



Women at work: 1991–2013



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1 Purpose and key points

Purpose

Women at work: 1991–2013 uses census data from the 20 years to 2013 to look at trends in occupational segregation between women and men. The report is intended to be useful to readers, researchers and policy-makers who have an interest in gender pay gap and labour market issues.

This report was developed in consultation with the Ministry for Women, and identified as a priority because of the gender equity issues associated with imbalances in the occupational distribution of men and women – imbalances that show some persistence despite changes in women’s aspirations, educational attainment, and labour force participation.

This report looks at the most common, and the most segregated, occupations for women and men, and takes a closer look at women in management, the professions, and the skilled trades. It also looks at trends in common fields of study, and at the role occupation has in income levels.

Acknowledgements

This report was prepared by Statistics New Zealand, in consultation with the Ministry for Women. Thank you to the Ministry for Women for their guidance, contribution to the report, and review.

Key points

Findings from this report showed that in 2013:

Occupation

- For women and men to have the same occupational distribution, 44 percent of women would have had to change occupation.
- Women were most heavily represented in clerical occupations, where they made up over three-quarters of all clerical workers. They were also over-represented in sales and service, professional, and technician and associate professional occupations.
- Women were under-represented in all major categories of manual work, but particularly in the skilled trades where they made up just 5 percent of the workforce.
- Two-thirds of the occupational categories (at level 3), were dominated by one sex.
- Women accounted for 59 percent of the growth in managerial employment, 63 percent in professional employment, and 75 percent in technician and associate professional work since 1991.
- Women were almost as likely as men to work in managerial roles.
- However, women in managerial roles tended to be concentrated in female-dominated industries. In education, 69 percent of managers were women, as were 77 percent of those in health and community services.
- Women outnumbered male professionals, increasing their representation from 54 percent in 1991 to 58 percent.
- Of the four professional occupational groups, women were the majority in three of them: teaching professionals, life science and health professionals, and ‘other’ professionals.

- Women have been increasing their representation in the physical, mathematical, and engineering science professionals group, up from 9 percent in 1991 to 21 percent in 2013.

Qualifications

- Women were slightly more likely to have formal qualifications than men – 79.5 percent of women compared with 78.6 percent of men.
- Men and women also tended to be concentrated in different fields of study for post-school qualifications.
- Natural and physical sciences was the only field of study with no sex segregation at the highest level – this field includes the bulk of the sciences (eg biology, chemistry, earth science) and mathematics. Men and women were 51 percent and 49 percent of people with qualifications in this field, respectively.



2 About occupational gender segregation

This report analyses changes in occupational gender segregation in New Zealand. It adds to the literature in this area by using 2013 Census data and by tracking patterns over the 20 years to 2013.

Occupational gender segregation (occupational segregation) is the clustering of female and male workers in particular occupations. Female and male workers can similarly be clustered at the industry level (industrial segregation).

New Zealand's labour market has been (and remains) highly segregated by gender. Previous research using 2006 Census data identified that close to half of women and men work in occupations in which 70 percent or more of the workers are the same gender as them (NZCER, 2008).

Occupational segregation and the gender pay gap interests

Occupational and industry segregation are important contributors to the gender pay gap, both in New Zealand and overseas. Research by Dixon (2000) on New Zealand's gender pay gap estimated that differences in occupational and industrial distribution between men and women accounted for 20 to 40 percent of the total gap.

A comprehensive analysis of the Australian gender pay gap found that occupational segregation accounted for 18 percent of the Australian gap, with industry segregation accounting for another 10 percent (KPMG, 2009). United Kingdom (UK) analysis indicated that occupational segregation accounted for 13 percent of their gender pay gap (Walby and Olsen, 2002).

Female-dominated occupations tend to be lower paid than those dominated by males (Ministry for Women, 2015). Opportunities for career development and training may also be restricted in low-paid female-dominated occupations (Rix et al as cited in Walby and Olsen, 2002).

Reducing occupational segregation is therefore one way to reduce the gender pay gap, which in turn is seen to have positive effects for women's return to, and increased participation in, the labour market. This can contribute to economic growth. A Goldman Sachs report (2011) estimated that closing labour market participation rates between women and men could boost GDP by 10 percent. The report saw significant potential benefit in government addressing occupational segregation.

United States (US) research identified that women's increased involvement in higher-paying traditionally male-dominated occupations contributed to narrowing of the US gender pay gap during the 1980s and 1990s. Conversely, increased segregation (or a slower rate of desegregation) could contribute to an increasing gender pay gap (Blau, Brummund, and Liu, 2012).

Occupational segregation obstructs a well-functioning labour market

From an economic perspective, occupational segregation is an example of a labour market rigidity that works against 'allocative efficiency' (the optimal use of limited resources to meet needs). Reducing occupational segregation improves labour market flexibility (Walby and Olsen, 2002) and allocative efficiency (KPMG, 2009).

One outcome of segregation is that there may be an 'under-supply' of skills in occupations with higher demand, and an 'over-supply' of skills in occupations with relatively low demand. In particular, women's relatively low participation rates in STEM (science, technology, engineering, and maths) subjects and occupations is noted.

Demand for workers in many of these STEM occupations is expected to grow (MBIE, 2014).

Low rates of male participation in female-dominated occupations causes concern. In 2011, the Human Rights Commission drew attention to the low participation of male workers in early childhood education and nursing, as well as women's low participation in male-dominated occupations.

Occupational segregation causes are multiple and contested

Walby and Olsen (2002) describe the origins of occupational segregation as 'complex'. They include "historical discriminatory practices at times when these were legal, which have lingering effects because of deeply rooted practices, such as pay structures which reflect traditional rather than contemporary valuations of skills and performance, and notions of cultural appropriateness of particular kinds of work".

'Choice' is a key concept that is debated around occupational segregation. If such segregation is the result of unfettered choice in the labour market, then an argument for market failure is hard to make (Walby and Olsen, 2002).

In response, many commentators point to the role of historical and societal pressures in choosing occupations and careers. For instance, one New Zealand study by Byrne (2002) found that the notion of 'choice' is a fictional one, given constraining forces at the family, institutional, and structural levels.

Gender stereotypes are one constraint on choice

One key constraint on choice appears to be gendered stereotyping of career paths. A 2008 New Zealand Council for Educational Research (NZCER) report identified that gender stereotypes continued to have a major influence on the career decisions of young people. Parental attitudes (reflecting wider societal attitudes) played a role, with UK surveys indicating parents were considerably more in favour of girls becoming teachers rather than engineers, for example (Credit Suisse, 2014). Other UK research notes a robust body of evidence showing that children's interest in science is formed by age 14. The perceived masculinity of science was identified as one reason for the low popularity of a science career in general (Archer, 2013).

Lack of flexible work maybe another constraint

An OECD report (2012) found that occupational segregation differences existed, to a large extent, because of women's continued responsibilities for unpaid tasks, such as childcare and housework. Flexible and part-time working arrangements are very important to women's participation in the labour market. However, part-time work opportunities can be clustered in low-paid occupations/industries (Evans in Treasury, 2003). Longitudinal research in the UK found that significant numbers of women experienced 'downward mobility' (they took on a lower level occupation than their previous one) when returning to part-time work after childbirth (Blackwell as cited in Walby and Olsen, 2002). Byrne's 2002 study provides support that this is also the case in the New Zealand labour market.

Classifications used in this report

The analysis in this report uses the New Zealand Standard Classification of Occupations (NZSCO) instead of the more recent Australian and New Zealand Standard Classification of Occupations (ANZSCO). This was to enable us to use a longer time series. Customers should take care when comparing the data in this report with other sources, as differences may be due to differences in the classifications used.

We used two versions of NZSCO – NZSCO90 for data from 1991, and NZSCO99 for data from 2001 to 2013. Differences between these two versions are mostly minor, and at the most detailed level. Most differences do not affect the highest level of the classification.

Similar care should be taken when comparing the industry data in this report with other sources. We used the 1996 Australian and New Zealand Standard Industrial Classification (ANZSIC96) for all industry analysis in this report, to allow comparisons between 2001 and 2013 data.

3 Trends in occupational distribution

In this chapter we explore how women and men are distributed across the different occupational groups. We look at the degree to which women’s occupational distribution differs to that of men, and the most common occupations for men and women.

Occupational dissimilarity

One way to measure the extent of gendered occupational segregation is to use a dissimilarity index. This index shows the degree to which women’s occupational distribution differs from that of men. That is, it shows the proportion of women who would have to change occupations for women to have the same occupational distribution as men.

Figure 1 shows there has been a steady but slow decline in occupational dissimilarity since 1991, with the index falling from 52 percent in 1991 to 44 percent in 2013. This means that in 2013, 44 percent of women would have had to change occupation for there to be no gendered occupational segregation. Most of the decline in dissimilarity occurred between 1991 and 2001, with very little change in subsequent years.

