WOMEN AND SCIENTIFIC CAREERS

NEW ZEALAND - RESPONSES TO QUESTIONNAIRE

10 February 2005

In responding to this questionnaire, we are aware of the Ministers' emphasis on increasing the participation of women in science and technology studies and careers. This pre-position raises several issues and further investigation is suggested in some areas to gain a deeper understanding of the way women choose, or are compelled, to work and any implications this has for science and technology.

Interventions to date focused, initially, on changing women/girls in ways that would make them more like men/boys, and then later, on changing the ways in which science is presented and taught to make it more relevant or accessible to women/girls[1]. However, assumptions outlined in the OECD paper still need to be tested to ensure we are isolating women as a target group for valid reason:

- Why can't research and innovation be successful with less numbers of women?
- What is the pool of unused male talent?
- Is the proportion of those enrolled in science and technology to those employed in science and technology similar in other fields?
- Is the 'waste' and 'counterproductive economics' of this situation broadly reflected throughout women's roles and occupations?
- If extra resources are to be expended to retain women in scientific careers, is this also not potentially counterproductive economically?
- How do we know which is the greater 'problem' – qualified women not working or children requiring an alternative carer?
- Why are gender differences between disciplines and sectors considered 'problems'?

Arguments for the importance of women's engagement in science rest broadly on democratic grounds (based on the logic that women are entitled to equality with men). The assumption is that inequality has arisen though disadvantage.

In our responses to the questionnaire, we have principally drawn upon gender comparisons. However, these are not the only comparisons to make, and they may not be the most useful unless we better understand why we are comparing women to men, and why we are attempting to redress the pattern of study and work for female researchers.

[1] Gilbert, J (2001). Engaging Women and Girls in Science: Reconfiguring Science, Science Education, and gender for the 'knowledge age'. Report prepared for Ministry of Research Science and Technology.

A. GENERAL OVERALL QUESTIONS

1. Does your country have any legislation in place which treats women differently than men with regard to the labour market, mobility or decision-making?

No, there is no legislation in place in New Zealand which treats women differently than men with regard to the labour market, mobility or decision-making.

In recent years New Zealand has introduced a number of legislative measures to assist people balance work and family responsibilities[2]. These tend to apply to women and men equally. The only women specific variation within the legislation is in relation to parental leave. Paid parental leave provides for a taxpayer funded payment for women for up to 13 weeks (increasing to 14 weeks in December 2005). Parental leave is offered to women in the first instance, however, they can choose transfer it to their partner.

There is a whole-of-government approach to improving the circumstances of women in New Zealand which has been developed through the Ministry of Women's Affairs Action Plan for New Zealand Women[3]. The Plan, while recognising work-life balance as an issue for both men and women, aims to improve a range of outcomes for women and reduce inequalities between women and men.

The government has also established a Work-life Balance Steering Group to develop policies and practices that promote a balance between paid work and life outside work, and has promoted work and family balance through: the Department of Labour; the Equal Employment Opportunities (EEO) Trust; and the EEO Commissioner within the Human Rights Commission; in addition to the Ministry of Women's Affairs

Government provides direct leadership role on work and family balance through its public service. EEO is required by legislation in the public service, and almost all public service departments have a range of work and family policies and practices in place. However, outside of the public service, employers can decide whether or not to address work and family balance[4].

Government policy regarding work and family balance is addressing the numerous issues facing women who wish to access employment, and women employees with caregiving responsibilities. For example, due to an expansion in the availability of quality childcare, employment rates for mothers with children aged 1-4 years has risen from 37% to 49% over five years to 1996, and then reached 52% in 2001.

[2] These include: Special leave; Parental Leave and Employment Protection Act 1987; Access to quality childcare; Social Security (Working Towards Employment) Amendment Bill; The New Employment Transition Grant; Employment Relations Act; Occupational Safety and Health; Equal Pay Act; Human Rights; Shop trading hours and location and opening of government services; School opening hours; Urban and transport planning.

[3] Ministry of Women's Affairs (2004). Action Plan for New Zealand Women.

[4] Ministry of Women's Affairs (2004). Work and Family Balance: A Policy Perspective.

2. Has your country included "gender mainstreaming" in its policy programmes to advance women in scientific careers? If so, what is the experience to date?

Since January 2002, all government agencies in New Zealand undertaking policy analysis and producing policy advice are expected to examine policy impacts on all groups including women. Additionally, some cabinet committee papers are required to have a specific gender impact statement. The purpose is to ensure that social policy advice to Ministers has gender analysis and includes an assessment of the impact of policies and programmes on men and women.

There has not been any specific policy programmes to advance women in scientific careers. Generally, the New Zealand government tries to ensure an environment and infrastructure that supports people with skills, interest and capability to advance in their chosen career, rather than putting in place regulations and quotas. The first step in setting the environment is introducing policies that influence education (and women generally have high participation rates), and the second step is influencing the employment area – providing a platform to ensure employees are treated fairly and that appropriate workplace processes are introduced.

B. SPECIFIC QUESTIONS

Participation in Higher Education

1. Does your country have any programmes to attract and retain more women into science and engineering higher education? If yes, please describe such programmes for the under-graduate, graduate and post-graduate levels (e.g. counteract stereotyping)? Please include any information on funding of such programmes, as well as their evaluation and impact.

Female participation in Higher Education

Generally, women in New Zealand have high rates of enrolment at tertiary education organisations (refer to Tables 1 and 2):

Table 1: Domestic students enrolled by gender 1998-2003[5]

	Students enrolled						% change	
	1998	1999	2000	2001	2002	2003	1998 - 2003	2002-2003
Female	142,873	165,305	177,322	196,290	223,878	243,516	70.4%	8.8%
Male	117,620	130,899	138,041	149,447	162,407	184,552	56.9%	13.6%
Total	260,493	296,204	315,363	345,737	386,285	428,068	64.3%	10.8%

Notes: Data relates to domestic students enrolled at any time during the year with a tertiary education provider in formal qualifications of greater than 0.03 equivalent full-time student; Data excludes all non-formal learning and on-job industry training.

Table 2: Participation rates by gender 1998-2003[6]

	Participation rate						% change	
	1998	1999	2000	2001	2002	2003	1998-2003	2002-2003
Female	9.4%	10.8%	11.5%	12.6%	14.2%	14.9%	57.6%	4.9%
Male	8.2%	9.1%	9.5%	10.3%	10.9%	11.9%	44.4%	8.6%
Total	8.9%	10.0%	10.6%	11.5%	12.6%	13.4%	51.7%	6.5%

Notes: Participation Rate is the percentage of the population aged 15 and over who were enrolled at any time during the year; Data relates to domestic students enrolled at any time during the year with a tertiary education provider in formal qualifications of greater than 0.03 equivalent full-time student; Data excludes all non-formal learning and on-job industry training.

[5] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.9

[6] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.10

Female students generally have higher completion rates in tertiary education (refer Table 3).

Table 3: Domestic students completing qualifications by gender 1998-2003[7]

	Students completing qualifications						% change 2002-2003
	1998	1999	2000	2001	2002	2003	
Female	32,103	33,837	41,316	45,700	55,338	63,521	14.8%
Male	21,968	22,375	27,401	31,252	34,872	40,227	15.4%
Total	54,071	56,212	68,717	76,952	90,210	103,748	15.0%

Notes: Data relates to domestic students completing a formal qualification at a tertiary education provider; Data excludes all non-formal learning and on-job industry training.

The only variation is Doctorate completion rates where the number of females completing Doctorate level is lower than that of men (refer Table 4 and 5).

Table 4: Domestic students enrolled by gender and qualification level 2003[8]

	Level 1-3 Certificate	Level 4 Certificate	Level 5-6 Diploma	Level 7 Bachelors	Level 8 Honours/ Postgrad Cert/Dip	Level 9 Masters	Level 10 Doctorate	Total
Female	120,134	20,032	31,683	76,691	9,344	6,432	1,905	243,516
Male	99,449	12,976	21,919	51,153	5,844	4,472	1,905	184,552
Total	219,583	33,008	53,602	127,844	15,188	10,904	3,810	428,068

Notes: Data relates to domestic students enrolled at any time during the year with a tertiary education provider in formal qualifications of greater than 0.03 EFTS; Data excludes all non-formal learning and on-job industry training; Students who were enrolled at more than one qualification level have been counted in each level. Consequently, the sum of the students in each qualification level may not add to the total number of students; Totals also include those students whose qualification level, ethnic group or age is unknown.

