MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

Advanced trade, technical and professional qualifications

Identifying demand

New Zealand Government

Beyond tertiary study

This report forms part of a series called *Beyond tertiary study.*
Other topics covered by the series include how graduates' earnings change over time, labour market outcomes, education and economic growth, and qualifications and income.

Author:
David Earle, Senior Analyst
Email: david.earle@minedu.govt.nz
Telephone: 64-4-463-8524

Acknowledgements:
The author gratefully acknowledges the support of Victoria Johns and David Patterson in reviewing this report, as well as the work undertaken by the Department of Labour in setting up and developing the skills monitoring information.

Published by:
Tertiary Sector Performance Analysis and Reporting
Strategy and System Performance
Ministry of Education

This report is available from the Ministry of Education website:
http://www.educationcounts.govt.nz/

April 2008

ISBN 978-0-478-13844-3
ISBN 978-0-478-13845-0 (web)

Contents

Figures

Tables

Key findings

- There is increased demand for advanced skills and knowledge in the workplace, driven by:
    - desires to improve innovation and productivity
    - greater use of new technologies
    - demographic changes in society and the workplace
    - construction and infrastructure development
    - increased registration requirements for a number of occupations.
- In general, increased demand for advanced skills and knowledge has been almost, but not quite, met by increased supply of people with those skills.
- However, there are particular occupations where there are significant and persistent skill shortages that fall within the following groups:
    - Professionals
    - Technicians and associate professionals
    - Trades workers.
- Increasing the number of people with advanced trade, technical and professional qualifications is only one part of the solution to persistent skill shortages – other aspects include the quality and relevance of qualifications, retaining skilled workers within New Zealand, improving employment conditions (not just pay) and making best use of migration to meet immediate shortfalls.
- What constitutes an advanced qualification varies across occupational groups, from level 4 certificates for many trades to degrees and above for professionals.
- The broad areas of study with high unmet demand for advanced qualifications are information technology, engineering, building and health.
- Graduate shortages in these areas are compounded by a shortage of technology, science and mathematics teachers in secondary schools.
- There is also high unmet demand for advanced-level qualifications in early childhood education, architecture, accounting, financial and business management services, psychology, social work, and food and hospitality.
- The Ministry of Education will undertake further work to identify more specifically the advanced qualifications where increased completions could help address persistent, unmet demand.

Executive summary

Increasing the achievement of advanced trade, technical and professional qualifications

The Tertiary Education Strategy 2007-12 includes a key priority to "increase the achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs". Success of this priority will be seen through more people achieving these qualifications, particularly in areas of long-term skill shortage. Progress will be measured through monitoring the performance of a representative set of qualifications.

This report is the first in a series of three planned reports aimed at setting up monitoring of this priority. This report assesses the demand for skills and qualifications across the professional, technician and associate professional, and trades worker occupations. The next report will look in more detail at demand for particular qualifications. The final report will establish a list of qualifications and specialisations that will be monitored over time.

This first report reviews the context for increased demand for advanced skills and knowledge. It then identifies occupations that are experiencing ongoing skill shortages and that require advanced-level qualifications. From this, qualification areas that may be in high demand are identified. These will be examined in more detail in the next report.

Linking qualifications to skill shortages

Increasing the number of people with relevant qualifications is one of several ways of addressing skill shortages. The quality and relevance of existing qualifications also need to be considered, in consultation with learners and employers. There are also wider issues of retaining skilled workers within New Zealand, improving employment conditions (not just pay) and making best use of migration to meet immediate shortfalls.

The link between increasing the number of qualified people and meeting industry skill needs is indirect and dynamic.

Skill shortages arise when the demand by businesses and industries for specific skills exceeds the supply of people with those skills. Skill shortages are a problem when they constrain the expansion of production and output. Shortages can arise because there are not enough people available with the skills and/or because people don't want to work in the industries where the skills are required.

The link between qualifications and meeting skill needs in industry follows the following process, which can take from one to over 10 years to complete and may occur several times within any one person's working life:

- People make decisions about what they would like to study and/or what occupation(s) they would like to work in.
- People attain education relevant to one or more occupations.
- People build experience relevant to one or more occupations (which may be before, during or after their period of study).
- Their qualifications and occupational experience enable them to be employed within one or more industries.

The key then is to look at the connection between occupations that are experiencing ongoing skill shortages and the extent to which they require specific advanced qualifications. This then provides a basis for understanding whether increasing the number of graduates will make a difference.

Demand and supply both increasing, but with some significant gaps

There are a number of factors that are driving increased demand for advanced skills and knowledge in the workplace. These include improving innovation and productivity, greater use of new technologies, ensuring that new employees have the skills to replace those who will be retiring over the next 15 to 25 years, increased construction and infrastructure development, and occupational registration requirements in areas such as health, early childhood education, social work and building.

The supply of skilled workers has increased through increased workforce participation, increased migration and a higher proportion of employees with tertiary education qualifications. At the same time, economic growth, along with shifts in employment towards industries and occupations with greater requirements for higher level skills, has increased the demand for skills.