Figure 1



Source: Statistics New Zealand

To some extent, the level of dissimilarity depends on how detailed the occupational breakdown is – the greater the number of occupational categories, the greater the dissimilarity will be. For this analysis we used level 3 of the occupational classification, which has 96 occupational categories. In 2013, using different levels of the classification, the dissimilarity index ranged from 32 percent at level 1 of the classification (nine categories), to 50 percent at level 5 (562 categories).

Even at level 5 there may be further job segregation that is not identifiable in the data. For example, within a particular occupational category, women may be under-represented in the more senior positions (vertical segregation), or tend to perform different roles from men (horizontal segregation).

Occupational distribution

Occupational dissimilarity between men and women largely reflects the following key differences in occupational distribution:

Women are much **more** likely than men to be employed in:

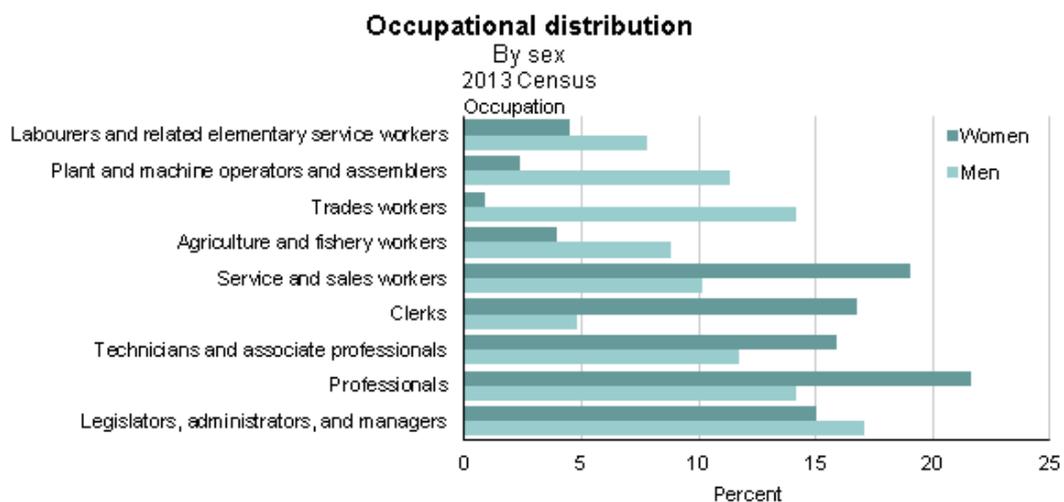
- ‘caring professions’ (eg nursing, teaching, and social work)
- clerical, administrative, and sales occupations
- lower-skilled service work (eg personal care and hospitality work).

Women are much **less** likely than men to be employed in:

- higher managerial positions in some areas (eg private sector)
- technical professions (eg architecture, engineering, and information technology)
- farming – both crop and livestock production
- protective services (eg the armed forces, police, and fire services)
- manual trades and technician occupations
- lower-skilled manual jobs (eg labouring and machine operating).

Some of these differences are evident when we compare the distribution of women and men at the highest level of the occupational classification (figure 2 below). Particularly marked is the over-representation of women among clerks and service and sales workers, and their under-representation in all categories of manual work – most markedly in the skilled category of trades workers.

Figure 2



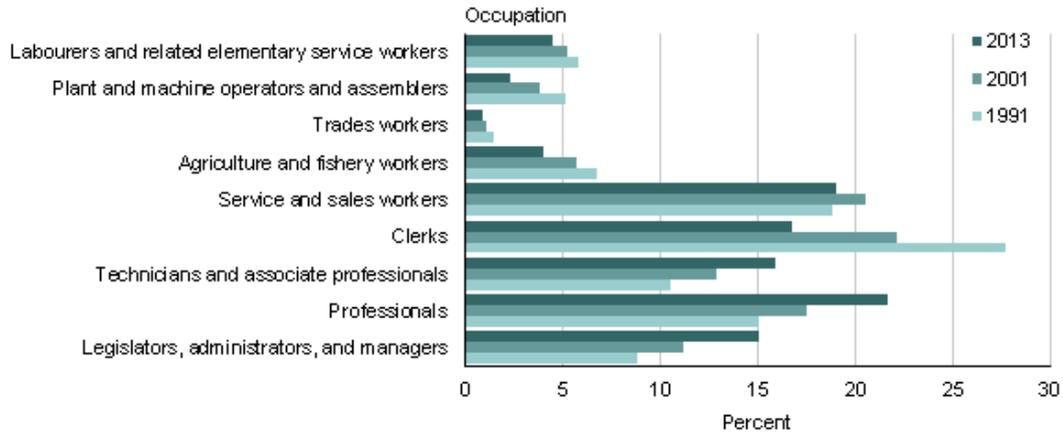
Source: Statistics New Zealand

Other differences are concealed within the high-level categories. For instance, women are more likely than men to work in professional occupations, but what we can't see at this level is that they tend to be concentrated in particular professions (eg nursing or teaching, rather than engineering). Similarly, women are almost as likely as men to work in managerial occupations, but this conceals the fact that women are considerably less likely to be in higher management positions in some areas. See chapter 4 for further discussion.

We see some broad shifts in the occupational distribution of women over the past two decades at the higher level (level 1). Figure 3 shows that increasing proportions of women were employed in managerial, professional, and technician and associate professional occupations. The proportion of women employed in these three categories rose from 34 percent in 1991 to 53 percent in 2013. Conversely, the proportions employed in clerical occupations and in manual occupations, both skilled and unskilled, declined.

Figure 3

Occupational distribution of women
1991, 2001, 2013 Censuses



Source: Statistics New Zealand

In part, these changes reflect broader shifts in the economy, which have seen movement away from the manual work of producing goods, to the non-manual work of providing services, and towards more highly skilled work in the professions and management. These changes have also affected men’s employment. Increasing proportions of men are employed in managerial and professional occupations, and declining proportions in all categories of manual work.

However, the majority of employment growth in the higher-skilled occupations has been among women. This reflects increasing labour force participation among women, and changing aspirations – as more obtain tertiary qualifications and pursue professional and managerial careers.

Between 1991 and 2013 women accounted for 59 percent of the growth in managerial employment, 63 percent of professional employment growth, and 75 percent of growth in technician and associate professional work. They also accounted for most of the growth in service and sales work (65 percent). Over this period the total number of women in employment increased 58 percent.

Figure 4

Change in numbers employed
By sex and occupation group
1991–2013



Source: Statistics New Zealand

Identifying the most common occupations for women and men

Moving to the most detailed level of the occupational classification (level 5), we identify which particular occupations are most common among women and men (table 1).

Table 1
Top 20 occupations of women and men, 2013

Women	Percent of all employed women	Men	Percent of all employed men
Sales assistant	5.9	General manager	3.9
General clerk	5.2	Sales assistant	3.6
Registered nurse	3.4	General labourer	3.0
Caregiver	3.1	Builder (including contractor)	2.4
Primary school teacher	2.8	Heavy truck or tanker driver	2.3
Cleaner	2.4	Administration manager	2.2
Early childhood teacher	2.4	Crop and livestock farmer, worker	1.9
Technical representative	2.3	Dairy farmer, dairy farm worker	1.8
Information clerk/receptionist	2.2	Computer applications engineer	1.8
Administration manager	2.1	Sales and/or marketing manager	1.6
General manager	1.9	Retail manager	1.6
Secretary	1.9	Carpenter and/or joiner	1.5
Office manager	1.9	Motor mechanic	1.3
Retail manager	1.8	Stock clerk	1.3
Accounts clerk	1.7	Technical representative	1.2
Accountant	1.5	Electrician	1.2
Social worker	1.5	Accountant	1.2
Secondary school teacher	1.4	Cleaner	1.2
Catering counter assistant	1.4	Chef	1.1
Administration officer	1.4	Chief executive/managing director	1.0
Source: Statistics New Zealand			

For women, sales, clerical, and administrative occupations feature heavily, along with historically female-dominated professions such as nursing, teaching, and social work, and lower-skilled service jobs such as caregiving and cleaning. Managerial occupations also feature, but mostly in administration and retailing, where women also have a strong presence below management level.

Seven of the top 20 female occupations also feature in the top 20 for men: general manager, administration manager, retail manager, accountant, technical representative, sales assistant, and cleaner. However, the male list features a large number of manual jobs – skilled trades, farming, labouring, and driving. Men are also more likely than women to be in senior management occupations (general manager and chief executive/managing director).

Notably, women are more concentrated than men in a narrow range of occupations. The 20 most common occupations for each sex accounted for 48 percent of female workers and 37 percent of male workers.