Table 5: Domestic students completing qualifications by gender and qualification level 2003[9]

	Level 1-3 Certificate	Level 4 Certificate	Level 5-6 Diploma	Level 7 Bachelors	Level 8 Honours/ Postgrad Cert/Dip	Level 9 Masters	Level 10 Doctorate	Total
Female	31,286	8,301	6,896	14,180	3,894	1,471	231	63,521
Male	21,471	3,911	3,912	8,463	2,301	1,163	268	40,227
Total	52,757	12,212	10,808	22,643	6,195	2,634	499	103,748

Notes: Data relates to domestic students completing formal qualifications at a tertiary education provider; Data excludes all non-formal learning and on-job industry training; Students who were enrolled at more than one qualification level have been counted in each level. Consequently, the sum of the students in each qualification level may not add to the total number of students; Totals also include those students whose qualification level, ethnic group or age is unknown.

Generally women have high participation and completion rates and, overall, there is no problem attracting and retaining women into higher education.

[7] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.11
[8] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.25
[9] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.27

Regarding science and engineering specifically, female enrolments in natural and physical sciences are on a par with men, while female enrolments in engineering make up around 13% of those enrolled (refer Table 6).

Table 6: Domestic students enrolled by field of study and gender 2003[10]

	Natural and Physical Sciences	Information Technology	Engineering and Related Technologies	Architecture and Building	Agriculture, Environmental and Related Studies	Health	Total
Female	9,805	17,659	4,680	2,714	4,919	32,735	243,516
Male	9,630	14,876	30,131	7,056	12,801	17,792	184,552
Total	19,435	32,535	34,811	9,770	17,720	50,527	428,068

Note 1 - Fields of study are: natural and physical sciences; information technology; engineering and related technologies; architecture and building; agriculture, environmental and related studies; health; education; management and commerce; society and culture; creative arts; food, hospitality and personal services; and mixed field programmes.
Notes 2: Data relates to domestic students enrolled at any time during the year with a tertiary education provider in formal qualifications of greater than 0.03 equivalent full-time student; Data excludes all non-formal learning and on-job industry training; Students who studied in more than one field of study have been counted in each field. Consequently, the sum of the students in each group may not add to the total number of students; Totals also include those students whose field of study, qualification level, ethnic group or age is unknown.

However, this disparity in engineering somewhat lessens when we look at completion rates (refer Table 7). 25% of women enrolled in engineering complete their qualifications, as compared to 11% of enrolled men.

Table 7: Domestic students completing qualifications by field of study and gender 2003[11]

	Natural and Physical Sciences	Information Technology	Engineering and Related Technologies	Architecture and Building	Agriculture, Environmental and Related Studies	Health	Total
Female	1,859	3,279	1,176	393	796	11,984	63,521
Male	1,779	3,306	3,452	1,249	1,901	7,753	40,227
Total	3,638	6,585	4,628	1,642	2,697	19,737	103,748

Notes: Data relates to domestic students completing formal qualifications at a tertiary education provider; Data excludes all non-formal learning and on-job industry training; Students who studied in more than one field of study have been counted in each field. Consequently, the sum of the students in each group may not add to the total number of students; Totals also include those students whose field of study, qualification level, ethnic group or age is unknown.

Table 8 shows a more detailed breakdown of field of study by post-school qualification and gender. It illustrates gender biases within the various fields of science and engineering. Women represent a lower proportion in all except the 'Biological Sciences' and 'Manufacturing Engineering and Technology' fields.

[10] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.32
[11] Based on Ministry of Education (2004) New Zealand's Tertiary Education Sector Profile and Trends 2003 Appendix Table 3.33

Table 8: Post-school Qualification Narrow Field of Study and Sex by Post-school Qualification Level of Attainment, for the Census Usually Resident Population Count, Aged 15 years and over, 2001[12]

Post School Qualification Narrow Field of Study			Post-school Qualification Level of Attainment	
			Bachelor Degree	Higher Degree
Natural and Physical Sciences	Mathematical Sciences	Male	2,133	1,242
		Female	1,488	570
		Total	3,621	1,812
	Physics and Astronomy	Male	1,122	948
		Female	204	147
		Total	1,323	1,098
	Chemical Sciences	Male	1,878	1,575
		Female	1,101	624
		Total	2,979	2,202
	Earth Sciences	Male	762	1,122
		Female	339	345
		Total	1,104	1,467
	Biological Sciences	Male	2,946	2,700
		Female	3,966	2,454
		Total	6,912	5,151
	Other Natural and Physical Sciences	Male	375	414
		Female	708	468
		Total	1,083	882
	Natural and Physical Sciences not further defined	Male	4,053	2,004
		Female	2,940	1,179
		Total	6,996	3,183
Engineering and Related Technologies	Manufacturing, Engineering and Technology	Male	99	66
		Female	129	69
		Total	225	135
	Process and Resources Engineering	Male	927	288
		Female	294	81
		Total	1,221	369
	Automotive Engineering and Technology	Male	57	48
		Female	12	6
		Total	69	57
	Mechanical and Industrial Engineering and Technology	Male	2,451	567
		Female	237	63
		Total	2,688	630
	Civil Engineering	Male	3,186	645
		Female	303	63
		Total	3,489	705
	Geomatic Engineering	Male	552	42
		Female	63	9
		Total	612	51
	Electrical and Electronic Engineering and Technology	Male	2,916	792
		Female	336	84
		Total	3,252	879
	Aerospace Engineering and Technology	Male	132	54
		Female	27	6
		Total	162	63

[12] Based on Statistics New Zealand 2001 Census: Education, Table 13

	Maritime Engineering and Technology	Male Female Total	66 3 72	30 3 30
	Other Engineering and Related Technologies	Male Female Total	639 411 1,050	504 321 825
	Engineering and Related Technologies not further defined	Male Female Total	1,380 237 1,620	1,170 174 1,341

University Programme

There are no nationwide programmes to attract women into science and engineering. However, there is a one-off programme at one University and other grass roots initiatives.

The University of Auckland has a WISE (Women in Science and Engineering) programme. It is the only university in New Zealand to have a permanently entrenched programme of affirmative action in the area of women in science and engineering. The programme started in 1989 with contestable equity funding and has been maintained since from its own budget as part of the Equal Educational Opportunities Unit.

There is one position, an equity advisor, associated with the programme. The focus of this position is two-fold – recruitment i.e. raising the awareness of community, students and their parents to the potential opportunities of a science or engineering career; and retention. The equity advisor works with school and university staff using initiatives such as:

- Girls only open days and seminars
- Facilitating course and career networks
- Individual course and career advising
- On and off campus promotion of science, technology and engineering
- Gender inclusive educational and promotional materials
- Student networks - WEN (Women in Engineering Network13)
- Mentoring

The proportion of female students in engineering has increased markedly since the appointment of the first WISE equity advisor. In recent years the percentage has reached a plateau of around 20%. The following table (Table 9) gives a picture of which disciplines have higher proportions and which are lagging behind.

[13] WISE has its own website in the School of Engineering - http://www.eo.auckland.ac.nz/wise/

Table 9: Women in engineering undergraduate enrolments, University of Auckland, 2003[14]

Discipline	Year	1	1/2	2	2/3	3	3/4	4	Total
General (Year 1)	F	98							98
	M	364	5						369
	%	21.2%	0.0%						21.0%
Software	F	13		14	3	15	1	5	51
	M	49		73	7	47	4	40	220
	%	21.0%		16.1%	30.0%	24.2%	20.0%	11.1%	18.8%
Biomedical	F		1	11	1	8			21
	M			7	1	10			18
	%		100.0%	61.1%	50.0%	44.4%			53.8%
Chemical & Materials	F			20	3	3	3	5	34
	M		4	23	5	15	7	15	69
	%		0.0%	46.5%	37.5%	16.7%	30.0%	25.0%	33.0%
Computer Systems	F			13	1	6	1	7	28
	M		1	52	8	27	11	40	139
	%		0.0%	20.0%	11.1%	18.2%	8.3%	14.9%	16.8%
Civil	F		2	19	1	10	7	8	47
	M		13	64	19	36	37	36	205
	%		13.3%	22.9%	5.0%	21.7%	15.9%	18.2%	18.7%
Electrical & Electronic	F		1	10	7	8	7	10	43
	M		8	62	20	62	40	64	256
	%		11.1%	13.9%	25.9%	11.4%	14.9%	13.5%	14.4%
Engineering Science	F		2	2	2	4	4	14	28
	M		5	10	3	8	11	23	60
	%		28.6%	16.7%	40.0%	33.3%	26.7%	37.8%	31.8%
Mechanical	F		2	5	2	5	2	10	26
	M		2	59	17	45	25	43	191
	%		50.0%	7.8%	10.5%	10.0%	7.4%	18.9%	12.0%
Mechatronics	F			3		5			8
	M			31	4	28			63
	%			8.8%	0.0%	15.2%			11.3%
Environmental	F			3	4	6	2	5	20
	M		2	5	1	2	5	1	16
	%		0.0%	37.5%	80.0%	75.0%	28.6%	83.3%	55.6%
Total	F	111	8	100	24	70	27	64	404
	M	413	40	386	85	280	140	262	1606
	%	21.2%	16.7%	20.6%	22.0%	20.0%	16.2%	19.6%	20.1%

