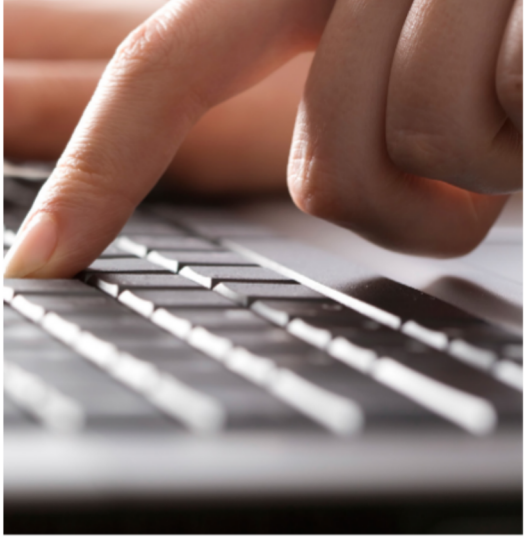
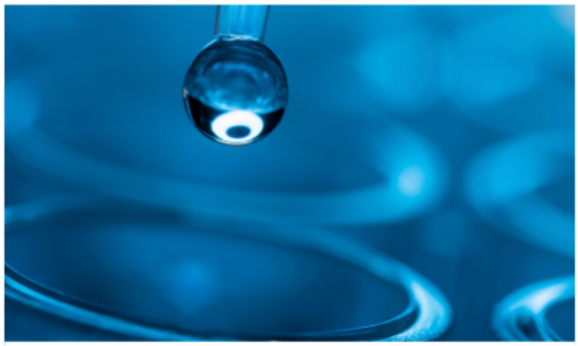
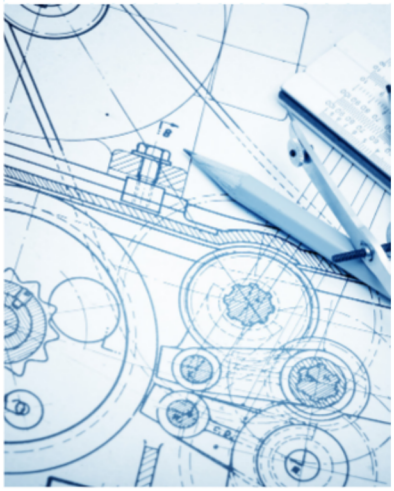




Professionals Australia

Gender segregation in the STEM professions

Professionals Australia's submission to Finance and Public Administration References Committee's Inquiry into gender segregation in the workplace and its effects on women's economic equality

February 2017

About Professionals Australia

Professionals Australia (formerly the Association of Professional Engineers, Scientists and Managers, Australia) represents over 23,000 professional engineers, scientists, managers, veterinarians, surveyors, architects, pharmacists, information technology professionals, interpreters and translators and transport professionals throughout Australia.

Professionals Australia members are employed across all sectors of the Australian economy. This includes all tiers of government and in a diverse range of industries throughout the private sector including Roads, Rail, Water, Electricity, Information Technology, Telecommunications, Consulting Services, Laboratories, Research, Surveying, Architecture, Retail Pharmacy, Mining, Oil, Collieries, and Manufacturing.

Contact us

Professionals Australia (formerly APESMA)
GPO Box 1272, Melbourne VIC 8060
t: 1300 273 262
e: genderanddiversity@professionalsaustralia.org.au
w: http://www.professionalsaustralia.org.au/professional-women/

Contents

Preamble

On 9 November 2016, the Senate referred an Inquiry into gender segregation in the workplace and its impact on women's economic equality to the Finance and Public Administration References Committee, with particular reference to:

a. the nature and extent of industrial and occupational gender segregation in Australian workplaces relative to comparable jurisdictions, including gender segregation in tertiary education courses;
b. factors driving industrial and occupational gender segregation in the Australian context;
c. economic consequences of gender segregation for women, including the contribution of industrial and occupational gender segregation to the gender pay gap;
d. approaches to addressing gender segregation as it relates to economic inequality and the gender pay gap in comparable jurisdictions; and
e. remedies appropriate for Australia, including but not limited to:
    i. measures to encourage women's participation in male-dominated occupations and industries,
    ii. measures to professionalise and improve conditions in female-dominated occupations and industries, and
    iii. measures to promote pay equity.

Why is gender segregation an issue in STEM more than in other areas?