4 Trends in occupational segregation

In this chapter we explore how well women are represented within particular types of occupation. This highlights occupational segregation, by showing which occupations are heavily dominated by women and which have a very low representation.

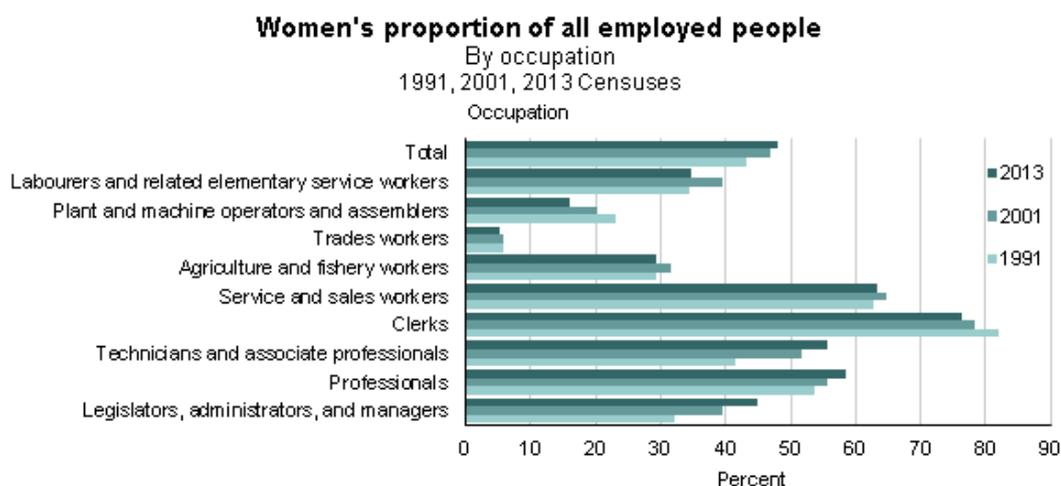
High-level trends

Figure 5 shows, looking at the highest level of the occupation classification (level 1), women were most represented in clerical occupations, where they made up over three-quarters of all clerical workers in 2013. They were also over-represented in service and sales, professional, and technician and associate professional occupations.

Conversely, women were under-represented in all the major categories of manual work, but particularly trades workers, where they made up just 5 percent of the workforce in 2013.

Between 1991 and 2013, women's representation increased in all the skilled white-collar categories of managerial, professional, and technician and associate professional occupations. In all other occupational categories their representation either fell or fluctuated within a fairly narrow range. Significantly, over the two decades, women's representation did not increase in any of the manual categories, indicating that such work remains a largely male preserve.

Figure 5



Source: Statistics New Zealand

Identifying the most segregated occupations

At a more detailed level of the occupation classification, we can identify which particular types of occupation are female-dominated and which are male-dominated. At level 3 there are 96 categories of which, in 2013, 18 were at least 70 percent female and 46 were at least 70 percent male. This means that in two-thirds of the occupational categories, one sex accounted for at least 7 of every 10 workers.

Table 2 shows the most segregated occupations at level 3.

Table 2
Top 20 female-dominated and male-dominated occupations, 2013

	1991	2001	2013
	Percent female		
Female-dominated occupations			
Secretaries and keyboard operating clerks	96.2	92.8	93.6
Nursing and midwifery professionals	94.2	93.4	92.4
Primary and early childhood teaching professionals	83.4	87.5	90.4
Client information clerks	94.9	88.6	90.1
Other personal services workers	88.1	89.7	89.3
Personal care workers	87.7	89.8	86.9
Special education teaching professionals	86.6	83.0	84.4
Library, mail and related clerks	79.3	80.5	81.6
Health associate professionals	79.0	80.8	80.6
Numerical clerks	82.7	80.0	80.5
Social work associate professionals	71.6	82.2	79.7
Archivists, librarians and related information professionals	83.9	78.2	77.4
Cashiers, tellers and related clerks	78.0	77.7	74.9
Textile products machine operators	80.9	76.9	72.4
Administrative associate professionals	54.2	66.9	72.3
Other teaching professionals	57.7	63.3	71.4
Life science technicians and related workers	65.5	70.3	65.6
Social and related science professionals	55.1	60.8	63.6
Housekeeping and restaurant services workers	71.7	66.1	62.4
Salespersons and demonstrators	63.0	61.0	60.8
Male-dominated occupations			
Building frame and related trades workers	0.8	1.2	1.1
Building and related workers	1.2	2.1	1.2
Electricians	1.2	1.4	1.3
Metal moulders, sheet-metal and related workers	3.2	1.5	1.6
Machinery mechanics and fitters	1.0	1.3	1.9
Metal-processing plant operators	3.9	6.1	3.4
Mining and mineral processing plant operators	1.4	5.6	3.6
Forestry and related workers	3.8	5.4	4.0
Building finishers and related trades workers	3.1	4.0	4.6
Electrical and electronic instrument mechanics and fitters	5.6	3.9	4.5
Agricultural, earthmoving and other materials-handling equipment operators	2.0	3.7	5.1
Blacksmiths, toolmakers and related workers	2.3	4.2	5.2
Motor vehicle drivers	7.4	7.3	7.5
Ship and aircraft controllers and technicians	5.3	6.3	7.6
Rubber and plastics products machine operators	14.4	10.1	7.7
Cabinetmakers and related workers	8.1	10.6	9.6
Wood-processing and papermaking plant operators	5.2	8.6	9.6
Metal and mineral products processing machine operators	9.4	14.2	10.7
Architects, engineers and related professionals	4.9	9.2	14.4
Labourers	15.0	16.2	14.9
Note: excludes occupations with a total count of less than 2,000 in 2013.			
Source: Statistics New Zealand			

In 2013, the female-dominated occupations were mainly clerical and personal service occupations, and the historically female nursing, primary and early childhood teaching, and social work professions. Between 1991 and 2013 there was little lessening of the female dominance in these occupations. In fact, some professions (such as primary and early childhood teaching, social work, and administrative associate professional occupations) became more heavily dominated by women.

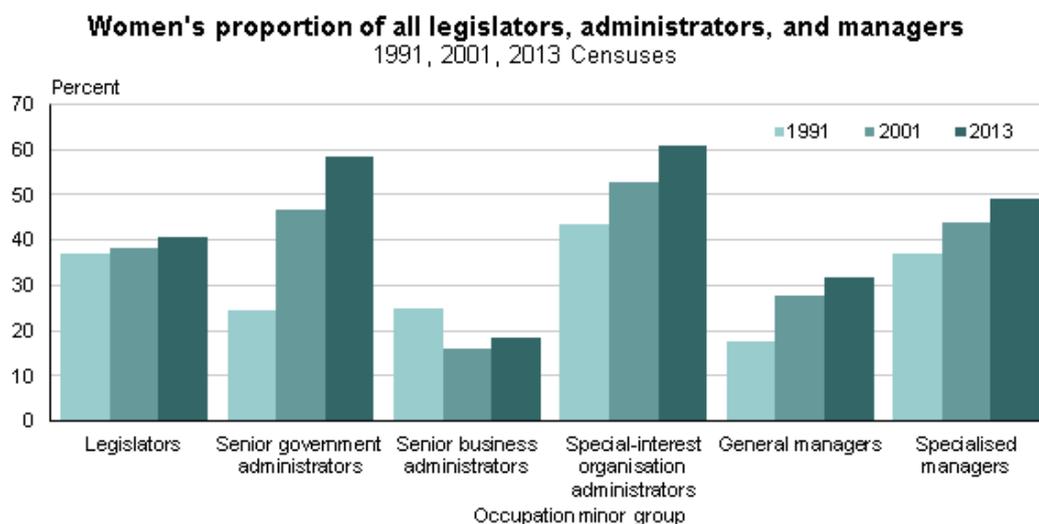
The most heavily male-dominated categories in 2013 were almost all manual occupations, including a number of skilled trades in which women made up as little as 1 percent of all workers. Again, male dominance in most of these occupations hasn't lessened, although women made some small gains in some of them – including the only professional category on this list (architects, engineers, and related professionals).

More women in management

Women have been increasing their participation in managerial occupations since 1991, and in 2013 were almost as likely as men to work in legislator, administrator, or manager roles (ie 'managers' or 'managerial' roles). Within this managerial group women steadily increased their representation from 32 percent in 1991, to 40 percent in 2001, and to 45 percent in 2013.

Women showed increasing representation in almost all the level 3 subgroups. Senior business administrators, which includes the most senior personnel of a private organisation, was the only area in which female participation fell. There were some small changes in the classification of this group between 1991 and 2001, which may have contributed to the decrease. However, it is clear that women continue to be more poorly represented among senior business administrators than in the other five managerial groups, accounting for just 19 percent of this group in 2013.