General initiatives

In terms of a broad-brush approach to engage future students in engineering and science as a career, the government has funded an initiative of the Institution of Professional Engineers New Zealand (IPENZ) called Futureintech. Futureintech has been set up to encourage young New Zealanders to become technologists, engineers and scientists. While not directed to female students in particular, their website promotes engineering as a career and has links to

[14] http://www.engineering.auckland.ac.nz/Studentinfo/wen/statistics.htm

websites focusing on women in Engineering and Science, such as "engineergirl" (National Academy of Sciences – USA) and the University of Auckland WISE site[15].

There are a number of other general programmes introduced into higher education which are attracting more female students, however, these programs are not exclusive to women, and are not particular to science and engineering:

- New Zealand's largest nationwide tertiary institution (Te Wananga o Aotearoa) has provided affordable childcare, low or zero fees and a learning environment based on tikanga Maori[16][17], and has achieved very significant growth in enrolments in a relatively short time, and a large proportion of its students are aged 40 and over.
- A range of entry-level programmes is now on offer at tertiary level institutions, which has encouraged a greater number of older people into tertiary study for the first time
- e-Learning (electronic learning), learning delivered through or supported by the use of digital tools, is now widely available throughout New Zealand. A primary benefit of e-learning is that it improves the flexibility of teaching and learning and is a means of overcoming barriers to learning, as it can meet diverse individual needs and accommodate various individual circumstances.
- Distance learning and study leave have developed as approaches to ensuring people are able to learn and adapt to change while achieving work family balance[18]

Such initiatives support, without specifically targeting, women in science and engineering studies.

Minorities Programme

The Royal Society of New Zealand has specific programmes aimed at encouraging 'minorities' into science and technology, but women are not a minority, except for engineering and such sciences as physics. To date the Society's 'minorities' work has aimed at increasing Maori and Pacific peoples into science and technology, however, anecdotes suggest that the greatest beneficiaries for some of the programmes may be women, as Maori and Pacific girls are gaining faster educational improvements than boys (shown in secondary school results and early tertiary enrolments).

[15] http://www.futureintech.org.nz
[16] Lattimore, R et al (2003), Ka Awatea Tuarua, An Implementation of the New Dawn, New Zealand Institute of Economic Research.
[17] Tikanga Maori refers to cultural aspects of Maori culture that are integrated throughout the learning process
[18] Ministry of Women's Affairs. (2002). Work and Family Balance: A Policy Perspective.

Labour Market Participation

2. Please provide information on the following:

a) Total female labour market participation rates and by level/field of education and age.

Total female labour market participation rates

From the 2001 Census undertaken by Statistics New Zealand[19]:

- The labour force participation rate was 67% (1,809,954 employed persons aged 15 years and over)
- Women comprised just over half (approximately 51%) of the usually resident population count and
- Women comprised almost half of the labour force at 46.9%.
- Women are a majority of those who are in part-time employment. 71% of part-time paid employees were women. 41% of full-time paid employees were women.

Women's increasing participation in the labour force has been one of the strongest employment trends in the post-World War II period. In the 10 years between 1991 and 2001, the labour force participation rate for women increased from 51.1% almost 10 percentage points to reach 60.1% while the rate for men (in the same period) increased 4 percentage points to reach 74%.

Women's labour market participation rates by level of education

Highest qualification by labour force status and gender is provided in Table 10, following:

[19] Statistics New Zealand. (2002) 2001 Census Snapshot 3: Work, Education and Income and 2001 Census Snapshot 11: Women.

Table 10: Highest Qualification by labour force status and sex for the census usually resident population count – Aged 15 years and over, 2001[20]

Highest Qualification		Labour Force				Labour Force Participation Rate	Un-employment Rate
		Employed Full-time	Employed Part-time	Un-employed	Total	Percentage	
Higher Degree	F	26,586	7,044	1,332	34,962	82.9	3.8
	M	38,352	3,429	1,518	43,299	86.6	3.5
Bachelor Degree	F	60,495	18,462	3,687	82,644	81.0	4.5
	M	74,268	6,909	3,444	84,621	86.5	4.1
Advanced Vocational	F	65,424	30,834	3,288	99,546	73.3	3.3
	M	55,422	4,971	2,124	62,517	85.3	3.4
Intermediate Vocational	F	10,494	4,320	2,127	16,941	79.7	12.6
	M	26,307	1,917	1,350	29,574	87.9	4.6
Skilled Vocational	F	17,931	9,747	1,329	29,007	77.2	4.6
	M	78,870	4,779	2,256	85,905	85.9	2.6
Basic Vocational	F	26,229	13,581	4,410	44,220	74.4	10.0
	M	32,661	3,735	3,003	39,399	84.2	7.6
Higher School	F	25,308	20,577	5,334	51,219	66.0	10.4
	M	40,353	12,780	5,070	58,203	73.3	8.7
Sixth Form	F	63,969	39,132	6,756	109,857	70.6	6.1
	M	82,404	13,671	5,871	101,946	79.7	5.8
Fifth Form	F	81,705	52,320	10,752	144,777	67.1	7.4
	M	111,993	16,422	9,093	137,508	79.2	6.6
Other School Qualification	F	25,854	13,017	3,777	42,648	46.9	8.9
	M	37,746	5,244	3,798	46,788	62.2	8.1
No Qualification	F	81,519	58,137	19,161	158,817	45.5	12.1
	M	169,512	26,547	22,554	218,613	64.8	10.3
Not Elsewhere Included(1)	F	30,864	20,760	8,214	59,838	35.4	13.7
	M	63,855	10,809	9,651	84,315	56.2	11.4
Total	F	516,378	287,931	70,170	874,479	60.1	8.0
	M	811,740	111,219	69,738	992,697	73.8	7.0

Note - Source: 2001 Census of Population and Dwellings; (1) Includes Highest Qualification Unidentifiable and Not Stated; All cells in this table have been randomly rounded to base 3.

[20] Based on Statistics New Zealand Human Capital Statistics 2003, Table 6.01.

Women's labour market participation rates by field of education

Qualification field of study by labour force status and gender is provided in Table 11, following:

Table 11: Post School Qualification Field of Study by Labour Force Status and Sex for the Census Usually Resident Population Count, Aged 15 years and over, 2001[21]

Post School Qualification Field of Study		Labour Force				Labour Force Participation Rate	Un-employment Rate
		Employed Part-time	Employed Full-time	Un-employed	Total	Percentage	
Natural and Physical Sciences	F	4,530	12,177	921	17,628	78.1	5.2
	M	2,121	20,337	1,086	23,544	84.2	4.6
Information Technology	F	1,995	5,316	1,509	8,820	78.3	17.1
	M	1,134	8,757	1,215	11,106	87.2	10.9
Engineering and Related Technologies	F	1,632	4,779	492	6,903	71.2	7.1
	M	6,798	108,054	3,744	118,596	84.9	3.2
Architecture and Building	F	936	2,169	213	3,318	79.9	6.4
	M	2,331	34,521	1,272	38,124	84.1	3.3
Agriculture, Environmental & Related	F	1,593	3,699	423	5,715	77.4	7.4
	M	1,500	19,596	960	22,056	87.9	4.4
Health	F	22,809	44,838	1,629	69,276	72.7	2.4
	M	1,503	14,610	456	16,569	83.0	2.8
Education	F	15,585	38,058	1,692	55,335	76.5	3.1
	M	1,554	11,208	465	13,227	78.6	3.5
Management and Commerce	F	15,183	46,545	4,458	66,186	78.2	6.7
	M	4,176	51,183	2,229	57,588	87.2	3.9
Society and Culture	F	15,978	39,090	3,552	58,620	76.5	6.1
	M	4,137	32,283	2,064	38,484	83.8	5.4
Creative Arts	F	5,127	9,186	1,338	15,651	72.6	8.5
	M	1,635	7,134	1,023	9,792	82.9	10.4
Food, Hospitality and Personal Services	F	5,160	10,623	1,428	17,211	76.6	8.3
	M	969	10,827	717	12,513	89.4	5.7
Not Specified(1)	F	34,074	59,379	10,683	104,136	45.6	10.3
	M	15,591	105,687	11,640	132,918	63.7	8.8
No Post-School Qualification	F	163,332	240,525	41,826	445,683	55.7	9.4
	M	67,773	387,540	42,870	498,183	70.1	8.6
Total	F	287,934	516,378	70,170	874,482	60.1	8.0
	M	111,219	811,740	69,738	992,697	73.8	7.0

Note - Source: 2001 Census of Population and Dwellings; (1) Includes Field Of Study not Given (although attainment level given), Don't Know, Refused to Answer, Response Unidentifiable, Response outside Scope and Not Stated; All cells in this table have been randomly rounded to base 3.