Many of the barriers that face professional women in STEM are not unique to the STEM professions. They can however be exacerbated by:

- the historical stereotyping of STEM professionals as predominantly male or masculine;
- the precarious employment that characterises roles that are contingent upon grant-based funding which underpins most research in Australia;
- workplace cultures, systemic practices and unconscious biases particular to the practice of science and research which directly or indirectly create disproportionate disadvantage for women; and
- disturbingly high rates of harassment and bullying on the basis of gender in STEM workplaces.

Beyond the issue of supply

While ensuring a strong supply of work-ready STEM graduates from universities is critical, equally important is the issue of removing the obstacles, barriers and biases which operate as disincentives to women remaining in the STEM workforce. So as well as initiatives to encourage women and girls into STEM education, long-term policy solutions will require addressing a range of complex factors that operate to disadvantage women in the STEM workforce and lead to attrition from the sector.

What is gender segregation?

The 2015 Women in the Science Research Workforce: Identifying and Sustaining the Diversity Advantage report says:

> *The patterns of women's participation and success in the science research workforce are well documented. Consistent and enduring patterns of vertical and horizontal segregation of women have been consistently described over the past twenty years. The persistence of tacit, rather than explicit gendered organisational cultures and systems that in small but cumulative ways disadvantage many women, whilst simultaneously advantaging many men,*

are also well known ... There is a new imperative to do this [to address what is] a significant threat to the attractiveness and sustainability of the science research workforce.[1]

As outlined in the Women in Science Research Workforce report, women's participation in the STEM workforce is marked by what is referred to as vertical and horizontal gender segregation.

Occupational or vertical gender segregation can be defined as segregation arising where opportunities for career advancement for a particular gender within an organisation are limited. Vertical segregation occurs where women are under-represented at senior, management and leadership levels, and/or over-represented in less senior, less secure and lower paid roles. Vertical segregation contributes to a range of areas of disadvantage for women including the gender pay gap and reduced retirement earnings.

Industrial or horizontal gender segregation can be defined as the concentration of men and women in different kinds of industries, sectors, fields/disciplines and/or specialisations or the uneven representation of women in the different areas of education and the workforce. [2] Horizontal segregation occurs where women are over-represented in less secure and lower paying industries, sectors, fields/disciplines and/or specialisations or conversely under-represented in industries, sectors, fields/disciplines or specialisations characterised by higher rates of pay and employment security.

While we discuss horizontal segregation in the STEM professions in this submission, our main focus and the primary data referred to in this submission is on vertical segregation – that is the factors that are linked with obstacles to career advancement at the workplace level.

Why should gender segregation be addressed?

The challenges we face as a nation are diverse and complex. Improving productivity and driving real innovation will rely on increasing the rate of women's participation in the STEM workforce and ensuring the STEM workforce is diverse and inclusive. A workforce characterised by diversity brings together a range of people who think differently and approach problems in different ways – and this creates a "diversity advantage" that generates a range of benefits including a thriving innovation culture, a positive impact on the bottom line and incentives to remain in the STEM workforce.

As well as addressing gender segregation as a justice and equity issue, there is growing evidence of the rationale for addressing gender equity issues at the national economic level as well as for the bottom line at the enterprise level.

Goldman Sachs JB Were's report, *Australia's Hidden Resource: The Economic Case for Increasing Female Participation,*[3] estimated that closing the gap between male and female employment would boost Australia's GDP by 11 per cent. A 2009 KPMG report *Understanding the Economic Implications of the Gender Pay Gap in Australia* also found that closing the gender pay gap would result in greater competitiveness and opportunities for growth with better attraction of skilled staff, reduced costs through lower turnover and ensuring individuals with the best skills and knowledge are retained.[4]

---

[1] Bell, S. and Yates, L. (2015). Women in the Science Research Workforce: Identifying and Sustaining the Diversity Advantage, Melbourne: L.H. Martin Institute, University of Melbourne, September 2015, p.7.
[2] Carrington, K. and Pratt, A. (2003) "How Far Have We Come? Gender Disparities in the Australian Higher Education System: Information, Analysis and advice for the Parliament.
[3] Goldman Sachs JB Were (2009). Australia's Hidden Resource: The Economic Case for Increasing Female Participation.
[4] Diversity Council Australia (2009). Understanding the Economic Implications of the Gender Pay Gap in Australia.