Figure 6



Source: Statistics New Zealand

Women are much more strongly represented among senior government administrators (which includes the most senior personnel in central and local government, and a small number of diplomatic representatives). They made up well over half of this group in 2013. This group experienced the largest increase in female representation of all the level 3 subgroups, up from 25 percent in 1991 to 58 percent in 2013.

Special interest organisation administrators (eg senior personnel of trade unions, sports, and humanitarian organisations) have the highest level of female participation (61 percent). This reflects that many special interest organisations fall under the historically

female-dominated education industry, as well as cultural and recreation services, and personal and other services, which both have almost equal gender representation.

Overall, women tend to have high representation in senior management in special interest organisations and in government, and low representation in private organisations.

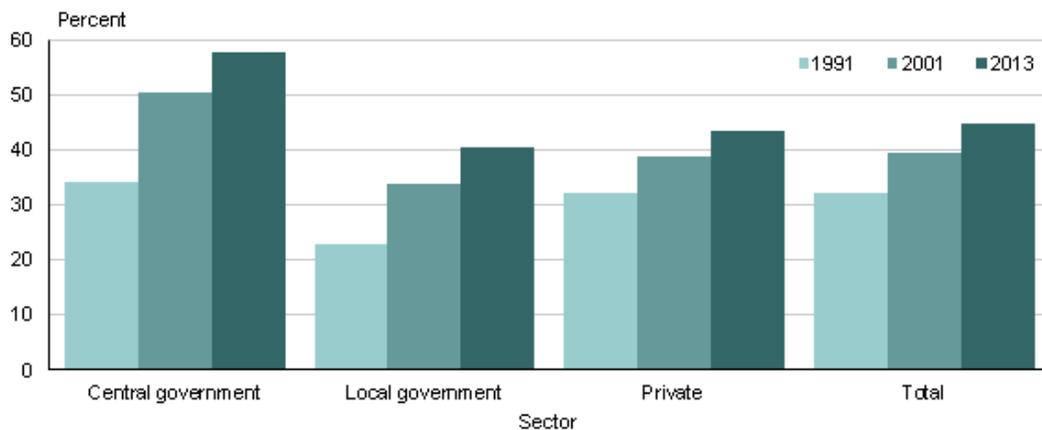
Information on managers by their organisation’s sector of ownership (figure 7) shows that women are well represented in central government, making up 58 percent of all legislators, administrators, or managers in that sector. However, this high representation doesn’t extend to the highest level of management. Currently, of the 29 public service chief executives, 12 are women (41 percent) (State Services Commission website, 2015).

Women were not as well represented in local government and the private sector in 2013, making up 41 percent and 44 percent of the managerial group in each sector, respectively.

Figure 7

Women's proportion of all legislators, administrators, and managers

By sector
1991, 2001, 2013 Censuses



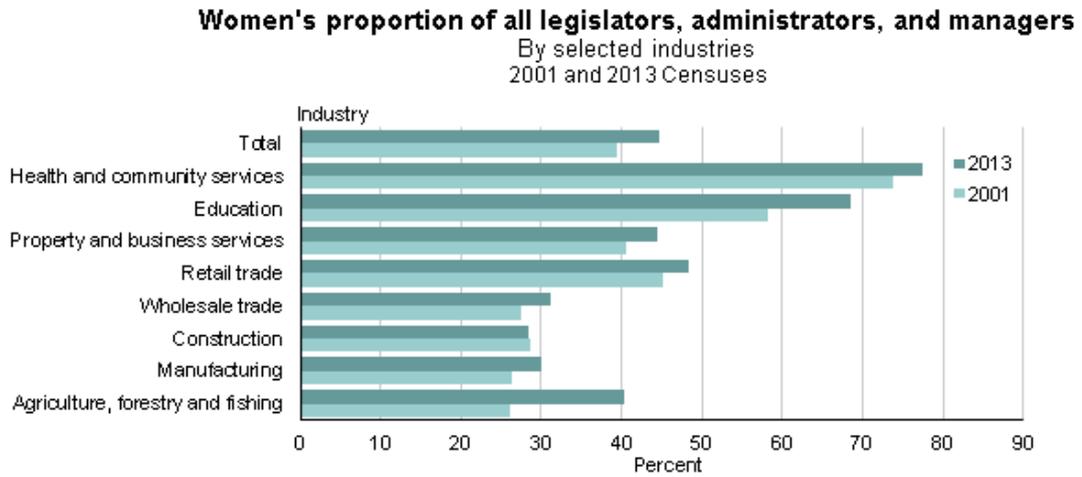
Source: Statistics New Zealand

Although women were almost equally represented in managerial roles in 2013, breakdowns by industry showed that they tended to be concentrated in female-dominated industries. As figure 8 shows, 69 percent of managers in education were women (11,050 women), and 77 percent of managers in health and community services (10,440 women). As with occupations generally, female managers are also concentrated in a narrower range of industries than male managers. Women accounted for more than 60 percent of workers in only two industries, while men accounted for over 60 percent in seven of the 17 major industry groups.

The industry groups where men significantly outnumbered women were: mining; electricity, gas, water and waste services; construction; manufacturing; wholesale trade; transport and storage; and communication services. The size of the managerial groups in some of these industries is quite small. Mining (780 people), electricity, gas, water and waste services (1860 people), and communication services (3690 people) have the three smallest managerial groups of the 17 industries.

Since 2001, women have made gains in almost all the 17 industry groups – although many of these gains are quite small. One historically male area where women have greatly increased their representation is in agriculture, forestry and fishing, where the proportion of women in managerial roles increased from 26 percent in 2001, to 40 percent in 2013. Women also significantly increased their representation in finance and insurance, and government administration and defence over the 12 years.

Figure 8



Source: Statistics New Zealand

Women also increased their representation in female-dominated industries – from 58 percent to 69 percent in education, and from 74 percent to 77 percent in health and community services. However, even in these industries women were slightly under-represented in management compared with their overall representation.

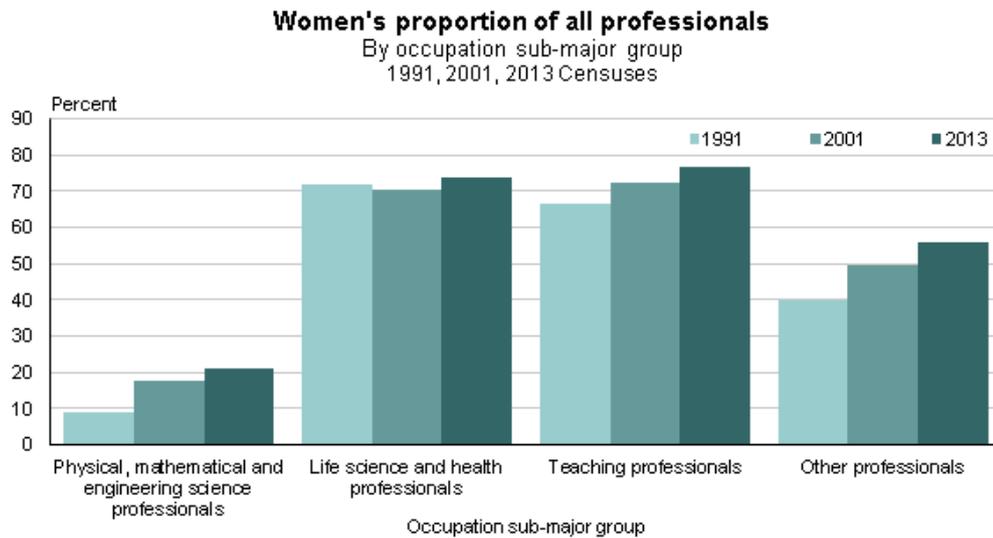
Within these two female-dominated industries, women dominated in all types of management in 2001, except for senior business administrators. In 2013, women had made gains in this category in both industries, making up 45 percent of senior business administrators in education, and 53 percent in health and community services. Women had increased their representation in all other managerial roles in these industries except for two. The proportion of female general managers in education remained at 57 percent, while women in senior government administrator roles in health and community services fell from 91 percent to 77 percent. Although the latter is a small category, it grew substantially between 2001 and 2013 (from about 30 people to almost 200), with men showing a greater increase than women.

Number of women in the professions grows

Women outnumber men in professional occupations. Women’s representation increased from 54 percent in 1991 to 58 percent in 2013.

Of the four professional occupational groups, women were the majority in three: teaching professionals, life science and health professionals, and ‘other’ professionals (eg accountants, lawyers, and social scientists). Women also increased their representation in all professional groups between 1991 and 2013.

Figure 9



Source: Statistics New Zealand

Teaching has historically had a strong female presence. In 1991, the only teaching group where women made up less than half was tertiary teaching – where 45 percent were women.