The increased supply of higher-skilled employees is not quite meeting the overall increase in demand. Attracting skilled employees and developing their existing workforce are key concerns for an increasing proportion of firms. A general finding is that while supply and demand are not greatly out of line across the economy, there are significant variations across industries and occupations. This means there are some areas experiencing severe and ongoing advanced skill shortages.

These shortages occur within the following occupational groups:

- Professionals – where there has been high growth, a high proportion of tertiary-qualified employees and high skill shortages

- Technicians and associate professionals – where there has been high growth, a high proportion of tertiary-qualified employees and medium-level skill shortages

- Trades workers – where there has been medium-level growth and a more moderate proportion of employees with tertiary education, but high skill shortages.

Across other occupations there is less evidence of skill shortages that could be addressed by increased numbers of people attaining advanced qualifications. While there has been high growth in management occupations, the supply of tertiary-qualified candidates appears to be keeping up with demand. Improvements in management capability are probably better addressed through workplace training programmes. The high shortages in trades workers have created flow-on shortages across plant and machine operators and assemblers. These are occurring in cases where similar tertiary qualifications are required across both occupational groups.

Areas of advanced qualifications in high demand

What constitutes an advanced qualification varies across occupational groups. In the professional occupations, advanced qualifications are generally at bachelors level and above. In the technician and associate professional occupations, advanced qualifications cover diplomas and bachelors degrees. In the trade worker occupations, advanced qualifications cover level 4 certificates and diplomas.

The broad fields of study where there is a high unmet demand for advanced qualifications are information technology, engineering, and building. These demands are driven by the increased application of technology within the economy and society, and greater investment in construction and infrastructure development. New registration requirements in the building and construction industry will also drive demand for advanced qualifications.

There is also high unmet demand for advanced health qualifications, particularly medicine and specialist and technical health services. This demand is driven by the increased proportion of the population in the older age groups, technology changes in the health services, and increased registration requirements for health-related occupations.

The shortages in these areas have had flow-on effects for the teaching workforce. The secondary school subjects for which schools are having most difficulty hiring teachers are technology, science and mathematics. The shortage of these teachers may in turn be hampering the development of new students who could enter tertiary study in these areas.

Other qualification areas with high unmet demand include early childhood education (due to increased quality requirements for centres and expansion of provision and access), architecture, accountancy, financial and business management advice, psychology, social work, and food and hospitality.

1 Introduction

1.1 Purpose of this report

One of four priorities set out in the Tertiary Education Strategy 2007-12 is to "increase achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs". This report is the first of a series of three planned reports aimed at setting up monitoring of this priority across the tertiary education system.

Success of this priority will be seen through "increased supply of people with advanced-level trade, technical and professional qualifications, particularly in areas of long-term skill shortage". Progress is to be measured through increased participation and achievement in these types of qualifications and progression into advanced levels from lower levels. It is intended that "measurement will focus on a set of trade, technical and professional qualifications which can be monitored consistently and relate to areas of ongoing skill need within the economy" (Office of the Minister for Tertiary Education, 2006).

This first report looks at skill demands within occupations and the qualifications held by the current workforce. This report concludes with initial comment on the nature of unmet demand for advanced qualifications.

The second report will look in more detail at the qualification areas highlighted in this report. It will consider how well these qualifications match the occupations and trends in the number of employees holding these qualifications. It will examine measures of employment rates and income premiums to assess the value placed on these qualifications in the labour market.

The third report will establish a list of qualifications, and specialisations within qualifications, that will be monitored over time. It will include baseline information on trends in participation and achievement.

1.2 Linking education to skill needs

The analysis in this report is premised on the following understanding of skill shortages and the link to education.

Skill shortages arise when the demand by businesses and industries for specific skills exceeds the supply of people with those skills. Skill shortages become a problem when they constrain the expansion of a business or organisation and the output is less than it would otherwise be.

There are a number of circumstances that can lead to a skill shortage. It can arise because there are not enough job seekers with the required skills. It can also occur when there is an adequate supply of job seekers, but they are unwilling to take up employment at current pay and conditions. Skill shortages can be short term, particularly where there is increased activity at the peak of an economic cycle. There can also be long-run skill shortages as new specialist skills are required to meet changes in technology, production and operating environments.

Both demand and supply are affected by a range of factors. Demand can increase due to economic growth, changing needs of business and industries, and changes in technology. Supply can be increased in the long term through more education and training. Increased inward migration is also another option for increasing supply, especially in the short term. However, these

increases may be offset by increases in retirements, mobility into other occupations and migration overseas.

Figure 1.1: Factors in skill shortages

Source: Department of Labour (2006g)

Economic theory suggests that mismatches between supply and demand should self-correct over time. However, a number of factors mean that skill shortages can persist over the medium term. These factors relate to the time it takes to increase the supply of people with the required skills, difficulties in getting good matching between employers and prospective employers, including poor information, and the long-term nature of employment relationships and occupational choice (Department of Labour, 2008a).

Increasing the number of people with relevant qualifications is therefore one of several ways of addressing skill shortages. The link between increasing the number of qualified people and addressing skill shortages as experienced by employers is indirect and dynamic.