Game-changers: Economic Reform Priorities for Australia - a 2012 report from the Grattan Institute - estimated that increasing female workforce participation by around 6% would increase the size of the Australian economy by about $25 billion per year.[5] Diverse and inclusive workplaces encourage workforce participation, which in turn drives productivity improvement. The 2015 report *Women in the Science Research Workforce: Identifying and Sustaining the Diversity Advantage* says that "Using (women's) talents to the full at all levels of scientific and technological education, training and employment is an economic necessity, and an investment in Australia's future national development" and puts the position that a multifaceted strategy to broaden participation in the science and technology workforce and to realise the potential of women's participation is needed.[6]

Gender equity and diversity are important factors in determining not only economic success at the national level but financial success at the enterprise level. Research shows that workplace diversity is linked to significant business benefits such as improved organisational performance, effectiveness, profitability and revenue generation. Research shows that diverse teams consistently outperform on innovation, problem-solving, flexibility, and decision-making[7].

What are the facts on horizontal segregation in STEM?

The latest OECD data show that just over 30 per cent of tertiary qualifications were awarded to women in STEM fields in OECD countries. In Australia, 33 per cent of STEM tertiary qualifications were awarded to women.[8]

While 50 per cent of undergraduates in the Natural and Physical Sciences, and Agriculture and Environment are female, female undergraduate participation in Engineering and Related Technologies stands at just over 15 per cent. Females are represented at more than 40 per cent in only 7 of the 29 fields of science education.[9]

The differential persists in the workforce with only 28 per cent of the employed STEM-qualified Australian workforce aged 15 years and over being female, compared to 55 per cent for all fields in the tertiary qualified population.[10]

For STEM professionals, horizontal gender segregation is complex with discrete and segmented labour markets at the levels of profession and/or field/specialisation. Workforce participation stands at 14 and 86 per cent for females and males respectively in Engineering and related technologies, and 25 and 75 per cent respectively for females and males in Information and communications technology (ICT). There was less disparity in the Natural and physical sciences where females comprised 47 per cent of the workforce compared with 53 per cent males, however there were significant differences in the participation rates for women in fields/disciplines within science.

Gender distribution also differs greatly based on industry. Women account for only 12 per cent of the STEM workforce in Construction, 17 per cent in Mining, 19 per cent in Utilities and ICT and 21

[5] Daley, J. (2012). Game-changers: Economic reform priorities for Australia, Grattan Institute.
[6] Bell, S. and Yates, L. (2015). Women in the Science Research Workforce: Identifying and Sustaining the Diversity Advantage, Melbourne: L.H. Martin Institute, University of Melbourne, September 2015.
[7] King, J. (2005). Benefits of Women in Science, Science 308: 601
[8] Roberts, K. (2014). Engaging more women and girls in mathematics and STEM fields: the International evidence. The OECD figures are from 2011 and include both tertiary type A and advanced research programs, accounting for Bachelor degrees, Masters degrees and doctoral research.
[9] Women in Science: Maximising productivity, diversity and innovation (2009). Bell, S., O'Halloran, K., Saw, J. and Zhao, Y.
[10] Office of the Chief Scientist (2016). Australia's STEM Workforce.

per cent in Professional, Scientific and Technical services. Women are better represented in Health Care at 60 per cent of the STEM workforce, and Education and Training at 41 per cent.[11]

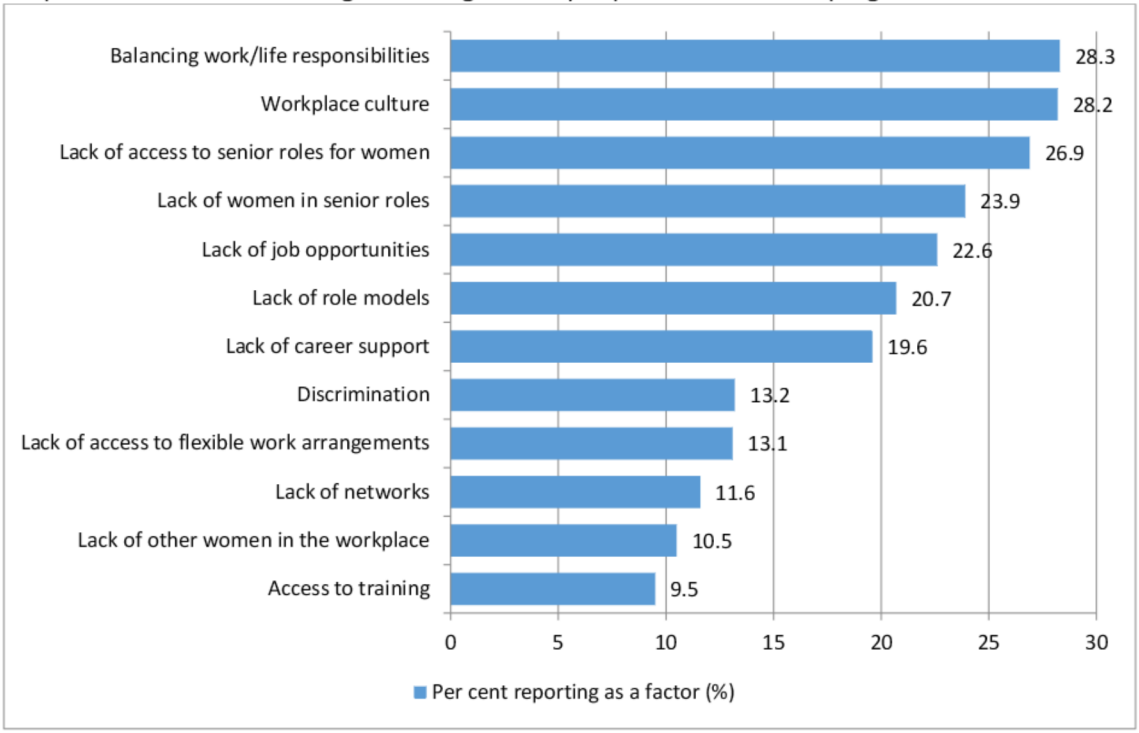
What are the issues relating to vertical segregation in STEM?