[21] Based on Statistics New Zealand Human Capital Statistics 2003, Table 6.03

Women's labour market participation rates by age

Labour Force participation rates by gender and age is provided in Table 12, following:

Table 12: Labour Force Participation Rates by Age Group and Sex (1997 – 2003)[22]

Average for Year ended March		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and Over	Total
		%											
1997	F	55.8	71.8	69.8	65.9	73.1	76.9	80.9	75.1	57.1	28.4	3.5	57.6
	M	56.7	84.4	91.0	91.7	92.9	92.8	92.6	89.9	81.8	53.2	10.8	74.6
1998	F	55.8	71.7	68.4	66.1	71.6	76.9	79.7	75.7	54.8	31.0	3.4	57.2
	M	56.2	84.1	91.6	91.4	93.4	92.2	93.2	89.6	82.9	52.9	9.4	74.4
1999	F	52.1	71.4	69.2	64.9	70.7	77.2	79.7	76.6	58.9	33.3	4.1	57.3
	M	53.5	81.6	90.7	90.5	92.5	91.3	92.7	89.7	82.8	56.7	9.2	73.5
2000	F	52.5	66.9	70.8	66.2	72.3	78.7	81.7	73.9	60.1	31.9	4.2	57.5
	M	53.7	81.6	90.1	90.3	91.4	91.8	92.4	89.9	81.6	58.2	11.1	73.5
2001	F	52.9	66.8	69.8	65.9	71.7	80.0	82.3	74.3	60.4	35.9	4.5	57.7
	M	53.6	78.9	90.4	91.5	91.8	91.5	91.8	91.1	82.6	61.5	11.9	73.7
2002	F	53.9	68.5	69.7	66.6	72.1	81.4	81.6	77.4	60.5	42.4	5.0	58.7
	M	55.0	80.3	90.3	91.7	92.4	91.7	91.9	90.2	83.5	64.9	14.0	74.3
2003	F	53.5	68.4	69.2	66.1	74.3	79.8	83.2	76.0	64.1	43.8	5.6	59.0
	M	54.9	78.6	89.8	91.6	91.9	92.8	92.0	89.9	84.6	67.2	14.4	74.3

2. b) Participation rates of women among university faculty (at all levels)

In 2003, women held 41.7% (3,743) of academic/teaching positions at universities. However, women were under-represented among the senior academic positions in universities (including deans/heads of school, heads of department/faculty, principal and senior lecturers) with 29% of senior academic staff being female (refer Table 13). This is reflected in the tertiary education institutions as a whole[23], where women account for only 36% of the senior academic positions.

Table 13: Senior Academic Staff in Universities by Gender July 1997-2003[24]

	1997	1998	1999	2000	2001	2002	2003	% Change	
								1997-2003	2002 - 2003
Female	537	641	730	1,009	1,063	1,137	1,288	139.9	13.3
Male	2,578	2,671	2,726	2,995	2,959	3,007	3,098	20.2	3.0
Total	3,115	3,312	3,456	4,004	4,022	4,144	4,386	40.8	5.8

[22] Household Labour Force Survey, Table 1.03

[23] Tertiary education institutions include the 8 universities, 4 colleges of education, 1 wananga and 2 polytechnics.

[24] Ministry of Education. (2004). Profiles and Trends Appendix. Table 9.13

The general low representation of women in senior positions in the universities was also apparent in the Human Rights Commission's publication New Zealand Census of Women's Participation in Governance and Professional Life. The results of this survey showed that only 200, or 15.8%, of the 1,264 professors and associate professors in universities were women.

Although fewer than their male peers, the numbers of women in senior academic positions in universities has been increasing in recent years (as shown in Table 13). Between 1997 and 2003, there has been almost a 140% increase in representation of women in senior academic positions.

The Human Rights Commission survey showed the university with the highest proportion of women professors and associate professors was Auckland University of Technology (a 'new' University), where 29.4% of the 34 professors and associate professors were women. At the University of Waikato, the figure was 20.7% of 87, while at the University of Canterbury (an older 'traditional' university) only 6, or 4.5%, of the 133 professors and associate professors were women.

Promotions are based on merit at universities; however, it has been interesting to note that at Canterbury University the number of women in the position of associate professor has recently more than doubled following an internal complaint by female staff members to the Human Rights Commission[25]. The complaint regarded a 'male-dominated university culture' where women struggled to progress. Eight female promotions to associate professor took their total of women in that position to 14. However, of the 60 academic promotions overall at the University, 72% were awarded to men. For the first time this year, the committee that review the promotions process was observed by a union representative and an elected female equity representative.

The WISE programme and a strong EEO presence in the University of Auckland seems to be having a positive effect for their School of Engineering. The EEO unit sits on all promotions and appointment committees. The School of Engineering now has 16 women academics – in 1989 there were only 3.

In other positions, in 2003 women held 57 (27.4%)[26] of the positions for executive and support staff, and 56 of the 200 senior executive positions (refer Table 14).

Table 14: Senior Executive Staff in Universities by Gender July 1997-2003[27]

	1997	1998	1999	2000	2001	2002	2003	% Change	
								1997-2003	2002 - 2003
Female	33	7	48	58	80	50	56	69.7	12.0
Male	130	15	132	155	176	141	144	10.8	2.1
Total	163	22	180	213	256	191	200	22.7	4.7

[25] Report by Warren, A (2004) Varsity promotes Women. 15th December 2004.
[26] Ministry of Education (2004). New Zealand's Tertiary Education Sector: Profiles and Trends 2003.
[27] Ministry of Education (2004). Profiles and Trends Appendix. Table 9.14

2. c) Share of women faculty at universities on temporary, part-time or permanent (indefinite) employment contracts

In 2003, 61% of the total staff in universities were full-time and 39% were part-time[28]. The share of female academic and executive staff in universities is shown in Table 15. Of the female academic/teaching staff at universities, 54% were full-time (as opposed to 67% of the men) and 46% were part-time (compared to 33% of the men). All female executive and support staff were full-time.

Table 15: Female staff in universities, 2003

		Full-time	Part-time	Total
Academic/ teaching staff	F	2,002	1,741	3,743
	M	3,473	1,754	5,227
Executive and support staff	F	57	-	57
	M	140	11	151

2. d) Participation rates of women among public sector researchers

Government Research and Development (R&D) personnel

The results of an R&D survey (2002) conducted by the Ministry of Research, Science and Technology in conjunction with Statistics New Zealand showed that women represented nearly 37% of full-time equivalent (FTE) employees involved in government R&D (refer Table 16). And the ratio of male FTEs to female FTEs remained fairly constant between 2000 and 2002.

Table 16: Personnel Involved in Government R&D, by qualification and sex, 2002[29]

Qualification	Male	Female	Total
PhD	904	232	1,136
Bachelor(1)	832	623	1,455
Technical(2)	216	109	325
Trade(3)	18	13	31
Other post-secondary(4)	142	82	224
Secondary(5)	196	178	373
Other or no qualifications	130	175	305
Total	2,437	1,412	3,849

(1) Bachelor degrees or equivalent and post-graduate qualifications other than a PhD.
(2) Technical qualifications, eg NZ Certificate of Engineering.
(3) Trade qualifications, eg NZ Trade Certificate or Advanced Trade.
(4) Other post-secondary qualifications, eg Diploma of Business, Administration, National Certificate of Business Studies.
(5) Secondary qualifications, eg bursary, Sixth Form Certificate, School Certificate.