A skill shortage is experienced within a business and/or wider industry. The shortage is manifest as a difficulty in hiring people within certain occupational groups. Entry into an occupation is determined by a combination of education and training and work experience. Decisions about training for a particular occupation are made by individuals, based on a range of information and perceptions about the occupation. Therefore the link from education to skill demand generally runs as follows:

— People make decisions about what they would like to study and/or what occupation(s) they would like to work in.

— People attain education relevant to one or more occupations.

— People build experience relevant to one or more occupations (which may be before, during or after their period of study).

— Their qualifications and occupational experience enable them to be employed within one or more industries.

This process from decision to study to employment in an industry can take anything from a year, in the case of occupations requiring a basic level of skill, to over 10 years, in the case of highly skilled professionals. Also, people may go through this process several times in their life and it is not necessarily a deliberate series of choices and actions. Opportunity can play a large part in it.

1.3 Approach to monitoring achievement of advanced qualifications

The key to understanding the contribution of tertiary education to alleviating ongoing skill shortages is to monitor the link between changes in the supply of graduates with occupationally relevant qualifications and the level of unmet demand within those occupations.

If we can identify the occupations that are experiencing ongoing skill shortage and require advanced-level qualifications, we can then seek to identify the qualifications that enable entry to those occupations. Having done so, we can then look at whether the supply of people attaining those qualifications is increasing or decreasing. This will signal areas for further investigation in terms of the dynamics of individual choice, intake, retention and completion – as well as which occupations those graduates are moving into within New Zealand and overseas.

This information provides a nexus for monitoring changes in supply and demand. From this, further exploration can be made of contributing factors and effects. However, it doesn't necessarily provide an evaluation of the effectiveness of tertiary education in reducing skill shortages, given the wide range of factors involved.

This approach focuses entirely on the quantity of provision and number of people graduating. A critical question for further examination will be the extent to which new graduates take up jobs within New Zealand or move overseas. It will also be important to look at how long New Zealand graduates remain overseas and what skills they return with.

An important aspect in many occupations and industries will be the quality and relevance of the content of the qualifications. This is much more difficult to measure at a system level and is an area that can only really be addressed by providers, learners and employers having stronger engagement with regard to specific qualifications.

Finally, the set of qualifications identified through this approach is likely to be reasonably valid for monitoring changes across the whole of the tertiary education system. However, it may not be sufficiently robust to inform specific decisions about funding and provision of qualifications. These decisions need to take account of a wider range of information about existing and future demand and be informed by active engagement among providers, learners and employers. Even where there is a reasonable argument to increase the number of graduates, this still needs to be addressed in a coordinated way (see, for example, the recommendations in Medical Reference Group, 2006 and Workforce Taskforce, 2007).

2 Increased demand for advanced skills and knowledge

This section examines the drivers of increased demand for advanced skills and knowledge in the workplace by looking at changes in the economy, labour market and population over the last 10 years.

2.1 Why are advanced skills and knowledge more important now?

Building productivity

Increasing the number of people in the workforce with advanced skills and knowledge not only provides a greater proportion of people who are more productive, but also increases the rate of innovation, contributing to overall productivity increases. Growth in productivity means that the country can produce more for the same amount of resource. It has been shown that increases in the proportion of the workforce with higher-level tertiary qualifications are associated with increased production per person (Razzak and Timmins, 2007a).

New Zealand's level of overall labour productivity is at the lower end of the Organisation for Economic Cooperation and Development (OECD) range. Compared with other countries, New Zealand is characterised by high labour participation and relatively low productivity (Ministry of Economic Development, The Treasury and Statistics New Zealand, 2007).

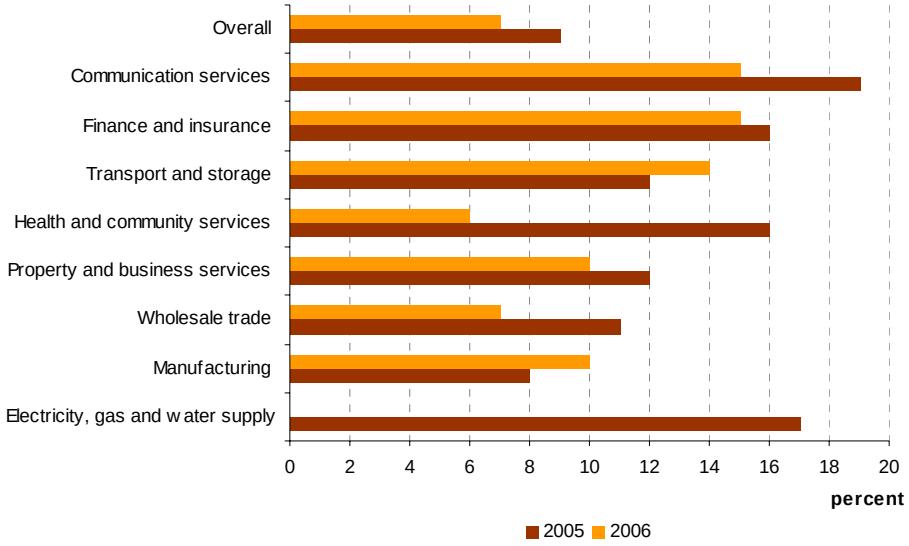
As the economy has grown and more people have become employed, growth in productivity in New Zealand has declined. That is, there has been less increase in the amount produced per person employed. The declines have been particularly marked for productivity growth due to labour and factors of production, other than either capital or labour, which include skills and knowledge (Statistics New Zealand, 2008). An international comparison found that New Zealand's relative productivity varies across industries, with New Zealand performing better in industries that are less capital intensive (Mason and Osborne, 2007).