In 2015, Professionals Australia conducted a survey of female members[12] to explore the issues around disadvantage for women in the STEM professions. This submission details selected findings on the issues that contribute to vertical gender segregation in STEM.

Barriers to career advancement – an overview

The three greatest barriers to career advancement reported were balancing work/life responsibilities, workplace culture and the lack of access to senior roles for women.

Respondents said the following factors significantly impeded their career progress:



Gender pay gap

The 2015 gender pay gap in Australia reported by the Australian Bureau of Statistics stands at 17.3 per cent. The gap is greater still for the Professional, Scientific and Technical Services industry where the differential sits at 22.6 per cent, down on the previous year's figure of 28.0.3 per cent. For Professionals as an occupation, the gap stands at 21.2 per cent. [13]

Our Women in STEM survey found that:

- 40.2 per cent of respondents did not believe they received equal compensation for work of equal value compared to their male professional colleagues; and

[11] Office of the Chief Scientist (2016). Australia's STEM Workforce.
[12] Professionals Australia (2015). The Slower Track: Women in the STEM professions survey report.
[13] Workplace Gender Equality Agency May 2016 Gender Pay Gap Statistics report based on Australian Bureau of Statistics (2015). Average Weekly Earnings, Australia, May 2015, cat. no. 6302.0.

- Survey respondents ranked pay equity second in importance only to flexible working arrangements/work and life balance as an issue faced by professional women that should be prioritised by government and industry.

Ranking of issues facing professional women

The differential earnings for male and female STEM professionals found in the surveys of Engineering, Science and ICT are of interest.

Note: The figures in this section compare the average weekly earnings of male and female respondents currently employed on a full-time basis. Differences noted mid-career are therefore not attributable to women working part-time.

Engineering

The 2016 Professional Engineers Employment and Remuneration Survey found a pay differential between male and female respondents with female respondents reporting a median total package of $101,100, 24% lower than their male counterparts at $133,154.

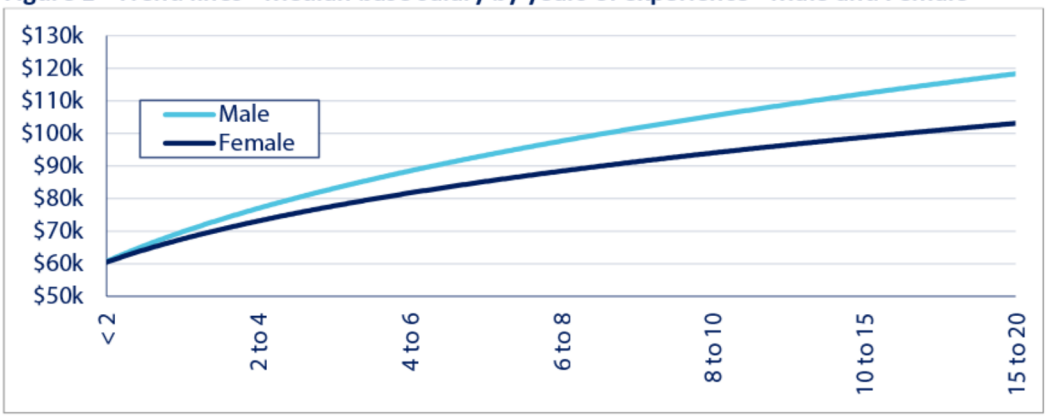
Table 1 - Remuneration across years of experience by gender