[28] Ministry of Education (2004). Profiles and Trends Appendix. Table 9.11
[29] Statistics New Zealand (2003) Research and Development in New Zealand 2002, Table 3.09

In 1995/96 women made up 36.7% of research and development staff in Crown Research Institutes (CRIs) - the primary government research facilities, together with universities - representing an increase of 3.3% since 1993/94[30]. And in the same survey year, women made up 39% of technicians in CRIs. For 2004, data on the breakdown of female researchers/scientists at six of the nine CRIs was available (refer Table 17).

Table 17: Researchers/Scientists in Crown Research Institutes (2004)

	Crop and Food	Landcare Research	Industrial Research Limited	National Institute of Water and Atmospheric Research	HortResearch	Forest Research	Total CRIs with data
Female	129	118	54	47	163	121	992
Male	138	173	207	191	222	180	1172
Total	267	291	261	238	385	301	2164

University R&D personnel

The results of the R&D 2002 survey showed male and female personnel (including R&D staff and research post-graduate students) in the university sector were evenly distributed, with 4,923 FTE males involved in R&D activities and 4,843 FTE females. Table 18, below shows the breakdown of male and female staff and post-grad students in the university sector.

Table 18: R&D Staff and Research Post-graduate Students, year ended 31 December 2002[31]

		Male	**Female**	**Total**
Headcount				
R&D staff	Researchers	4,308	2,836	7,144
	Technicians	820	560	1,380
	Support staff	431	1,887	2,318
Research post-graduate students		4,767	4,757	9,524
Total headcount		10,326	10,040	20,366
Full-time equivalent employees(FTEs)				
R&D staff	Researchers	1,502	1,014	2,516
	Technicians	299	196	496
	Support staff	121	494	615
Research post-graduate students		3,001	3,138	6,139
Total FTEs		4,923	4,843	9,766

Note: Due to rounding, some figures do not add to stated total.

[30]Ministry of Research, Science and Technology (1998). Human Resources in Science and Technology in New Zealand.

[31] Statistics New Zealand (2003) Research and Development in New Zealand 2002, Table 4.09

2. e) Share of women researchers at public research institutions on temporary, part-time or permanent (indefinite) employment contracts

Data on the breakdown of temporary, part-time or permanent contracts is not routinely collected. However, the following data has been collated from a sample of Crown Research Institutes:

Forest Research Institute

Table 19 – Percent of men and women in each category

	Temporary Scientists/post-docs	**Permanent appointments**	**Less than 80% employment (Part-time)**
Females	12.5%	87.5%	12.5%
Males	1%	99%	5%

Landcare Research[32]

45% of scientists are women and of those with post-graduate qualifications 32% are women. Of the scientists recruited since 1995 over 80% of women have been retained to the present compare with 60-70% of men. There are 13 senior managers of whom one is a woman.

[32] Landcare Research (2004) Annual Report

2. f) Participation rates of women in business sector R&D by level of education, age, by industrial sector or by occupation. If your government does not collect such data, please provide any case studies or other reports that can shed light on the participation of women in business research activities.

The R&D survey of 2002 saw an increase in human resources devoted to R&D by the business sector, continuing the trend of recent years. 4,152 FTEs were employed in 2002, an increase of 864 (26%) on 2000[33] (refer Table 20). Women represented almost 26% of the total number of personnel involved in business R&D.

Table 20: Personnel Involved in Business R&D, by qualification and sex (2002)[34]

	Full-time equivalent employees (FTEs)		
	Male	**Female**	**Total**
PhD	401	92	493
Batchelor	1515	554	2,069
Technical	493	77	570
Trade	303	29	332
Other post tertiary	93	70	163
Secondary	141	145	286
Other post Secondary	126	113	239
Total	3,072	1,079	4,152

Note: Due to rounding, some figures do not add to stated total.

In 1995/96 women made up 27% of R&D staff in the business sector and comprise 17% of researchers and 33% of technicians. Between 1993/94 and 1995/96 women's participation in research and development improved by 2.9% in business R&D to 27.1%.

We do not routinely collect participation rates of women in business sector R&D by age, industrial sector or by occupation. No further studies are available on the participation of women in business research activities.

[33] Much of this increase came from businesses added to the survey population by the expanded 2002 population selection criteria. Even without this additional source, however, the number of FTEs would still have increased by 6 percent.

[34] Statistics New Zealand (2003) Research and Development in New Zealand 2002, Table 2.17

3. Please provide any information on the development of temporary or part-time employment of women in business sector R&D

New Zealand has schemes and support networks for business R&D in general, however, nothing specifically for women. Furthermore, there are schemes specific to women in business, but nothing directly targeting R&D.

An example is Technology New Zealand (TechNZ). TechNZ is a suite of schemes that promotes the development and adoption of advanced technologies by business. Its role is to support companies wanting to overcome specific technical barriers which are likely to be part of the R&D phase. TechNZ awards Technology for Industry Fellowships (TIF) that support research undertaken in New Zealand business.

In general, New Zealand is in line with international practice in the use of awards to support linkages between institutions of learning and business[35]. And, while not specifically for research activities, there are a number of funding/loan schemes available to women for business purposes:

- Launched in 1987 by the Mäori Women's Welfare League, Maori Women's Development Inc provides loans to Maori women to help establish or maintain existing businesses; and
- Women's Loan Fund provides small loans to women for business assistance by operating a pool of money for women to borrow. The intention of the fund is to loan money at no interest to women who have no access to affordable credit.

There are also a number of business women's support networks, these however, do not focus specifically on R&D or temporary/part-time employment measures:

- The Women's Business Network[36]
- The New Zealand Federation of Business and Professional Women Incorporated[37]
- Women's Leaders Network (WLN) - The WLN is an informal network of women in business, government, academe and civil society from the 21 APEC member economies.

And there are broader business mentoring schemes available to, but not exclusive to, women such as 'Business in the Community'[38]. There are also Economic Development Agencies that deliver a range of business assistance services including mentoring, business advice, and assistance accessing capital.

[35] Menzies, M. and Barwick, H. (2000). Scholarships and fellowships in Human Capital Development. Report for the Ministry of Research, Science and Technology.
[36] http://www.womens-business.org.nz/
[37] http://www.bpwnz.org.nz/
[38] http://www.businessmentor.org.nz/

4. Does your country have recruitment procedures for women researchers at universities, public research organisations that differ from those for men (e.g. different recruitment criteria, composition of recruitment panels?)

No. However, tertiary education institutions will be undertaking pay and employment audits (under the Pay and Employment Equity Plan of Action), which will explore the distribution of women and men in the institutions. The audits will look at differences in representation, explore the reasons why, including recruitment policies and practices. This would most likely show that the same recruitment processes could sometimes operate in gender biased ways. Until this further work is conducted, however, we remain unsure if there are any explicit differences.

5. Is "positive discrimination" (or affirmative action) permitted in your country to help increase the recruitment of women researchers and faculty? If so, please provide details and any evaluations or studies on the impact of such policies.

In New Zealand the concept of affirmative action has been developed principally through the Human Rights Act 1993 (HRA) and the New Zealand Bill of Rights Act 1990 (BoRA). Both Acts contain provisions relating to affirmative action or special measures to achieve equality.

The provisions are very similar. They allow actions which would otherwise amount to discrimination if they are taken in good faith. Although the BoRA is aimed at remedying past discrimination, and the HRA at promoting equal outcomes, in practice both require some causal link to justify the measure. In the case of the HRA, however, it is necessary to establish that the group targeted by the programme does not occupy an equal place with others in the community and the measure is necessary for them to achieve equality. Therefore while it is possible to have affirmative action measures, they must be able to be justified in terms of the need of the group targeted.

New Zealand's human rights laws provide the statutory context for affirmative action but there is little relevant case law[39]. And no affirmative action has been taken specifically around the recruitment of women researchers and faculty. The debate on affirmative action has focused more on matters relating to race or ethnicity, rather than gender.

Although technically not all can be considered affirmative action, a variety of strategies has been used over the years in New Zealand in an attempt to redress discrimination and under-representation in the areas of employment and education[40]. However, again these have largely applied to Maori and Pacific Island peoples rather than women.

[39] There has been only one New Zealand legal decision specifically on affirmative action and it involved the question of quotas (places in a fishing cadet scheme reserved for Maori and Pacific students - 1996).