Changing technology

There are rapid changes taking place in technology in the workplace. While new technologies can be labour saving, they require employees to redevelop their skills and they create increased demand for specialist skills in the installation, operation and maintenance of the technology.

In 2005, 9 percent of businesses made major or complete changes in technology, with 7 percent doing so in 2006. Technology change varied across industries, with finance and insurance, communications services, and transport and storage having consistently high rates of technology change.

Figure 2.1: Proportion of businesses in selected industries making major or complete changes in technology



Source: Statistics New Zealand, Business Operations Survey

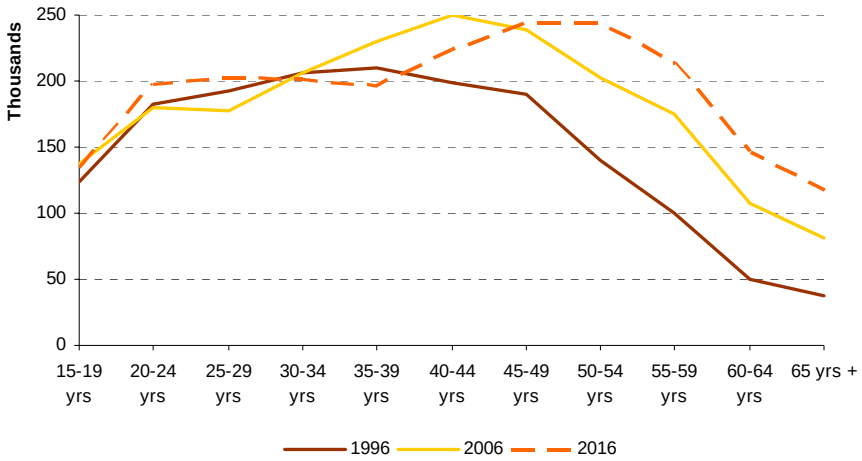
Demographic change

New Zealand is going through significant demographic changes. The demographic change most often focused on is the aging of the population, with an increasing proportion of the population being aged 65 and over. This trend has and will drive increased demand for medical and health care services. These services require a high level of skills and knowledge.

There is also a change going on within the working age population. There is a peak group of employees currently aged 40 to 50, who will be moving towards retirement over the next 15 to 25 years. This group represents experienced employees and holders of workplace knowledge. The number of employees in the younger ages has declined over the last 10 years, as the proportion of the population in these age groups has declined. There will be an increased number of younger people entering employment over the next 10 or more years, as the 'baby blip' generation comes through.

It is important that younger employees develop the skills and knowledge to replace skills and knowledge that will be lost through retirement. In some areas, this is an urgent issue, with a large proportion of the workforce close to retirement (Medical Reference Group, 2006). It is also accompanied by issues of intergenerational differences in the workplace (NZIER, 2006).

Figure 2.2: Actual and predicted number of people employed by 5-year age groups



Note: Predicted numbers were calculated by applying 2006 employment rates by age group to the 2016 predicted population.

Source: Statistics New Zealand, Census of Population and Dwellings and Population Predictions

Construction and infrastructure development

Over the last five years there has been increased public and private investment in construction and infrastructure development. This ranges from improvements to roading and public transport, through to office construction and new housing. This boom in the infrastructure industries, along with new technologies, has led to a greater demand for employees with advanced skills.

The construction industry reached a historic peak in 2005. While it has fallen off somewhat since then, it is likely to pick up again in the next year or two (BRANZ, 2005; NZIER, 2008a and 2008b). The demand for environmentally friendly building standards for businesses and homes will also increase the demand for technical skills in the infrastructure and construction industries.

Occupational registration requirements

Increased requirements for registration have and will continue to be introduced for a number of occupations. These generally include requirements for people registered to work in these occupations to hold a recognised qualification at a specific level.

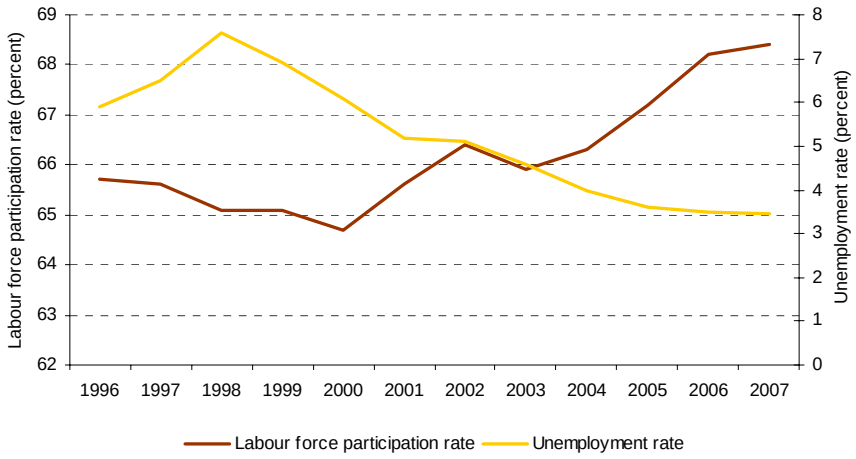
This has already occurred in nursing over the last 10 years, with nurses being required to hold a bachelors degree or higher. It is currently underway in the early childhood education sector, with requirements for teacher-led centres to have at least half of their staff holding a recognised early childhood education qualification, increasing to all staff by 2012. Changes are also being implemented in social work. Similar requirements are to be introduced for registered occupations in the building industry over the next two years (NZIER, 2006). It is likely that further requirements will be introduced in other parts of the health system in the future (Technical Health Workforce Strategy Group, 2007).