		N	Base Salary				Total Package			
			Lower Quartile	Median	Upper Quartile	Mean	Lower Quartile	Median	Upper Quartile	Mean
Male	Less than 2	23	$60,000	$65,000	$90,000	$72,857	$65,723	$72,000	$99,762	$84,658
	2 to less than 4	27	$60,000	$72,313	$80,000	$72,687	$66,507	$78,000	$101,500	$84,945
	4 to less than 6	36	$77,250	$86,000	$95,945	$85,993	$89,295	$100,750	$112,701	$105,864
	6 to less than 8	14	$85,000	$92,155	$120,721	$101,777	$94,219	$113,903	$142,685	$118,158
	8 to less than 10	24	$92,500	$103,000	$120,500	$105,468	$101,288	$115,533	$147,888	$123,144
	10 to less than 15	55	$98,143	$120,000	$135,000	$119,406	$112,468	$131,500	$165,000	$138,459
	15 to less than 20	34	$109,000	$122,824	$134,000	$124,865	$127,075	$146,837	$155,490	$143,550
	20 to less than 25	27	$110,000	$133,330	$150,000	$128,057	$127,429	$153,615	$172,500	$150,977
	25 to less than 30	31	$118,600	$145,000	$175,000	$149,218	$147,200	$159,500	$224,750	$181,120
	30 to less than 35	46	$130,000	$141,300	$163,844	$151,531	$145,600	$170,063	$199,290	$175,830
	35 or more	30	$120,000	$145,000	$167,000	$146,425	$132,000	$176,000	$190,500	$168,396
	All Respondents	347	$90,000	$117,000	$140,061	$118,010	$102,930	$133,154	$168,750	$138,775
F e	Less than 2	7	$57,500	$61,000	$75,000	$64,423	$63,510	$68,163	$86,220	$72,880

2 to less than 4	4		$66,167		$69,834		$72,453		$75,043
4 to less than 6	5	$63,000	$87,000	$89,000	$80,800	$68,985	$97,900	$103,965	$91,126
6 to less than 8	5	$80,000	$96,000	$96,693	$91,739	$88,000	$118,360	$120,942	$108,595
8 to less than 10	SNR								
10 to less than 15	10	$90,000	$105,000	$127,960	$110,199	$112,467	$118,938	$143,327	$128,359
15 to less than 20	5	$90,000	$92,000	$108,890	$103,132	$99,762	$102,438	$122,501	$114,383
20 or more	SNR								
All Respondents	42	$69,334	$90,000	$109,000	$92,813	$84,750	$101,100	$124,553	$106,672

While the gap in reported wages for male and female respondents was narrower at 0 to 4 years of experience, the gap was more pronounced beyond 4 years' experience. Equal pay rates for entry level and early-career roles signal that most organisations provide competitive remuneration at this stage. However, as experience increases the pay gap emerges and widens, suggesting factors relating to career progression for women are impacting their earnings. Barriers preventing the advancement and progression of female engineers can include balancing work/life responsibilities, career breaks, workplace culture, differential access to mentoring and networking opportunities and the lack of access to senior roles for women. These issues impact the progression of women in engineering into higher levels of responsibility and remuneration. Significantly, the pay gap is not attributable to part-time work directly, as the survey results have been drawn from full-time respondents.

Figure 1 - Trend lines - Median base salary by years of experience - Male and Female



Science

Overall, the survey found the mean base salary reported was $117,473 for males compared with $96,748 for females, and the mean total package for males was $135,929 compared with $112,385 for females. Female respondents' reported earnings were less than their male counterparts across job functions with the exception of Quality control and production and Computing, and less across all qualification levels.

In 2015, the survey found a significant relationship between responsibility level and gender and their effect on remuneration. While female respondents tended to be paid equivalent to their male peers in lower level roles, male respondents were better remunerated in middle career roles at Levels 3 through 5. The gap increased as responsibility level increased, and did not close until respondents exceeded level 5, typically executive management positions. The 2016 survey found similar results with a significant effect of gender and level on base salary and total package, as well as an interaction between the two suggesting the gender pay gap widens as responsibility level increases. This year however female respondents also reported lower earnings than males at Level 2. Again, the difference in remuneration between male and female respondents reduced beyond Level 5, where roles are generally subject to greater internal and external scrutiny. It is important to note

that only scientists employed on a full-time basis are included in this analysis ruling out the impact of part-time working arrangements as a factor in these differences.