[40] Affirmative action in New Zealand. (2004) Rosslyn Noonan & Sylvia Bell – Unpublished report.

6. Are there any government regulations or policies that encourage business firms to increase the recruitment of women in industrial R&D activities?

No.

Retaining Women in Scientific Careers

7. Do you have specific programmes to retain women who have chosen a scientific career (e.g. coaching and mentoring, preferential treatment for career advancement)? If so, please describe.

There are no overarching government programmes to retain women who have chosen a scientific career. However, there are numerous grass-roots initiatives among the business and science community to assist and support women.

The women's support network - the Association for Women in the Sciences in New Zealand (AWIS) - is a non-governmental (voluntary) body that aims to encourage women to use and develop their scientific abilities and to achieve their full potential. AWIS receives no government funding. It takes an active role in seeking to influence the environment for women in science careers by making submission on issues relating to women and science, and contributing to the Science and Technology Advisory Committee's review of science administration, Resource Management Law Reform and legislation on Employment Equity.

Another women's profession group active in New Zealand is Zonta. Although not specifically promoting women in science, the group actively supports and advocates improvement in the legal, political, economic, educational, health and professional status of women overall. They have a mentoring capacity, as do several of the business groups mentioned in question B3.

Specifically in the area of science, although not exclusive to women, individual research organisations have programmes for mentoring and retaining staff. For example, in 2003 Forest Research[41] (a Crown Research Institute) identified that their highest staff turnover was among scientists with less than two years service. Feedback revealed that these young scientists were leaving the organisation for a number of reasons, principally related to insufficient or unfocussed career guidance. A mentoring programme was introduced as part of an organisational development programme to build on capability strength and move forest research people "from good to great". The programme is still in its infancy, but feedback so far indicates it is successful.

[41] Forest Research (2004) Forest Research: Annual Report 2004.

8. To what extent do new funding schemes (more contract funding, centres of excellence) influence the participation of women in research?

All government funding schemes are open to both men and women participants. There are no government funding schemes particularly addressed to women, and no funding schemes have been introduced to influence the participation of women in research.

New Zealand has an almost 100% contestable funding system for our government research institutes whereby funds are devolved according to productivity (papers per year) of a scientist. This could seemingly disadvantage women, as the system cannot easily discern rates of productivity (i.e. it does not allow for part-time work, time off for raising children or looking after the elderly etc).

Anecdotally, it is believed that female scientists are disadvantaged in obtaining contracts or being recognised as suitable for centres of excellence if they have taken time out, worked part-time, or had commitments outside work (occupations that impact on their cumulative publication record). Unfortunately, we do not routinely collect gender information from researchers receiving funding, or on the numbers of women involved in centres of excellence, so do not have any data to confirm or dispute this.

However, given that women in research generally are well represented, the contestable funding system would not appear to have a significant disadvantage for women. Furthermore, sometimes contracts and larger research groupings provide part-time work which some women scientists want, at least for some years. The disadvantage is that these positions are usually temporary or fixed term.

In general we have not been able to ascertain which funds may have more female applicants; or a higher female success rate; or in which disciplines women are undertaking research. However, gender information has been collected for one highly competitive fund - the Marsden Fund (an 'elite' fund for research excellence).

Analysis of the Marsden Fund shows that while overall the proportion of female recipients of the Fund has remained steady at about 20% since the establishment of the Fund in 1995, the ratio of Principle Investigators that are women has increased since 2001. 2001 saw the introduction of a "Fast Start" initiative within the fund. Fast Start funding is for researchers who are in the early stages of their research careers, and women make up a third to half of all Fast Start Principal Investigators in any given round. Broken down by round, the figures of all Marsden Fund Principal Investigators are shown at Table 21.

Table 21: Marsden Fund Principle Investigators, 1995-2004

	Female	Male	% Female
1995	6	66	8%
1996	12	95	11%
1997	7	59	11%
1998	23	99	19%
1999	20	79	20%
2000	21	92	19%
2001	28	85	25%
2002	25	86	23%
2003	37	104	26%
2004	27	75	26%

Furthermore, from the Marsden Fund we have information on gender and disciplines. For 2004, women made up 60% of the Principal Investigator (PI) and Associate Investigators (AI) from the Humanities panel, compared to 5% PI/AI representation in the 'Ecology, Evolution and Behaviour' panel, and 6% of 'Physical Sciences and Engineering' PI/AIs.

While the number of female Principal Investigators is increasing, overall there is a lower proportion of women who make up Associate Investigators of the Marsden Fund (15% for 2004). Partly this may be due to the fact that a fair number of the researchers on Marsden contracts are not in New Zealand, and men appear to make up a disproportion amount of the international Associate Investigators.

So while there is some suggestion that the present funding arrangements in New Zealand disadvantage women, on the whole, we do not have any firm data to correlate any particular problems regarding the engagement of women in science.

9. Do you have research funding schemes particularly addressed to women researchers? If so, please describe.

None of the large government research funds are targeted to women. However, there are numerous individual funding sources available targeting women continuing in their studies and research. Scholarships and fellowships provided by government and other organisations in the non-governmental sector, while not strategically focused, fill an important and complementary role.

Providers of women's research funding and scholarship schemes include:

- The Ministry of Women's Affairs
- NGOs and Societies
- Women's Trusts
- Women's associations
- Professional associations
- Universities (internationally and nationally)
- Graduate associations
- Individuals who have bequeathed scholarships

Many of the funding schemes are particular to women undertaking research in science.

10. Is mobility or experience gained abroad a prerequisite for scientific career advancement at universities and public research organisations? If so, is special consideration given to the objective barriers to mobility among women due to family rearing?

There is evidence (based on various surveys from 1998) showing a high degree of mobility among New Zealand scientists in general[42]:

- out-migration of scientists and engineers exceeded in-migration over the 3 years to 1998
- Younger scientists and engineers between the ages of 15 and 34 were more likely to go overseas than other age groups
- New Zealand's health professionals, engineers and computing professionals are more likely to migrate out than any other professional group
- There is a continuous outflow of young New Zealand scientists as they go overseas for further training or simply for 'overseas experience'
- There is an accelerating loss of New Zealand scientists at post training ages (25-44) and even older
- Graduates 'don't hesitate' to take positions overseas which provide conditions and opportunities to develop their talents.

However, there is little evidence that highlights the mobility of women in particular or women's barriers to mobility. However, we do know that in March 2004 the Royal Society of New Zealand gave 36 travel grants of which 18 were to women (50%), and that in September 2003, 8 of 15 travel grants were to women (51%). These women were all PhD students.

Anecdotally, it is thought that mobility/experience abroad is expected, and while it is anticipated there would be mobility issues for women (especially those with young children), men also face issues regarding mobility. Overall, there may not necessarily be any particular disadvantage for women in this regard.

[42] WEB Research in association with the Open Polytechnic of New Zealand (1999). Barriers and Incentives to Participation in the New Zealand Science and Technology System: Taking Stock. Report prepared for the Ministry of Research Science and Technology.

11. What are the criteria for measuring scientific excellence? Does teaching play the same role as publications? Are other factors taken into account? If so, which ones?

Overall, the focus for measuring scientific excellence is peer review and past publication. Teaching plays a lesser role; however, it is still used as a measure of performance. For example, at the University of Otago each applicant for promotion has to rate themselves in terms of teaching, research and community service and must apply on the grounds of levels of excellence in each of these categories, with evidence to back up their claims.

Predominantly though, research output in terms of publications (numbers of publications and citations) continues to be a national benchmark for measuring scientific productivity and excellence. Patents, too, continue to be a measure of 'excellence' - a standard by which we measure our capability to produce original and commercially useful R&D. Gender is not collected in relation to either of these measures.

Some particular examples of how we measure 'excellence' in science and research follow:

Marsden Fund

The Marsden Fund supports 'excellent' research in New Zealand. The only criterion for receiving funding is 'excellence'. Selection is based on a peer review of the proposed research. There is some assessment of the quality of the research team, but the criteria are heavily weighted towards how clever, novel, and ground-breaking the research will be. Decision making regarding Marsden funding is very forward-looking in terms of the promise the proposed research, rather than being backward looking and taking an historical look at the credentials of the researchers.

Applications for Marsden Funding are considered by selection panels for various disciplines. Each selection panel has to interpret excellence according to the discipline concerned, so there is some variation as each panel has the task of deciding the appropriate criterion for its field, subject to scrutiny by the Marsden Council, and then the Royal Society of New Zealand if necessary.