2.2 More skilled workers are available

The supply of skilled employees has increased through increased workforce participation, increased migration and a higher proportion of employees with tertiary qualifications.

Strong economic growth over the last 10 years has resulted in increased employment and decreased unemployment. Labour force participation rates have increased from a low of 64.7 percent in June 2000 to 68.4 percent in June 2007. Similarly, unemployment rates have fallen from a high of 7.6 percent in 1998 to 3.5 percent in 2007. Similar rates of participation and unemployment are predicted to continue over the next four and a half years (NZIER, 2008b).

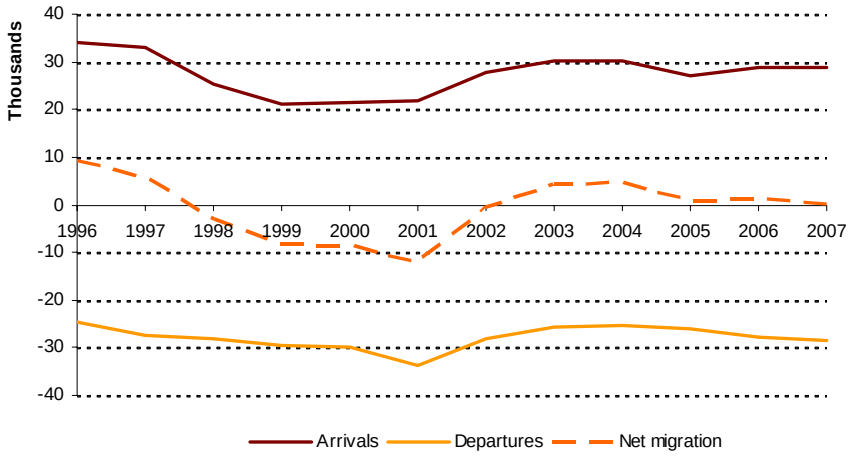
Figure 2.3: Labour force participation and unemployment rates



Source: Statistics New Zealand, Household Labour Force Survey (June quarters)

The recent steady economic growth has also led to a period of positive net permanent and long-term migration. That is, more people are arriving than departing. This followed an earlier period, from 1998 to 2002, when there were more departures than arrivals. However, a recent increase in departures has brought the net rate back towards zero. Departures are predicted to slow from 2009, bringing the net rate back to positive (NZIER, 2008b).

Figure 2.4: Annual net permanent and long-term migration of people with a declared occupation

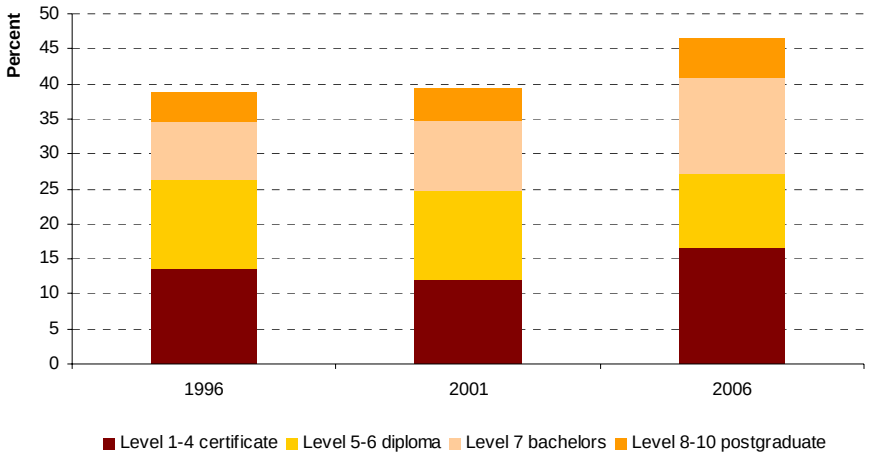


Source: Statistics New Zealand, Migration Data

From 1996 to 2006, there was an increase, from 41 to 47 percent, in the proportion of people in employment with tertiary qualifications. From 2001 to 2006, there was a considerable increase in the proportions with level 1 to 4 certificates and bachelors degrees. The proportion with level 5 to

6 diplomas has remained fairly constant,[1] and there was a steady increase in the proportion of people with postgraduate qualifications.