The data therefore supports the finding that a gender pay gap exists in the group surveyed, and the gap is unlikely to be attributable to a greater concentration of women in lower levels of responsibility.

Figure 2 - Average annual base salary by responsibility level and gender

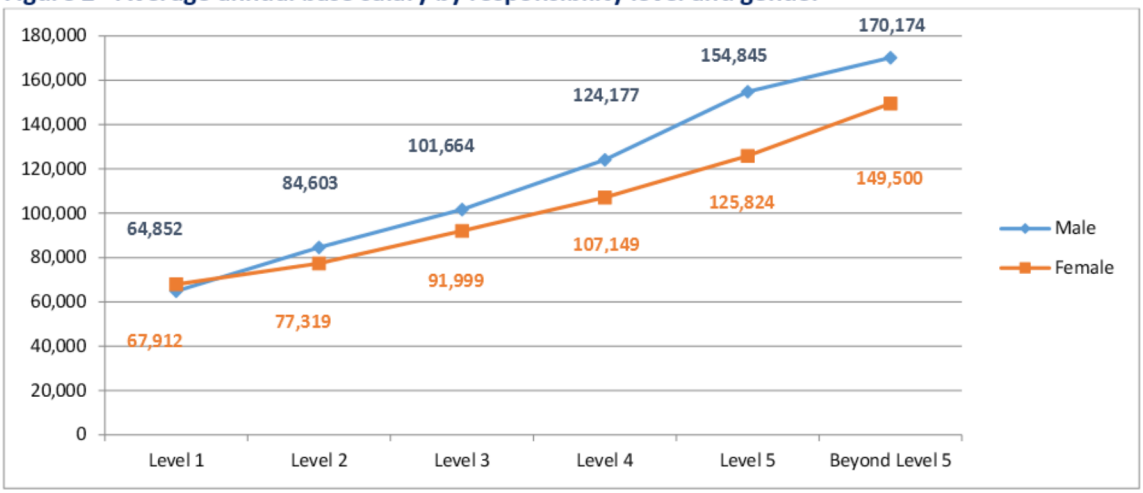