The judgement of 'excellence' is made in an international context, not just a New Zealand one. In addition to panels, all full proposals are peer reviewed. More than 90% of reviewers come from outside New Zealand and they rate the proposals against the best they see in their countries.

Excellence is an overall perspective, compared to the original one of 'basic science', which has been superseded. Research funded by the Marsden Fund must be the best in New Zealand in the field. Receipt of Marsden Funding is the ultimate accolade.

CoREs

Centres of Research Excellence (CoREs) were established during 2002 and 2003 to support world-class research that would contribute to New Zealand's development as a knowledge society. The CoREs are inter-institutional research networks with researchers working together on a commonly agreed research plan.

The term of funding for selected CoRE projects was for six years, and projects are still in progress. 'Excellence' had a considerable bearing on which proposals were selected for

CoRE funding. 'Excellence' was assessed in a very similar way to 'excellence' for the Marsden Fund, but other criteria such as benefit to New Zealand, opportunities for research skill development and so on were also important. There was also greater weighting given to the quality of the research team, so publication record etc was considered. Mid-period review of the progress of the CoREs will be undertaken shortly.

PBRF

While the bulk of RS&T funding is devolved as contestable, long-term contracts through the Ministry of Research, Science and Technology via its funding purchase agents, the Ministry of Education also allocates funding directly to tertiary education organisations.

The Performance-Based Research Fund (PBRF) has been developed as a means of aligning research funding of tertiary education organisations to research performance. The PBRF is being phased in over the period 2004 to 2007. Using the PBRF, funding to tertiary education organisations[43] will be allocated on the basis of research performance determined through quality evaluation. The system separates research funding from tuition funding - rewarding research excellence in order to enhance the sector's research capability and, over time, its performance. Through the introduction of PBRF, information on the quality of research in the tertiary sector is now collected, in addition to the relative research performance in different research fields and organisations.

The results of PBRF investigations are used to allocate funding to tertiary organisations – based on their 'performance' in terms of 'quality of research' - and to allow these organisations to make decisions about resource allocation and strategic direction. The results are not designed to be used to inform human resource decisions such as promotion or remuneration levels. The Tertiary Education Commission will shortly be putting out a consultation paper on the use of PBRF data. Tertiary education organisations complement PBRF quality evaluation findings with independent studies of research output, and, in particular, bibliometric studies.

How quality is measured in the PBRF

The PBRF uses three measures to build an overall picture of quality within the tertiary sector. The three measures are a periodic peer review element also known as the Quality Evaluation, research degree completions (RDC) and external research income (ERI). The peer review component provides the most detailed, direct and reliable information on research quality. As a consequence, it is weighted 60% in the allocation of funding compared to 25% for RDC and 15% for ERI. Both the ERI and RDC measures are calculated on the basis of a rolling average giving a reasonable level of funding stability to tertiary organisations, while maintaining incentives for providers to improve their performance.

The RDC measure is a measure of the extent to which the provider is meeting its research training function. The amount of money generated by the institution by way of ERI is viewed as a good proxy measure of research quality as it is usually won through competitive bidding and is often subjected to rigorous peer review.

In order to be eligible to participate in the Quality Evaluation component, tertiary organisations must have had degree-granting authority. Staff employed by these institutions were assessed for their eligibility against various participation criteria that make particular

[43] Tertiary Education Organisations include all the universities, colleges of education, Wananga, polytechnics and private training establishments.

reference to their involvement in degree-level teaching and/or research. An evidence portfolio was prepared by each eligible staff member setting out their *research outputs* over the review period (six years), their *contribution to the research environment*, and *peer esteem* weighted 70/15/15. Participating tertiary organisations then conducted an internal assessment and submitted only those portfolios that were assessed as meeting the standards of a funded Quality Category. Each evidence portfolio was then assessed by one of the 12 peer review panels covering 41 designated subject areas. In addition, the work of the panels was overseen by a moderation panel. The panels assigned a final Quality Category to each PBRF-eligible staff member which was then used to generate Quality Score information for each participating organisation, subject area and nominated academic unit.

Items eligible for inclusion in the *research output* section include articles in peer-reviewed journals, books, chapters, commissioned reports and periodicals, theses, conference presentations and creative work, contributions to the intellectual infrastructure of subject areas (such as new scholarly editions, and investigation that leads to new materials, devices, products or processes). The *peer esteem* component includes research-related fellowships and prizes, the ability of the individual to attract graduate students and citations. The *contribution to the research environment* component includes membership of research collaborations, generation of externally funded research, and contribution to researcher development and student supervision.

The quality category 'A' represents the highest quality standard. An 'R' is assigned to staff who are embarking on a research career and hence have not yet had the opportunity to produce many research outputs or to acquire the research standing that would lead to an award of 'A', 'B', or 'C', in addition to researchers assessed as producing lower quality research[44].

Teaching vs publications

Teaching does not count as much towards a PBRF quality score as other research outputs. The PBRF is designed to measure research quality, not teaching quality. However, in order for a researcher to be eligible for PBRF assessment, and thus to attract funding for the institution, the staff member is expected to contribute to the learning environment of the particular institution, and to make a significant contribution to research activity and/or degree teaching. This is reinforced by the New Zealand Education Act which requires that degrees be "taught mainly by people engaged in research".

To counteract any lessening of the importance of quality teaching that the PBRF may introduce, performance measures and indicators for use in the tuition component of funding tertiary organisations are proposed to be introduced. This will involve making a small component of funding for teaching at risk based on measures such as course completion rates and learner satisfaction surveys.

Results

The first PBRF quality evaluation was held in 2003 and the results were released in April 2004. There were 22 participating tertiary education organisations. Many of the highest performing subject areas were sciences with five of the 10 highest ranked subjects in scientific fields (the highest-scoring subject area was philosophy). Of the 12 PBRF panels, the four panels with the highest average quality scores were in scientific and technological areas.

[44] Full guidelines for assessing the quality of research are available at www.tec.govt.nz/funding/research/pbrf/guidelines.htm#idf_Q2.

Women

Men tended to score higher than women in the quality evaluation, with 69% of men being awarded an 'A', 'B' or 'C' quality category, compared with 60% of all those participating. 2.2% of female PBRF-eligible staff were assigned a score of 'A', compared to 8.2% of men. 'B' recipients were 15.3% of the women (compared to 28.6% of the men). And 'C' was assigned to 29.8% of females (and 32.5% of men).

Concerns have been raised that the assessment framework of the PBRF unintentionally disadvantaged or discriminated against certain groups, including women. For example, the average quality score achieved by women in the 2003 assessment was substantially lower than that for men. This reflects the fact that a much lower proportion of women than men received a high Quality 'A' Category, while a much higher proportion of women received an 'R' Category.

There may be many reasons for this disparity, including that a much higher proportion of men hold senior academic positions and have typically held those positions for longer than their female counterparts. While this is true, the data also reveals differences in the average quality scores of women and men of equivalent rank. It is not clear how such differences can be accounted for, but it is nonetheless a concern that aspects of the assessment framework may be unfairly discriminating against women researchers.

As part of an attempt to ensure fair treatment of all staff, the PBRF assessment allowed researchers to detail certain 'special circumstances' that may have affected their research performance. These include such things as extended leave due to parenting responsibilities, or part-time employment. Some circumstances that may affect research performance, such as heavy teaching loads, were excluded. An important issue for consideration, therefore, is that whether the current criteria for claiming special circumstances are appropriate, and also whether panels are interpreting them fairly or adequately.

Even if it turns out that the results reflect genuine differences in the seniority, employment status or even research performance of male and female academics, it is still a concern that the PBRF might inadvertently perpetuate such differences. The PBRF is being reviewed with the intent of resolving such issues in time for the next Quality Evaluation in 2006.

12. Do universities, public research organisation and businesses have measures in place to facilitate achieving a proper balance between life and work (family choices)? If so, please describe (for example, do these measures apply to women and men (parental leave)? Is the return to research work after child care supported?, etc).

The EEO trust promotes the benefits of work-life balance to business - explaining how a proper work and life balance can improve the performance and well-being of their employees, and has business benefits[45]. The EEO trust provides a variety of resources and current information on work-life balance, and offers awards for businesses with work life initiatives.

There are also various measures in place in public research organisations to achieve a proper balance between life and work.