Figure 2.5: Number of people employed by level of highest post-school qualification



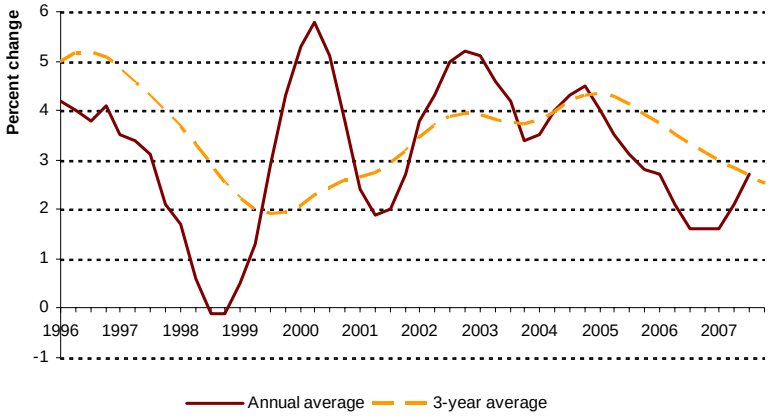
Source: Statistics New Zealand, Census of Population and Dwellings

The increase in the proportion of employed people with tertiary qualifications reflects the increased number of completions of qualifications over the 10-year period. There has been significant growth in the number of certificates completed and steady growth at higher levels. The number of certificates completed is likely to continue to decrease as stricter funding controls take effect. Growth in completions at diploma level and above is likely to continue, even within a capped funding environment.

2.3 Increased demand for skilled employees

The New Zealand economy has seen steady economic growth over the last 10 years. During the period from 1996 to 2007, real gross domestic product (GDP) increased by an annual average of 3.1 percent. Economic growth is predicted to be more modest over the next three years, in the range of 2.1 to 2.7 percent on average (NZIER, 2007).

Figure 2.6: Real gross domestic product growth

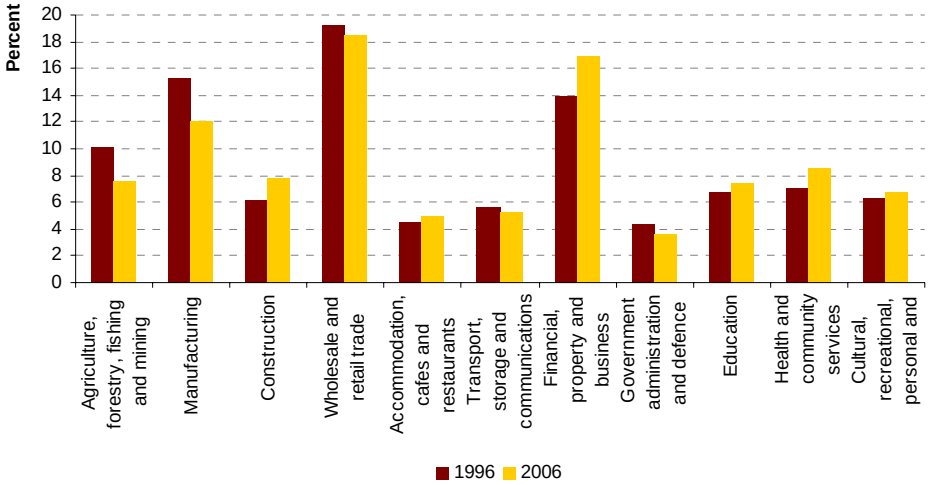


Source: Statistics New Zealand, Datastream – sourced from Reserve Bank of New Zealand website

[1] The 1996 and 2001 figures are not strictly comparable with 2006 figures. Level 7 diplomas were included with advanced vocational qualifications in 1996 and 2001 (which have been mapped to level 5 to 6 diplomas) and with bachelors degrees in 2006.

From 1996 to 2006, there has been a shift in the distribution of employment away from agriculture and manufacturing, with an increased proportion of people employed in health, education, and business and other services, as well as construction. These are industries that generally have greater requirements for higher-skilled employees.

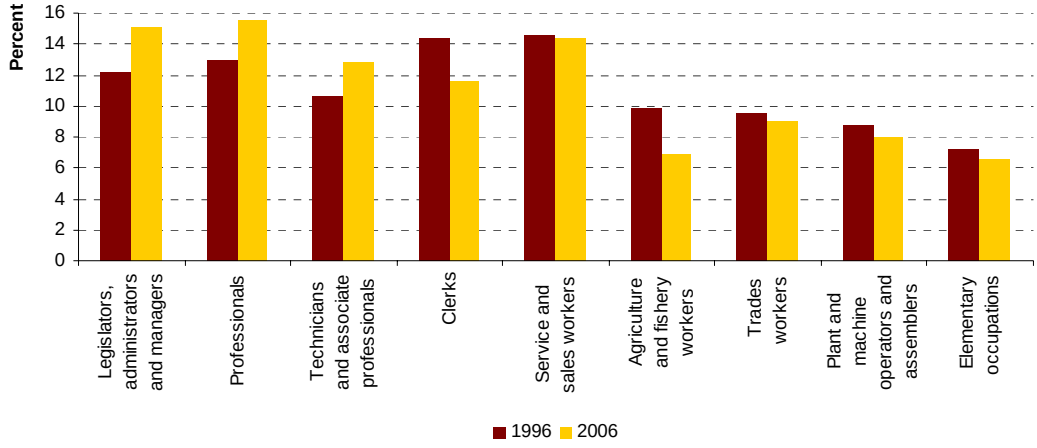
Figure 2.7: Proportion of people employed by industry



Source: Statistics New Zealand, Census of Population and Dwellings

The distribution of people in employment across occupations has also changed. There is an increased proportion working as administrators and managers, professionals, and technicians and associate professionals. These occupations generally require higher levels of qualifications and skills.

