
Rutherford Discovery	81	27	33.33
Rutherford Foundation	22	8	36.36
Sir Charles Hercus	27	18	66.67
Māori Health	12	8	66.67
Pacific Health	4	3	75.00
Total	158	66	49.12 (average)

B. Findings of prior evaluations

New Zealand

The Rutherford Discovery Fellowship was reviewed in 2012 in a largely desktop exercise (plus stakeholder interviews). The review was triggered by a letter of concern signed by 560 people in the sector. It found that 20 fellowships were awarded over the first two years of the programme; ten in life sciences; six in physical sciences and four in humanities and social sciences. Most awardees were in early post-doctoral phase. The scheme supported 'excellence' over repatriation and the 'leadership' goal was not well understood. The range of 3-10 years postdoctoral was perceived as too large. Changes made included reducing the range to 3-8 years postdoc and removing 'tier one' and 'tier two' distinctions. Other suggestions regarding repatriation and expectations of post-fellowship employment were not implemented.

The Sir Charles Hercus Fellowship was evaluated by the HRC in 2016 via a survey and an analysis of contractual data. The study found that nearly all the Fellows advanced their research careers and gained further research funding. All lead their own research teams. The research had contributed to:

... expanding knowledge in their field, with the translation of this knowledge into clinical settings, the generation of intellectual property, and the development of new and improved techniques and methodologies. The uniqueness of these methods and techniques were

attributed to attracting both national and international collaborators to their research, which had brought new expertise and resources to their research⁹.

They were prolific in publications, won a number of prizes, trained others and supervised these. Mentors were considered important in supporting career development.

Difficulties included lack of tenured positions (only half gained permanent positions), a focus on academic as opposed to community research, limited access to further funding and some institutional inflexibility in regard to hosting the fellowship.

Other evaluations listed in an appendix to the Deloitte (2007) report included a Victoria Link survey of fellows and scholars, which revealed career dissatisfaction at 80%, problems with adequate funding, job insecurity and lack of personal reward. A 2002 evaluation of the James Cook Fellowship was extremely positive: time for research, international opportunities, new areas of research, new collaborations, new knowledge and skills and improved research momentum.

A recent study, but not an evaluation, was carried out (not dated) by the University of Auckland Faculty of Health Postdoctoral Society for MBIE and provided for this evaluation. A survey of these early career staff found that:

Job stability and stable career pathways are a huge challenge for early career staff

91% are on temporary contracts

There is support for early and mid-career fellowships, but more work is needed to attract talent

Fellowships should be contingent on offers of subsequent full-time work

There is support for 'fast start' schemes

There is a need to focus on repatriation.

In summary, evaluations of fellowship schemes both here and internationally were generally strongly supportive of the fellowship model: providing a period of funding to individuals to carry out developmental work.

International

The findings of the international evaluations concentrated on key areas, including the ability to attract quality applicants, the contribution of fellows, the impact on science programmes and institutional effects.

The USFDA (Food and Drug Administration) program attracted 3709 applicants for 246 places over eight years. Most of those who graduated (77%) from the program ended up employed by the agency (which is one of the goals of the program – to train potential new staff in the USFDA methods). Others went to industry and university positions.

The National Science Foundation's Graduate research program in the USA focused on a comparative analysis of successful and unsuccessful applicants. Successful applicants were more likely to complete graduate programs, had a wider range of research activities, published more papers and were more likely to be employed in higher education. On the other hand, they had fewer opportunities for paid work or applying for grants and less training on research, teaching, policy and participation in other research projects.

⁹ Sir Charles Hercus fellows – where are they now? Retrieved at <https://www.hrc.govt.nz/news-and-events/sir-charles-hercus-fellows-where-are-they-now>. (ND)

An evaluation of the NSF's international research fellowship program (IRFP) also compared successful to unsuccessful applicants. The study found that IRFP awardees were more likely to have productive research collaborations with foreign researchers, their time abroad did not come at the expense of overall research productivity or career advancement and the fellowships seeded collaborative relationships that extended beyond the fellowship period.

In the UK, the ESRC postdoctoral scheme was highly regarded by evaluators, including a mentoring element which was described as 'critical'. A major focus of this post-PhD fellowship is on the quality and quantity of published articles and the development of professional skills (presenting work to others, teaching experience and working in a collegial environment). Most found academic positions, around half of these being permanent. It is estimated that the scheme 'saved' 15-20% of participants from leaving the academic environment. It was also noted that the scheme's prestige (a competitive selection process) added opportunities to the Fellow's career.

The ARCs Future Fellowship scheme is the only 'mid-career' fellowship programme in Australia. It supports scientists in basic and applied science in any field. The evaluation was wide-ranging and considered both administration and impact.