By 2013, women outnumbered men in all teaching groups, with some of these groups being highly segregated. Women made up 90 percent of primary and early childhood teaching professionals, and 84 percent of special education teaching professionals. The tertiary teaching profession remained the least female dominated, although women made up 54 percent of this group. The tertiary teaching group has grown in size since 1991, with increased female representation coming from the more rapid uptake of women than men.

Women made up 74 percent of life science and health professionals in 2013. However this masks some sex segregation at the lower levels. In 1991, women were strongly under-represented among both life science professionals (22 percent) and health professionals (except nursing) (32 percent). The last remaining subgroup, nursing and midwifery professionals, was heavily female dominated (at 94 percent), a major reason for the life science and health professionals group as a whole being female dominated.

By 2013, the nursing and midwifery professionals group was still very female dominated, but women's representation had also increased to almost half in the other two subgroups (life science professionals, and health professionals (except nursing)). However, on looking more deeply we can see there is still considerable segregation in the health professional category. For example, while GPs are almost equally likely to be male or female, 87 percent of surgeons are male, and 93 percent of dietitian and public health nutritionists are women.

Table 3
Health professionals (except nursing) occupations
 By order of female representation
 2013

	Percent female
Dietitian and public health nutritionist	92.7
Hospital pharmacist	70.4
Retail pharmacist	60.7
Gynaecologist and obstetrician	56.3
Optometrist	54.8
Veterinarian	52.3
Resident medical officer	50.9
General practitioner	46.7
Physician	41.1
Radiologist, radiation oncologist	39.5
Dentist and dental surgeon	37.3
Anaesthetist	32.7
Surgeon	12.8
Health professionals (except nursing)	48.7
Source: Statistics New Zealand	

'Other' professionals is a diverse group that includes occupations such as accountants, human resources professionals, lawyers, judges, archivists, librarians, economists, social scientists, psychologists, and religious professionals.

In 1991 'other' professionals had a 60/40 male/female split. By 2013 this had almost reversed, with this group comprising 44 percent men and 56 percent women. The biggest change was among legal professionals, with female participation increasing from 25 percent in 1991 to 49 percent in 2013.

Employment growth in female-dominated occupations such as human resources, public relations, and psychologists also contributed to the overall increase in female representation in the 'other professional' category.

The only group where men have consistently higher participation than women is in the physical, mathematical, and engineering science professionals group. In 1991, men made up 91 percent of this group. Women have been making gains in this male dominated area, increasing their representation from 9 percent in 1991 to 21 percent in 2013.

Within this group, women increased their participation as physicists, chemists, and related professionals, doubling their representation to 30 percent in 2013. (Note: some of this change may be due to classification changes.)

Women also had increased participation as mathematicians, statisticians, and related professionals (men and women are now almost equally represented). To a smaller

degree, as architects, engineers, and related professionals, women increased their representation from 5 percent in 1991 to 14 percent in 2013. Computing professionals showed little change over this period. In 2013, only 25 percent of computing professionals were women.

Women in skilled trades

Trades workers are overwhelmingly male, with women making up only 5 percent of all trades workers in 2013.

There hasn't been a lot of movement within the trades since 1991. Trades has four main subgroups: building trades, metal and machinery trades, precision trades, and other craft and related trades. While the proportion of women in each subgroup has increased slightly since 1991, there was a small drop in the proportion of women in the trades overall. This is because building trades – where women are very poorly represented – now makes up a bigger portion of the trades sector.

Figure 10



Source: Statistics New Zealand

Although women haven't changed their representation in the trades much overall, some occupation groups (at level 3) have had significant increases. The two largest increases in female representation have occurred in the subgroups that already had a larger proportion of women – other craft and related trades workers, and precision trades workers.

For other craft and related trades workers, the biggest change was for food and related products processing trades workers – with female representation increasing from 13 percent in 1991 to 24 percent in 2013. This group includes occupations such as butchers, meat graders, and bakers.

The other craft and related trades workers subgroup also contains the only two female-dominated trade occupations (at level 5): tailor/dressmaker, and textile products pattern maker. Both have become slightly less segregated since 1991, with small falls to 78 percent and 64 percent female, respectively, in 2013.

Hairdressing is often seen as a female-dominated trade. In our occupation classification, hairdressing is grouped under 'service and sales workers', rather than 'trades workers'.

Hairdressing is certainly female dominated – women made up 87 percent of all hairdressers in 2013.

Within the precision trades workers group, precision instrument makers and related workers had the largest (and only) increase, up from 18 percent female in 1991 to 27 percent in 2013. Occupations within this group include jeweller and jewellery repairers (up from 27 percent to 44 percent female), and those making and repairing optical instruments (up from 14 percent female to 30 percent). However, if you find yourself in need of a locksmith, chances are they will be male – 95 percent of locksmiths were male in 2013.

Women in the construction industry

The most common industry for trade workers was construction, accounting for 44 percent of trade workers' employment in 2013. Of construction trade workers, 90 percent were building trades workers, the trade where women are least represented, at 2 percent of all building trades workers.

Women were most well represented in signwriting (16 percent) or painting/decorating/paper hanging roles (8 percent). Women made up only 1 to 3 percent of workers in the remaining building trade occupations, which includes occupations such as carpenters, builders, plasterers, plumbers, and electricians.

Evidence suggests that women employed in the construction industry largely work in administrative support roles rather than in core areas of the industry (HRC, 2012). Information from the 2013 Census supports this, finding that 37 percent of women in the construction industry were employed in clerical roles, with only 5 percent employed as trades workers. By comparison, only 1 percent of men in the industry worked in clerical roles, while just under half (49 percent) were trades workers.

5 Education and occupational segregation

In this chapter we look at how well women are represented in different fields of study. This will show any shifts in what men and women are studying, and whether this suggests more movement of women into male-dominated occupations, and men moving into female-dominated occupations in future.

High-level trends

Since 1991, the proportion of adults (aged 15 years and over) with formal qualifications has increased significantly, with a substantial increase between 1991 and 2001 (from 46 percent to 72 percent), followed by a smaller increase between 2001 and 2013 (to 79 percent).

Both sexes showed an increase, but women have shown the bigger increase in the proportion with formal qualifications, up from 42 percent in 1991 to 80 percent in 2013. The figures for men increased from 50 percent in 1991 to 79 percent in 2013.

Common fields of study for women and men

As with occupation, there is some gender segregation in fields of study for post-school qualifications. While some subjects, like management and commerce, and society and culture, appear in the top five fields of study for both men and women, others tend to mirror what we see in occupational segregation.

In 2013, the most common field of study for women with post-school qualifications was management and commerce, at 21 percent. Architecture and building was the least popular, at 1 percent.

The most common field of study for men with post-school qualifications was engineering and related technologies, at 32 percent. Education, which leads to female-dominated occupations, was the least popular, at 3 percent.

Table 4
Top five fields of study for women and men with post-school qualifications⁽¹⁾
2013

Women	Percent	Men	Percent
Management and commerce	21.0	Engineering and related technologies	31.8
Health	18.8	Management and commerce	15.2
Society and culture	18.7	Architecture and building	12.5
Education	14.5	Society and culture	10.6
Creative arts	7.0	Natural and physical sciences	5.4

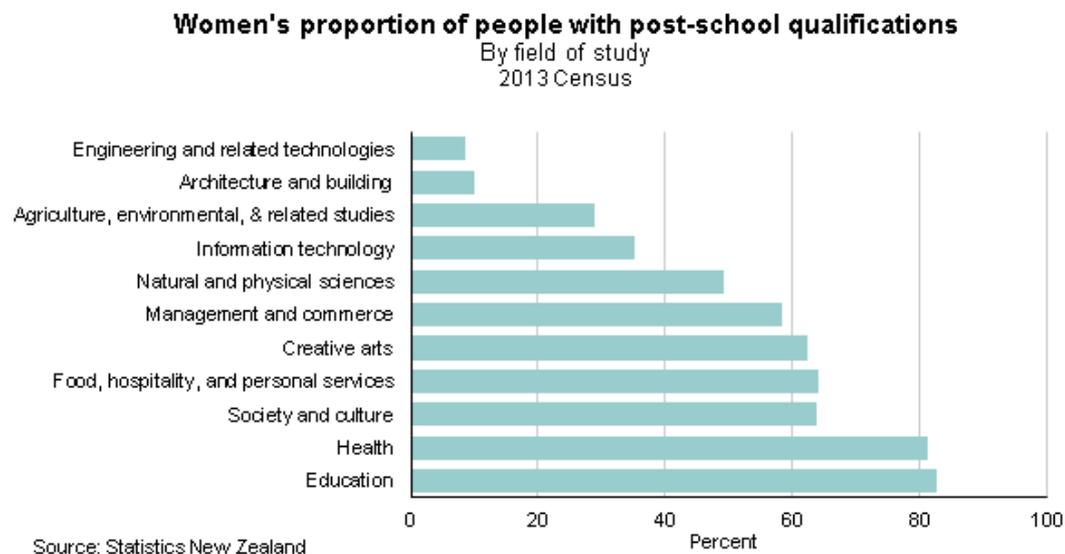
1. Of people who gave their field of study. This excludes the 'field not given' category.
Source: Statistics New Zealand

The top five fields didn't change much between 2001 and 2013, with the only change in field being for women, where creative arts replaced natural and physical sciences. Within the top five fields, management and commerce replaced health as the most common field for a post-school qualification for women in 2013.