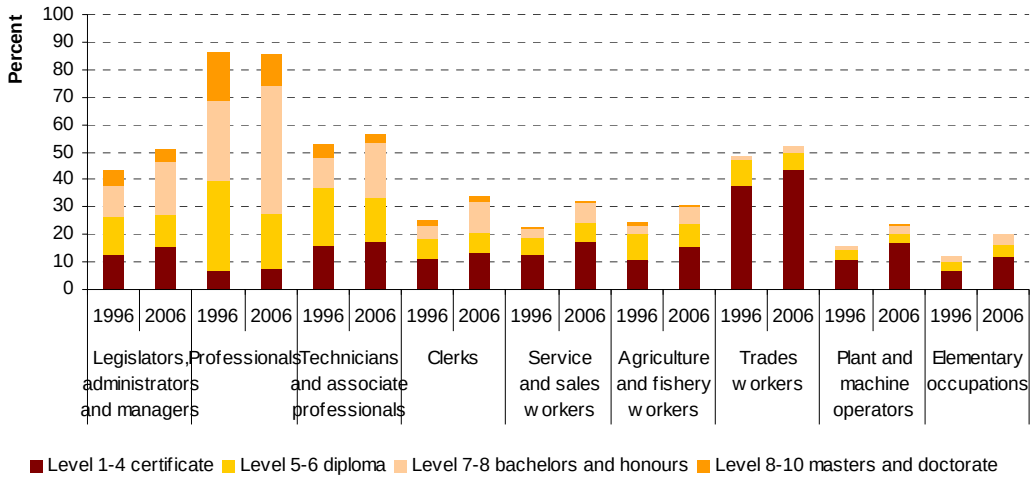
Figure 2.8: Number of people employed by occupation



Source: Statistics New Zealand, Census of Population and Dwellings

Over the 10-year period from 1996 to 2006, there have been differing changes in the distribution of qualifications within different occupations. In the professional occupations, there has been a shift towards higher-level tertiary qualifications. In the technician and associate professional occupations there has been a shift to higher levels and an increase in the overall proportion with tertiary qualifications. In the trades, there has mostly been an increase in the overall proportion with tertiary qualifications.

Figure 2.9: Proportion of employed population with tertiary qualifications by occupation



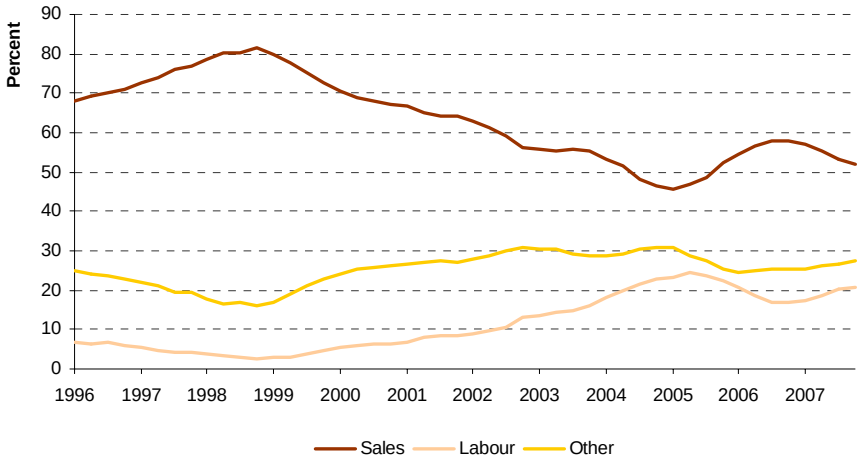
Source: Statistics New Zealand, Census of Population and Dwellings

2.4 Increased supply is not quite meeting increased demand

Over the last 10 years both supply and demand for skilled employees have grown together. However, there is evidence that demand has grown slightly faster than supply overall, with demand for skills relatively higher in the service industries (Razzak and Timmins, 2007b).

Finding suitable and skilled employees has become more difficult for businesses. In the late 1990s, up to 90 percent of firms reported sales as the single most limiting factor in their ability to increase production or activity. This has now decreased to around 50 percent of firms. Over the same period, the proportion of firms reporting labour as the single most limiting factor has increased from around 2 percent to around 20 percent. The proportion of firms reporting other factors as main constraints over this period has remained fairly constant.