The scheme was found to be very efficient, with administration costs at 1.31% of grant value. Objectives were consistent with the government's strategic policy priorities.

The scheme directly contributed to: enhancing the attractiveness of research careers; creating viable career pathways for Australian researchers; attracting the best minds to conduct world-class research in Australia; and increasing the level of inter-sectoral and international collaboration.

The scheme contributed to good alignment with wider policy and programme activities. Close links between the ARC and administering organisations facilitated efficient and effective programme design and delivery. Data collection methods were embedded in administration of the scheme

Barriers for applicants applying from overseas for repatriation included the requirements of the application, slow decision-making, length of tenure (too short), funding levels and a lack of ongoing support such as permanent positions.

A key feature of international schemes was that most were strategically aligned and delivered resources into areas of need. They strengthened both research programmes and individual development. The existence of delineated pathways and support for ongoing career development were key elements in the success of these schemes.

C. Policy context

The Deloitte report and others define the early career research space, where many of the fellowships lie, as being fraught with potential barriers and a lack of resources. The 2016 HRC review of the Sir Charles Hercus Fellowship noted:

The significant stumbling blocks to career progression were identified as a lack of tenured positions and an over-subscription for these positions, and limited research funding in a highly competitive environment. Of the ten fellows surveyed, five had secured tenured

positions at a university, while the remaining five fellows were reliant on external funding to support their salary, and their research¹⁰.

In the literature and also within the science system, there is frequent reference to the precarious position of those in the postdoctoral space. In the employment situation, this tends to refer to part time, non-permanent work that fails to offer advancement that would otherwise be open to workers performing that kind of work¹¹.

Stakeholders in this study have suggested that there are two main elements, supply and demand:

An oversupply of graduates at the PhD level; and
A large labour market for temporary contract research workers

The 2018 census reported 29,800 people with PhDs in New Zealand, up from 22,300 in 2013 and 16,800 in 2006. At the same time, stakeholders note that the market for permanent positions in the research workforce may have barely increased at all in recent years. This implies that there is an oversupply (in terms of permanent positions) in the number of PhDs of around 1000 new graduates per year.

In international research, postdoctoral researchers are seen to be at the centre of a temporary labour market built around research grants (and fellowships) (Holzinger et al, 2018 p. 209):

The growing contingency of academic labour is most evident in the early stages of research careers – the doctoral and postdoctoral phases. Postdoctoral researchers are the focal point of these new developments as the characteristics of contingent researchers are exemplified in this group. They have become an important pillar of the research and innovation system and primary drivers of academic research as they are publishing papers, apply for research grants, manage labs, supervise junior researchers and take over teaching responsibilities. Simultaneously their work conditions have become increasingly insecure and precarious.

Stakeholders frequently discussed these issues. The policy question for this evaluation is the role of fellowships in supporting this temporary workforce. The following are a selection of representative comments from those interviewed (sector is in brackets after the comment):

Fellowships give people a step up towards a permanent position from a more tenuous one (Policy).
There are pipeline issues... the number coming through is too high (Univ/ policy).
The system as a whole is healthy. There are sufficient opportunities (Univ leader).
I have long been promised a permanent position but in reality I continue to work from contract to contract (Pacific researcher).
Should our NZ research system be supporting postdoctoral pathways that lead to nowhere? (Agency).
...there is a significant group of people holding two, three or four post-docs to fill in gaps to get to permanent employment. It is more common to go PhD, postdoc, permanent.
You can get to a point where you have done too many gap filler projects and will be seen to be 'over the hill' in terms of permanent positions (Agency/ University).
To get a junior academic job you have to act as an intermediate/ senior academic (ECR).

¹⁰ Sir Charles Hercus fellows – where are they now? Retrieved at <https://www.hrc.govt.nz/news-and-events/sir-charles-hercus-fellows-where-are-they-now>. (ND)

¹¹ Standing, Guy 2011 The Precariat: The New Dangerous Class ISBN 1-84966-351-3 London: Bloomsbury Academic

In effect, post-docs are a gap-filler (Agency).

Many people in the field survive on soft money, projects one after the other. I am one such, despite my senior position it is not permanent... I am embarrassed talking to my students and introducing them into such an unstable career path. I don't want to put them off - live their dreams - don't want to be a grumpy old man! (Research Professor)

There is concern more generally about the eternal postdoc putting together a patchwork career based on the unsettling movement from project to project (Univ).

The mountain for our Māori students to climb is much higher, I think (Māori agency).

The weakness is that, at the end of the period, too often there is no position for them.

Many Maori researchers are older and their time is limited and thus they become unattractive to the institutions (Māori /university)

The data from this survey has shown a number of ways in which fellowships help maintain an uneven labour market post-fellowship, even though this is not the intent. More policy work is required to examine this effect and seek to overcome it.