Of the 11 fields of study, only one had a reasonably equal male/female split in 2013 – natural and physical sciences. This field includes biological and earth sciences, and mathematical sciences. Mathematical sciences is one of the occupational areas where men and women participate almost equally.

Six of the 11 fields were female dominated, with health and education studies being very segregated – women made up over 80 percent of those with qualifications in these fields. The remaining four fields (information technology, engineering and related technologies, architecture and building, and agriculture, environmental, and related studies) were all male dominated. In particular, engineering and related technologies, and architecture and building, were heavily male dominated, with about 90 percent of people with qualifications in these fields being men. This fits with the patterns of occupational segregation outlined in chapter 4.

Figure 11



The level of segregation within the different fields of study didn't change greatly between 2001 and 2013, except for two fields: information technology, and agriculture, environmental, and related studies. Information technology, which had a reasonably even representation of men and women in 2001, became male dominated, with women making up just 35 percent of people with qualifications in this field in 2013. Female representation among those with qualifications in agriculture, environmental, and related studies increased from 23 percent to 29 percent between 2001 and 2013. As we saw in chapter 4, this is a historically male-dominated occupation area in which women greatly increased their representation in managerial roles – even though there were only small changes in the agriculture and fishery workers group as a whole.

Paths to female and male dominated occupations

Both health and education are highly female dominated.

More women than men with health qualifications

Women made up 74 percent of life science and health professionals in 2013 (up from 71 percent in 2001). However, as seen in chapter 4, this masks some of the sex segregation at the lower levels of this classification. A similar pattern is seen in field of study of their qualification. While women made up 81 percent of people with qualifications in the health field in 2013, women were less represented in areas such as medical studies and optical

science, at 50 and 54 percent, respectively. No health related field of study (at level 2) is male dominated (although some health-related occupations are).

Table 5
Women as a proportion of all people with health as a field of study
2013

	Percent female
Nursing	94.1
Radiography	85.8
Rehabilitation therapies	83.4
Health not further defined	80.1
Complementary therapies	80.0
Veterinary studies	77.8
Dental studies	75.4
Pharmacy	72.5
Other health	70.1
Public health	64.4
Optical science	54.3
Medical studies	49.6
Total Health	81.1
Source: Statistics New Zealand	

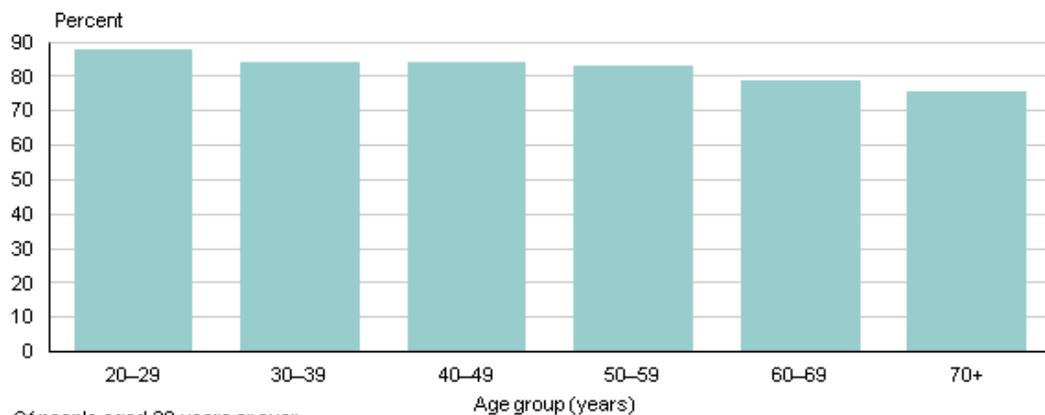
The dominance of women within the health field is even more striking when looking at younger people (aged 20–29 years). In each of the 12 health fields in table 5, at least 61 percent of all people aged 20–29 years with qualifications in those fields were women. This ranges from 61 percent for medical studies to the most female-dominated health field for young people, 92 percent for veterinary studies. The 20–29-year age group was the only 10-year age group where nursing was not the most female dominated field. Men made up 12 percent of those aged 20–29 years with qualifications in nursing in 2013, compared with just 3 percent of men aged 60–69 years.

More women than men with education qualifications

The education field tells a similar story. Women made up 83 percent of people qualified in this field in 2013 (up from 81 percent in 2001). Looking at the figures by age shows that women's representation increased in younger age groups. Women made up 88 percent of people aged 20–29 years with qualifications in education in 2013, compared with 79 percent of women aged 60–69 years.

Figure 12

Women's proportion of people⁽¹⁾ with education as field of study
By age
2013 Census



1. Of people aged 20 years or over.

Source: Statistics New Zealand

This increasing proportion of women in education aligns with what we see in women's participation in the workforce. As seen in chapter 4, women made up 77 percent of teaching professionals in 2013 (up from 72 percent in 2001). Teaching has become increasingly female dominated. The choices men and women are making about the fields they want to study suggests this is unlikely to change in the near future. In 2013, education was the least common field of study for men with post-school qualifications.

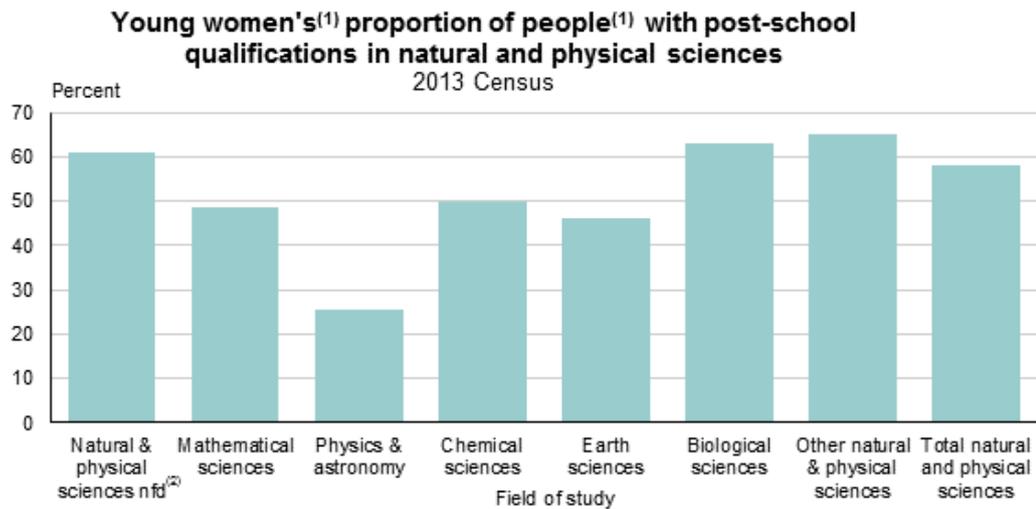
Female representation increasing within STEM

Science, technology, engineering, and mathematics (known collectively as STEM), and the trades are widely thought of as male-dominated areas. This is starting to change, as female representation increases in many of these areas.

In 2013, natural and physical sciences was the only field of study that had no sex segregation – this field includes most sciences (eg biology, chemistry, earth science) and mathematics. The even representation of men (51 percent) and women (49 percent) qualified in these fields, reflects a small increase in women's representation. In 2001, 45 percent of people with qualifications in this field were women. This is flowing into the workforce, with women making steady increases in the physical, mathematical, and engineering science professionals occupation group as a whole, up from 9 percent in 1991 to 21 percent in 2013.

Looking at field of study by age, we see that younger women had higher representation in natural and physical sciences than older age groups. At a detailed level there were differences between women and men, as seen in figure 13. Some subjects, such as physics and astronomy, were still very male dominated (only 25 percent of people aged 20–29 years with qualifications in this field of study were women). However, three of the seven subjects had close to equal representation of men and women. For the remaining three, women dominated – representing around 60 to 65 percent. This could indicate that more women will move into science occupations in the near future.

Figure 13



1. Aged 20–29 years.
2. Not further defined.

Source: Statistics New Zealand

While women had relatively equal representation in science and mathematics qualifications, women were less represented in information technology, engineering and related technologies, and architecture and building in 2013.