Figure 3 - Average annual total package by responsibility level and gender

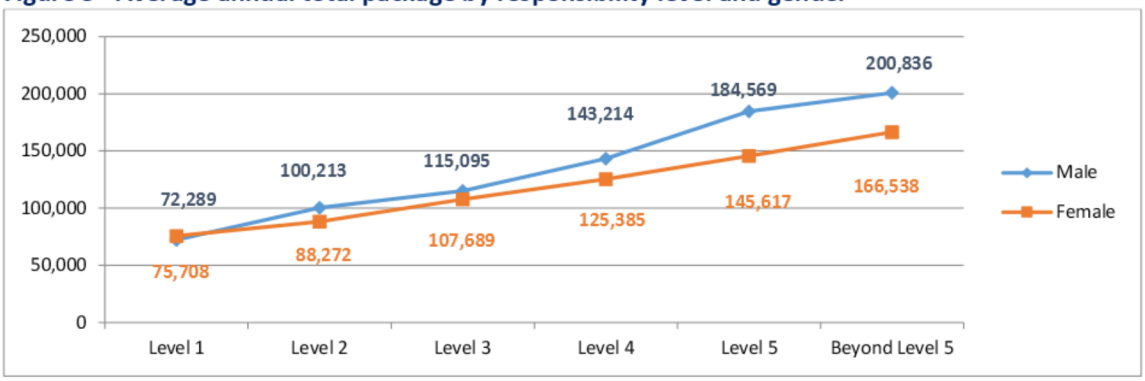


Figure 4 - Average annual base salary by years of experience and gender

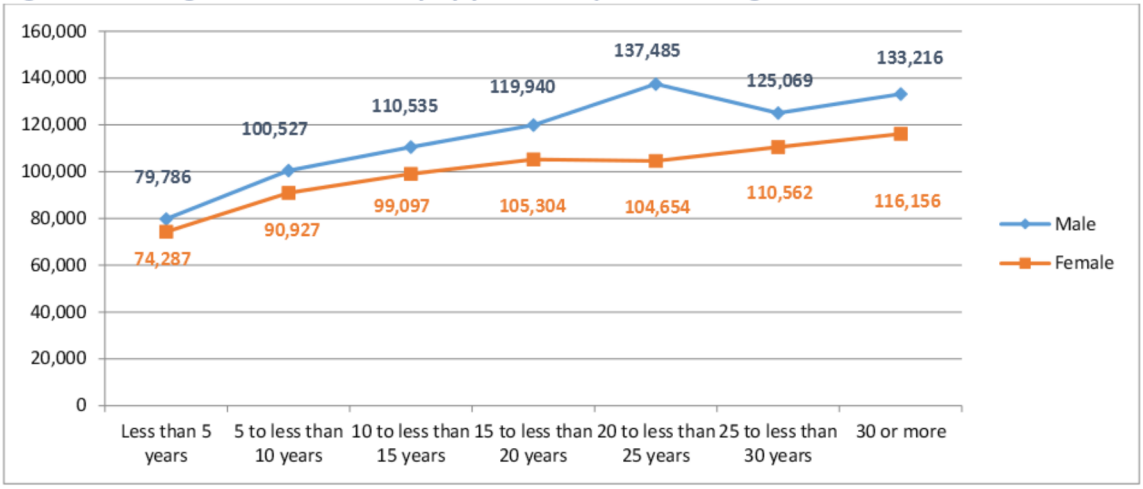
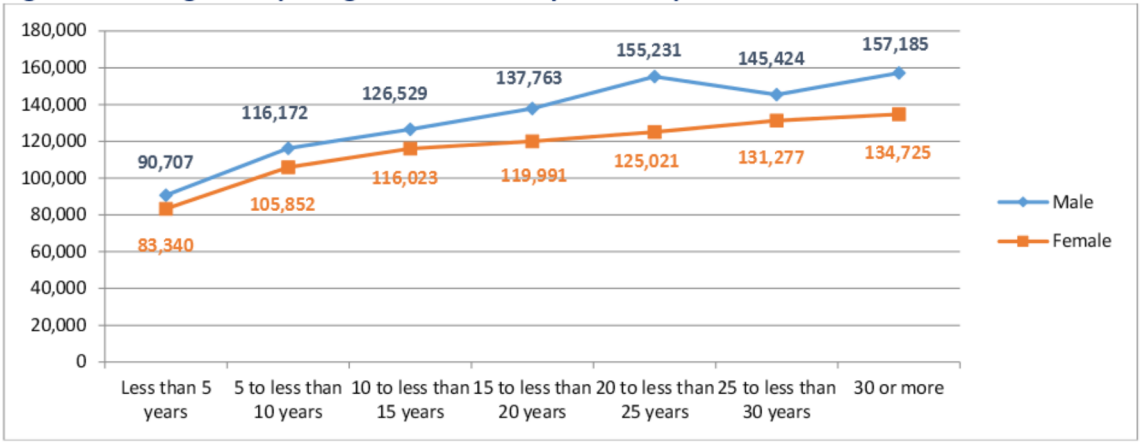


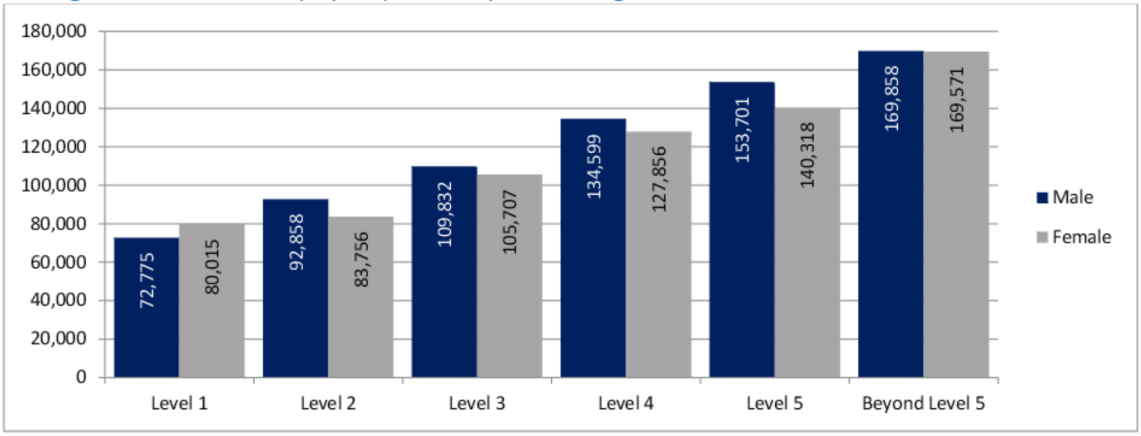
Figure 5 - Average total package salaries across years of experience