Parental leave of up to 13 weeks is available to either parent as a legislative requirement, with the option of up to 12 month's leave without pay. The legislative rate of pay for parental leave is $346.63 per week, about 40% of the normal salary of a woman scientist and about a quarter of the salary of a senior scientist or senior lecturer. However, most Crown Research Institutes (CRIs), offer full salary for the first 6 weeks of parental leave for female staff having children, and offer fathers two weeks leave at full pay.

There are no specific work and family policies within CRIs; however, generally CRI human resource policies endeavour to create balance between work and family. One CRI in particular – Landcare Research – is creating a 'Manaaki Tangata' ('Caring for the People') plan which will outline EEO legislative requirements and work-life balance issues. It aims to set out the principles of 'care' and encapsulate all the work-life balance information needs of employees, such as outlining flexible hours, parental leave entitlements etc.

Some Universities have a work and family policy, such as the University of Auckland[46] and the University of Waikato[47]. Such policies apply to men and women equally. There has not been any research into the broacher impact and effect of these policies on women researchers at the university level.

Some research institutions have child care facilities associated with them – universities in particular.

In extreme circumstances of imbalance between life and work, EEO legislation would come into play. The legislation ensures health and safety issues, stress in the workplace etc are considered for all employees. Although a legal avenue is generally the route of last resort.

In general, debt burdens from student loans are impacting particularly on those with lower paying jobs or who spend periods of time out of the workforce to have children[48], and may be affecting work-life balance and decisions regarding family planning.

[45] http://www.eeotrust.org.nz/worklife/business.shtml
[46] http://www.eo.auckland.ac.nz/docs/WL&F%20PAMPHLET%20AUGUST%202004.pdf
[47] http://www.waikato.ac.nz/hrm/internal/publications/GPK02.pdf
[48] Ministry of Women's Affairs. (2002). Work and Family Balance: A Policy Perspective.

13. Does your country have any programmes and measures in place to increase the share of women researchers in senior decision-making positions (research funding agencies, agenda-setting bodies)? If quota schemes are applied, what is your experience?

General position of New Zealand women in decision making positions

Women hold the four constitutional positions in New Zealand: the governor general, Prime Minister, Attorney General and Chief Justice. And overall, the proportion of senior managers in the public service who are women has been increasing fairly steadily since the data began being collected in 1998. In 2001, in a survey of departments, the State Services Commission reported that 57% of public service employees were women, and that women filled 33% of senior management positions (including 23% of chief executive positions). In 2004, 47% of new senior managers over the past year were women. However, women also left the senior management ranks at a fairly high rate. The net effect of this for women resulted in an increase of one percentage point (refer Table 22).

Table 22: Representation of Women in Senior Management Public Service Departments (1998-2004)[49]

	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Women	29.4%	32.7%	33.6%	32.7%	35.5%	35.1%	36.2%

General programmes and measures

Senior Leadership and Management Development Strategy

The State Services Commission introduced a programme in 2003 called the Senior Leadership and Management Development Strategy. The Strategy, among other issues, considered the high turnover rate and retention of women in senior positions in the public service. One of the goals of the programme is to increase diversity at senior management level (chief executives and other senior roles with considerable complexity, accountability and impact), and women and Maori are two groups specifically targeted by the Strategy. A major feature of the Strategy is the Executive Leadership Programme (ELP) to build a group of talented managers of the required quality, quantity and diversity to meet the future needs of the Public Service.

Nominations Service

The Ministry of Women's Affairs has produced an introductory guide to membership of government boards and committees[50]. It outlines the Ministry's Nominations Service. The key aim of the Nominations Service is to increase the number of women in decision-making bodies and was established to increase the numbers of women appointed to government boards and committees. The target is to have 50/50 representation of women on statutory boards and committees by 2010.

[49] State Services Commission (2004) Human Resource Capability Survey of Public Service Departments as at 30 June 2004 (workforce profile)
[50] Ministry of Women's Affairs (2001). Women on Board.

The Ministry itself does not appoint board members. To achieve their target, the Nominations Service maintains a database of women with the relevant skills and experience which is used to identify potential candidates for director positions on state sector boards. The nominations are then considered by the government agency responsible for those appointments. The Nominations Service maintains contact with women in science networks to ensure women of high standing can be targeted and registered.

Position of women in science in decision-making positions

Statistics present a mixed picture of the position of women in science in decision-making positions. While women are well represented in policy making positions, they are less well represented as research leaders and institute board members.

Ministry of Research, Science and Technology

The Chief Executive of the Ministry of Research, Science and technology is female, as are two of the four Senior Management Team of the Ministry. And as at 30 June 2004, women made up 60% of MoRST staff[51].

Research Funders

Women are less well represented on the boards of the three principal government funded research purchase agents (refer Table 23).

Table 23: Research Funders - Board/Council Members by Gender (as at 7th Feb 2005)

	Research Funders			
	The Foundation for Research, Science and Technology	**The Royal Society of New Zealand**		**The Health Research Council**
		Marsden Fund Council	**RSNZ Council**	
Female	2	2 (including the chair)	3	3
Male	7	8	13	7
Total	**9**	**10**	**16**	**10**

Crown Research Institutes

The female participation rate at board level is somewhat higher within the Crown Research Institute (CRI) boards. Currently there are 61 CRI board members (for nine CRIs). 25 of the board members are female (41%), and 36 are male[52].

There is no specific policy direction regarding women and the appointment of any Crown boards; however, there is a general desire in appointments to reflect the general make-up of society. Ministers make all Crown board appointments and Ministers are conscious of the need for diversity in board appointments. While the primary consideration for board appointees is skill, the pool of potential board members presented to the Minister is as diverse as it can be, and Ministers must certify that they have considered gender throughout the appointment process.

[51] Ministry of Research Science and Technology. (2004). Annual Report 2003/2004.
[52] Crown Company Monitoring Advisory Unit, 4 Feb 2005

The Royal Society of New Zealand Fellows

The Royal Society of New Zealand has a President's Panel that specifically looks at nominations of women for fellowship of the society. Presently (as at 1/1/05) there are 25 female fellows of the royal society of New Zealand (7.8%). This represents the highest proportion of female fellows of any of the Royal Societies around the world. It also has 45 Honorary Fellows (who are not resident in New Zealand) of which 2 are women (4.5%).

Nominations for fellowship are initially considered by selection panels covering 10 separate disciplines. Each panel highly recommends up to 3 nominees for consideration by a fellowship selection committee which makes the final selections. Strictly, the only criterion for inviting nominations of fellows is distinction in research and/or the advancement of science. Although all Fellows are selected on merit and are subject to international referees etc, the President's Panel has been put in place to ensure that female nominees get a fair hearing. It is not an affirmative action programme, and there is no concern that women are not getting a fair hearing. The role of the President's Panel is simply to ensure that outstanding female nominees are not overlooked due to the disproportionate number of male fellows on the selection panels.

The President's Panel considers the nominations at the same time as the selection panels, and provides a second view to nominees who may have been overlooked by the relevant selection panel. In addition to considering and, if warranted, adding weight to female nominees, the president's panel also considers nominations of men whose nominations do not fit into any of the traditional panels.

Researchers in decision making positions

It is thought that generally women are seldom principle investigators or objective leaders in Public Good Science Fund grants, and that women, therefore, have less control over science budgets. However, there is little data available to confirm or dispute this position.

As mentioned, data on the gender of research recipients is not routinely collected by the funding agencies. The only information at hand is for Marsden Fund recipients. Since its existence (1995) under Royal Society administration, the Marsden Fund has supported 170 principle female investigators (refer Table 24).

Table 24: Marsden Fund Recipients, breakdown of Principle and Associate Investigators, total since 1995.

	Female	**Male**	**% Female**
Principal Investigator	170	582	23%
Associate Investigator	149	667	18%
Total Associate or Principal Investigators	249	1081	19%

The proportion of total female investigators has been steady over time (refer Table 25). However, there has been a marked increase in female Principle Investigators from a base of 6 (8%) in 1995 to 27 (26%) in 2004.

Table 25: Marsden Fund Associate or Principle Investigators 1995 – 2004

	Female	Male	% Female
1995	17	100	15%
1996	24	155	13%
1997	19	113	14%
1998	37	198	16%
1999	35	148	19%
2000	35	176	17%
2001	36	152	19%
2002	48	183	21%
2003	72	227	24%
2004	41	154	21%

Our information on the gender of researchers in general is inadequate to draw any conclusions about women researchers in decision-making positions. While it would appear from analysis of this one fund that women in senior decision making positions are increasing in number, there are no specific programmes or measures in place to affect female representation.