Information technology had almost equal representation of men and women in 2001, but this has shifted. In 2013, women made up only 35 percent of those with post-school qualifications in IT. Despite this decline, there hasn't been a lot of movement in female representation in the computing professionals occupation group, although women made up only 25 percent of people working in these occupations in 2013.

Engineering and related technologies, and architecture and building, are also heavily male-dominated fields of study. These fields include subjects that can lead people into engineering, or working in trades, such as carpentry and electrical mechanics. Women in the younger age groups in 2013 were more highly represented in both of these fields. Thirteen percent of 20–29 year olds with qualifications in engineering were women, compared with 4 percent of 60–69 year olds. Similarly, 15 percent of 20–29 year olds with qualifications in architecture and building were women, compared with 4 percent of 60–69 year olds.

This small upward trend aligns with increasing female representation in some related occupations. In 2013, women were more likely to work as an architect, engineer, or related professional (14 percent in 2013, up from 5 percent in 1991). However, in 2013 this increase hadn't flowed into the trades, with women being slightly less likely to work in the trades in 2013 (5 percent in 2013, down from 6 percent in 1991).



6 Occupational segregation and income

In this chapter we look at the effect occupational segregation could be having on pay inequalities between men and women. We look at whether there are differences in income levels in male and female dominated occupations, whether women are more likely to work in low income occupations, and at how pay compares for men and women in female dominated occupations.

Customers should keep a couple of things in mind when using this income data from census:

- Annual income isn't the income an individual earns from their occupation, but is the annual income a person in that occupation earns. This is because census income information includes income from all sources (eg investments), and is collected for the 12 months before the census. It is affected by people taking a break from work or changing jobs during that time.
- We have restricted the analysis in this chapter to adults working full time (30 hours or more a week). However, it could be that women and men show differences in the hours they work over the 30 hours, which would affect income.
- The following is not appropriate to use as a measure of the gender pay gap.

Median incomes for male dominated and female dominated occupations

When we look at the median income for people working full time (30 hours or more a week) in the top 20 male-dominated and female-dominated occupations, on average, the median income in male-dominated occupations was \$3,600 higher than in female-dominated occupations in 2013.

People working in the most female-dominated occupations (secretaries and keyboard operating clerks) actually earned more than those in the most male-dominated occupations (building frame and related trades workers), \$47,900 and \$45,700, respectively.

However, the higher average for male occupations could be partly due to the larger range of salaries in those occupations. The median income of those in the top 20 male-dominated occupations ranged from \$35,200 (labourers) to \$90,200 (ship and aircraft controllers and technicians). For the top 20 female-dominated occupations the range was from \$27,400 (housekeeping and restaurant services workers) to \$68,900 (other teaching professionals). However, this is income from all sources. Another factor could be differences in investment income between men and women, or it might be that people working in lower income occupations may be less likely to have income from other sources.

Table 6
Median incomes in top 20 female-dominated and male-dominated occupations
 2013

	Percent female	Median income all people employed full-time
Female-dominated occupations		
Secretaries and keyboard operating clerks	93.6	47,900
Nursing and midwifery professionals	92.4	60,200
Primary and early childhood teaching professionals	90.4	53,800
Client information clerks	90.1	36,500
Other personal services workers	89.3	30,800
Personal care workers	86.9	30,400
Special education teaching professionals	84.4	62,100
Library, mail and related clerks	81.6	42,400
Health associate professionals	80.6	49,000
Numerical clerks	80.5	44,700
Social work associate professionals	79.7	42,100
Archivists, librarians and related information professionals	77.4	52,000
Cashiers, tellers, and related clerks	74.9	39,900
Textile products machine operators	72.4	31,200
Administrative associate professionals	72.3	51,500
Other teaching professionals	71.4	68,900
Life science technicians and related workers	65.6	45,300
Social and related science professionals	63.6	67,500
Housekeeping and restaurant services workers	62.4	27,400
Salespersons and demonstrators	60.8	33,400
Average of the median incomes		45,800
Male-dominated occupations		
Building frame and related trades workers	1.1	45,700
Building and related workers	1.2	43,700
Electricians	1.3	53,100
Metal moulders, sheet-metal and related workers	1.6	46,300
Machinery mechanics and fitters	1.9	47,500
Metal-processing plant operators	3.4	44,400
Mining and mineral processing plant operators	3.6	65,000
Forestry and related workers	4.0	43,700
Electrical and electronic instrument mechanics and fitters	4.5	49,900
Building finishers and related trades workers	4.6	42,400
Agricultural, earthmoving and other materials-handling equipment operators	5.1	44,300
Blacksmiths, toolmakers and related workers	5.2	55,400
Motor vehicle drivers	7.5	44,800
Ship and aircraft controllers and technicians	7.6	90,200
Rubber and plastics products machine operators	7.7	38,800
Wood-processing and papermaking plant operators	9.6	41,300
Cabinetmakers and related workers	9.6	41,100
Metal and mineral products processing machine operators	10.7	43,200
Architects, engineers, and related professionals	14.4	72,200
Labourers	14.9	35,200
Average of the median incomes		49,400
Note: excludes occupations with a total count of less than 2,000 in 2013.		
Note: median income is rounded to the nearest hundred, and is for full-time workers only.		
Note: percent female is for all workers, both full-time and part-time.		
Source: Statistics New Zealand		

Low income occupations

Are women more likely to work in low income occupations? This depends on the number of occupations examined, and the level of the classification – sex variations often exist within occupational groups. Looking at the 20 lowest paying level 3 occupations (by median income), the split between men and women is reasonably even, with women making up 56 percent of those employed in the 20 occupations. However, in the five lowest paying occupations, women make up 71 percent of those employed in 2013.

Table 7
Median incomes in five lowest paying occupations
2013

	Percent female	Female median income	Male median income	Median income
Lowest paying occupations				
Housekeeping and restaurant services workers	62.4	25500	30400	27400
Building caretakers and cleaners	60.1	26600	33400	30100
Personal care workers	86.9	29400	36700	30400
Other personal services workers	89.3	29900	39000	30800
Textile products machine operators	72.4	29400	37200	31200
Note: excludes occupations with a total count of less than 2,000 in 2013.				
Note: median income is rounded to the nearest hundred, and is for full-time workers only.				
Note: percent female is for all workers, both full-time and part-time.				
Source: Statistics New Zealand				

More women than men work in all of the five lowest paying occupations, and all of those occupations are female dominated – women made up more than 60 percent of people in these five occupations. On average, women also earn less than their male counterparts in these occupations. The median income was restricted to full-time workers only (30 or more hours a week); but men may still be working longer hours than women, which could affect median income. Another factor could be that as income figures are for the year prior to the census, the medians for women may be affected by them being more likely than men to have had time out of the workforce, or on reduced hours, during the year, for family reasons.

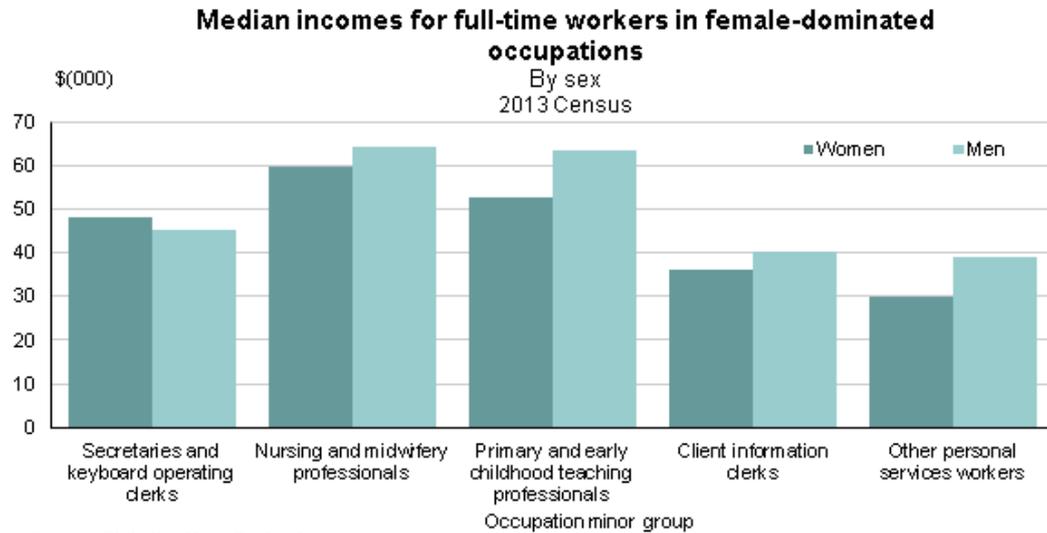
Men generally earn more than women in female-dominated occupations

Men had a higher annual median income than women in almost all of the 96 level 3 occupations, whether or not the occupation was male or female dominated. If we look at female median income as a percentage of male median income, and, where female median income is 95–105 percent of that for males, treat occupations as equal, only three occupations had equal median incomes. Women earned a higher median income than men in one occupation – secretaries and keyboard operating clerks (the most female-dominated occupation at level 3), where the female median income was \$3,100 higher than males. For the rest of the occupations, men earned a higher median income than women.