ICT

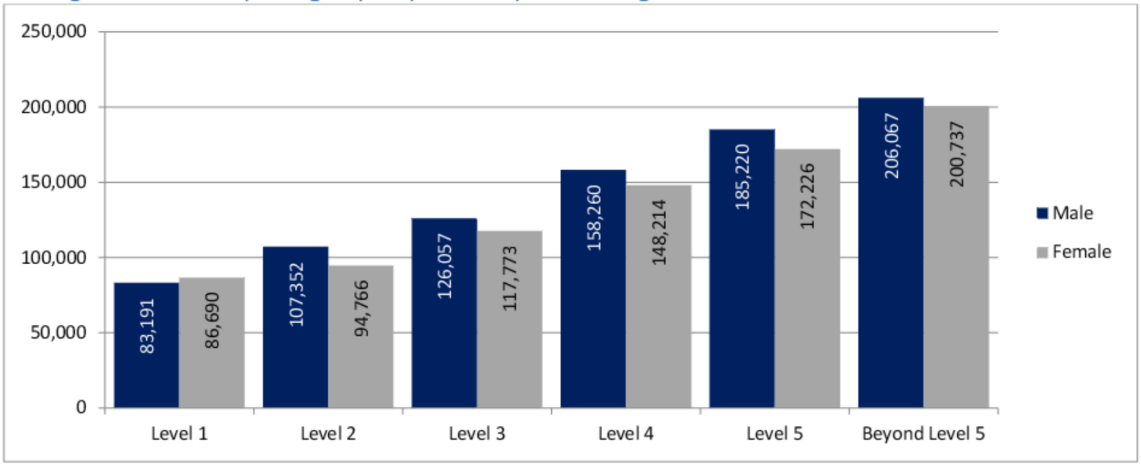
The average income for male respondents reported in the 2015 Professionals Australia/Australian Computer Society ICT Professionals Remuneration Survey was generally higher than for female respondents for levels of responsibility beyond Level 1 and at or below Level 5, a pattern similar to that found amongst both science and engineering professionals.

Average annual base salary by responsibility level and gender – ICT Professionals



2015 Professionals Australia/ACS ICT Remuneration Survey

Average annual total package by responsibility level and gender – ICT Professionals



Retirement savings

Disadvantage in the form of comparatively lower retirement savings can be entrenched as a result of women opting for part-time time work, taking a career break for maternity leave or to accommodate family responsibilities. It can also arise as an outcome of the concentration of women in lower-paid roles, in lower-paid occupations and in lower-paid disciplines within the STEM professions.

The survey found the following in relation to retirement savings:

- 47.4 per cent of respondents said a career break had seriously reduced their retirement savings;
- 49 per cent said working part-time had seriously reduced their retirement savings; and
- 47.7 per cent said access to more flexible work arrangements and therefore full-time work would have meant a reduced impact on their retirement savings.

Respondents' comments:

- The double-whammy of PhD and maternity leave has seriously impacted my retirement savings.
- My partner is on leave without pay, because we had no childcare in our area – this has impacted both our retirement savings.

Part-time work and flexible work arrangements

While gaining access to part-time work and flexible work arrangements can help women balance their work and family responsibilities, the arrangements can also be a means of entrenching discriminatory practices and structural bias against those who have primary caregiver responsibilities. The survey found that utilising part-time work and flexible work practices could result in a narrowing of choice, limiting of opportunities and the reinforcement of discriminatory historic work patterns such as the concentration of women in roles and occupations with less responsibility and seniority. Survey respondents confirmed a range of practices operating in their workplaces that had the effect of creating systemic biases and barriers to career advancement for women who opted for part-time or flexible work arrangements.

- Results confirmed a significant differential in the employment status of male and females across the STEM professions with females more likely to be employed part-time than males in Engineering, Science and ICT.
- Women with children were found to be less likely to be employed full-time than those without, confirming that caregiver responsibilities directly impact employment status.
- 61.5 per cent of survey respondents reported that they believed working part-time had negatively impacted their career.
- 23.9 per cent said carer responsibilities had negatively impacted their career.
- 51.2 per cent said they were unnecessarily prevented from undertaking certain types of work because they worked part-time.
- 23.6 per cent said they were seen as not pulling their weight because they used flexible work arrangements.
- 27.2 per cent said lack of access to flexible work arrangements had significantly or moderately impeded their career advancement.
- 25.3 respondents said they had been sidelined for promotion because they worked part-time.
- 40.1 per cent of respondents said they can miss out on information about what is happening in their workplace because they use flexible work arrangements.