After secretaries and keyboard operating clerks, nursing and midwifery professionals, and primary and early childhood teaching professionals are the most female-dominated occupations. For nursing and midwifery professionals, men had a median income of \$64,200 and women a median income of \$59,800. This means women's median income is 93 percent of men's.

The difference is even greater for those in primary and early childhood teaching, with women’s median income at 84 percent of the male median (\$52,800 for women and \$63,200 for men). This shows that even in female-dominated occupations, men have higher incomes. Vertical segregation may be part of the reason – that is, more men may be in senior positions in these occupational groups.

Figure 14



Excluding occupational groups that are too small to analyse, the three occupation groups (at level 3) with the largest differences in median incomes for men and women are: senior government administrators, health professionals (except nursing), and legal professionals. In these three groups, women earn 56 to 61 percent of the median income of their male counterparts. For example, for health professionals (except nursing), the median income for women is \$89,800, while for men it is \$150,000, a gap of \$60,200. However, gender segregation occurs within this group and, as table 8 shows, male-dominated occupations, such as surgeons, have much higher median incomes than female-dominated occupations such as dietitians and public health nutritionists.

Table 8
Median incomes of health professional (except nursing) occupations
 2013

	Percent female	Median income for all people working full-time (\$)
Dietitian and public health nutritionist	92.7	58,600
Hospital pharmacist	70.4	72,000
Retail pharmacist	60.7	76,100
Gynaecologist and obstetrician	56.3	150,000+
Optometrist	54.8	88,700
Veterinarian	52.3	90,100
Resident medical officer	50.9	99,900
General practitioner	46.7	149,800
Physician	41.1	150,000+
Radiologist, radiation oncologist	39.5	150,000+
Dentist and dental surgeon	37.3	131,600
Anaesthetist	32.7	150,000+
Surgeon	12.8	150,000+
Health professionals (except nursing)	48.7	120,700

Note: as the highest total personal income band is 150,001+, when a significant number of people sit in this band, we are unable to calculate a specific median income. All we can say is the median income is \$150,000 or higher.

Note: median income is rounded to the nearest hundred, and is for full-time workers only.

Note: percent female is for all workers, both full-time and part-time.

Source: Statistics New Zealand



7 Conclusion

Occupational segregation between men and women is slowly changing, reflecting increasing labour force participation among women, and changing aspirations as more obtain tertiary qualifications and pursue professional and managerial careers. However, there are still considerable differences in the types of work in which women and men are concentrated.

In 2013, 44 percent of women would have had to change occupation for there to be no gendered occupational segregation. Women were much more likely than men to be employed in 'caring professions' (eg nursing, teaching, and social work); clerical, administrative, and sales occupations; and lower-skilled service work (eg personal care and hospitality work). Women were much less likely than men to be employed in some higher managerial positions, technical professions (architecture, engineering, and information technology), farming, protective services, manual trades, and lower-skilled manual jobs.

The majority of employment growth in the higher-skilled occupations between 1991 and 2013 was for women; they are steadily increasing their representation in managerial and professional roles. However, women are much less likely to be employed in senior management roles in a private business, and in technical professions such as architecture and engineering. Women in managerial roles also tend to be concentrated in female-dominated industries, and are over-represented in education, and health and community services management. Occupations where female representation has not changed much at all include the skilled trades.

More women have been earning formal qualifications, and since 2001 women have been more likely than men to have qualifications. Women and men tend to have their qualifications in different fields of study. Education, a female-dominated field of study, was the least popular qualification held by men in 2013. Likewise, the male-dominated field of architecture and building was the least popular field of study for women. However, men and women were equally likely to have qualifications in science and mathematics in 2013, which is reflected in increasing numbers entering occupations in these fields.

Despite increasing numbers of women earning formal qualifications, and pursuing professional and managerial careers, men still tend to earn more. Among full-time workers, men had a higher median income than women in almost all occupations (at level 3 of the classification) in 2013. This was regardless of whether the occupation was male or female dominated. More women than men were working in the five lowest-paying occupations. Women made up more than 60 percent of people in all of them.

Gender differences in occupation, and their effects on income differences, are important issues for both gender equity and labour market efficiency. Given the persisting levels of segregation discussed in this report, the issues are likely to be with us for some time. Developing policies and programmes to address gender occupational segregation, and ensure equal opportunity for women, requires good statistical information. We hope this report will contribute to the information needs in this area, and provide a foundation for monitoring changes in the future.

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Appendix 1: Definitions of terms used in this report

Average median income: adding a number of median incomes together, and dividing this by the number of median incomes to get an average.

Employed: people in the working-age population who, during the week ended 3 March 1991, 4 March 2001, or 3 March 2013, did at least one of the following:

- worked for pay, profit, or income for an hour or more
- worked without pay in a family business or family farm
- usually worked in a job, business, or farm but were not working during that week for some reason.

Employed full-time: usually working 30 or more hours per week.

Employed part-time: usually working fewer than 30 hours per week.

Industry: the type of activity undertaken by the organisation, enterprise, business, or unit of economic activity that employs one or more people aged 15 years and over.

The census data on industry relates to the industry for the main job held by an individual. This is the job in which a person worked the most hours.

Occupation: a set of jobs that require the performance of similar or identical sets of tasks by employed people aged 15 years and over.

A job is a set of tasks performed or designed to be performed by one person for an employer (including self-employment) in return for payment or profit.

The census data on occupation relates to the main job held by an individual. This is the job in which a person worked the most hours.

Occupational dissimilarity index: this index shows the degree to which women's occupational distribution differs from that of men. Or in other words, it shows the proportion of women who would have to change occupations in order for women to have the same occupational distribution as men.

Occupational gender segregation: the clustering of female and male workers in particular occupations. Female and male workers can similarly be clustered at the industry level (industrial segregation)

Median income: half receive more and half receive less than this amount.

Men: a male adult aged 15 years or over.

Post-school qualification: the highest qualification a person aged 15 years and over has gained over and above any school qualification. Included are qualifications awarded by educational and training institutions, as well as those gained from on-the-job training. We produce data on post-school qualification as category of attainment and by field of study.

Qualification: is a formally recognised award for educational or training attainment. 'Formal recognition' means that the qualification is approved by one of the following (or their predecessors):

- New Zealand Qualifications Authority (NZQA)
- Universities New Zealand Te Pokai Tara
- Association of Polytechnics of New Zealand

- Association of Colleges of Education in New Zealand
- approval bodies that have been recognised by NZQA
- the recognised overseas authority of a secondary school, profession, academic discipline, or trade.

In general, a qualification is defined as requiring full-time equivalent study of three months or greater. Study time is an estimate of the typical time it takes a learner to achieve the learning outcomes of the qualification. This includes direct contact time with teachers and trainers, as well as time spent studying, and on assignments and assessments.

Qualification subject (field of study): is the main topic or field of study of a qualification. This means that subjects of all courses studied within a qualification are not captured. 'Subject' applies to a post-school qualification, not to a secondary school qualification.

Sector of ownership: identifies the part of the economy that owns an organisation, enterprise, business, or unit of economic activity. Examples are central or local government, or private ownership.

Women: a female adult aged 15 years or over.



Appendix 2: Technical notes

Rounding

Random rounding to base 3 is used on all census data in this report. Random rounding to base 3 involves randomly rounding every unsuppressed count in a table to a number divisible by three. Statistics NZ applies random rounding to base 3 to census outputs by rounding values to:

- the nearest multiple of three with a probability of two-thirds (applied approximately two-thirds of the time)
- the second closest multiple of three with a probability of one-third (applied approximately one-third of the time).

Values that are already multiples of three are left unchanged.

The reasons for randomly rounding all counts, large and small, to base 3 include:

- disguising the small counts of 0, 1, 2, and 3, which have the highest disclosure risk
- protecting against the recalculation of small counts from differencing large counts
- retaining almost all of the statistical properties of the table by adding only a little noise to the larger counts.

Each value in a table is rounded independently, including the totals. This means that the marginal totals can differ slightly from the corresponding sum of the rows or columns, ie if the columns or rows in a table are added, they will not always equal the total given. Almost all the statistical properties of the table are retained, as the values will never be more than two digits higher or lower than the original number.

Confidentiality

[See the 2013 Census confidentiality rules](#) for more information on the confidentiality rules used in this report.

Classifications

[See the 2013 Census data dictionary](#) for more information on the classifications in this report (including a list of what occupations are included in each level).