Figure 2.10: Proportion of firms reporting sales and labour as main constraint factor



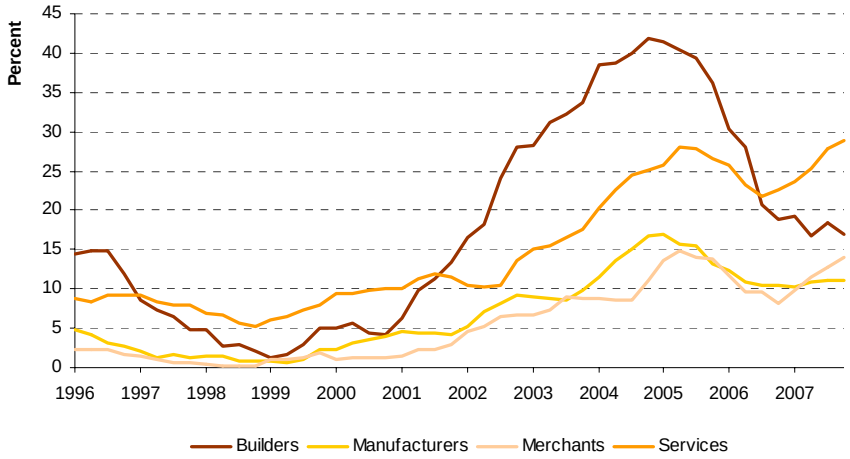
Note: Lines have been smoothed using 4-quarter moving averages to reduce seasonal effects.

Source: NZIER, Quarterly Survey of Business Opinion

The proportion of industries identifying skilled labour as a main constraining factor has varied by industry sector. The building sector has gone through a period where it has been significantly

constrained by labour shortages, but this has now eased. Labour is an increasing constraint in the service sector and an ongoing, but lesser, constraint for manufacturers and merchants.

Figure 2.11: Proportion of businesses where labour is the main constraint



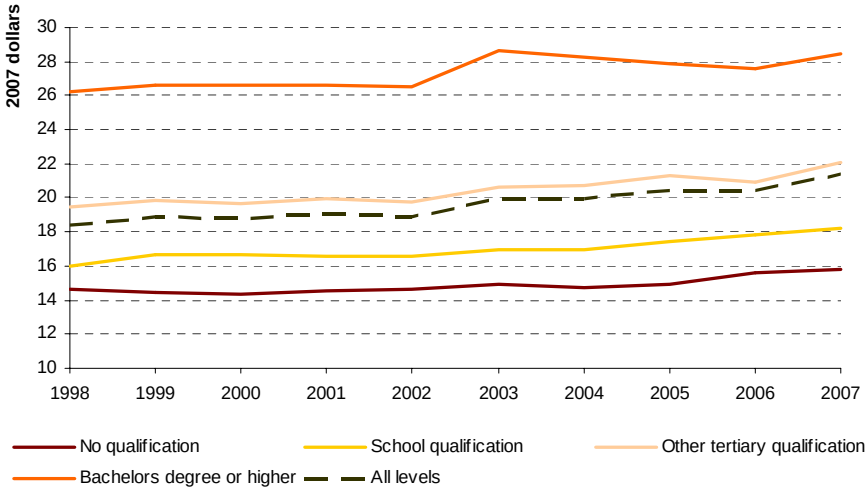
Note: Lines have been smoothed using 4-quarter moving averages to reduce seasonal effects.

Source: NZIER, Quarterly Survey of Business Opinion

Over 2005 and 2006, the most important business practice change most frequently reported by businesses was provision of training. The three most common areas of training were health and safety, trade-related, and professional and technical training (Statistics New Zealand, 2007). Training was also reported by businesses as the most common activity to support innovation, ahead of acquisition of computer hardware and software. Lack of skilled personnel was one of the commonly identified areas as hampering innovation (Statistics New Zealand, 2006).

The high demand for skilled and unskilled labour has resulted in some increase to real average hourly wages. The increases have been steady across all levels of qualification, including those with no qualifications. There is no indication of an overall increased premium being paid for people with higher educational qualifications. This can be explained by the relatively close match of increased supply and demand, as well as changes to increase the minimum wage over this period (Razzak and Timmons, 2007b).

Figure 2.12: Real average hourly wage by qualification level



Source: Statistics New Zealand, Income Survey

3 Demand for advanced qualifications across occupations

The following chapters look more specifically at the areas of demand for advanced qualifications across occupations. This section provides a brief analysis across broad occupational groups.

Three sets of indicators are used to establish whether there may be unmet demand for advanced qualifications. The first set addresses occupational growth. If more people are being employed in the occupational group, then there is likely to be increased demand for people at all qualification levels. The second set looks more specifically at the proportion of employees with tertiary qualifications, particularly at level 5 and above, and indicates whether there is greater demand for tertiary-qualified employees. The third set looks at relative difficulty of recruiting staff. The first two sets establish the extent to which supply and demand are growing; the third provides evidence of areas of mismatch between supply and demand.

The indicators used are as follows:

- Employment growth:
    - Percentage growth in the number of employees over the five-year period from 2001 to 2006 and the 10-year period from 1996 to 2006[2]
    - Net migration for people in the occupation over the 5- and 10-year periods to 2006[3] (this is also an indicator of skill shortages)
- Tertiary qualifications:
    - Percent of employees with a tertiary qualification at any level and percent with qualifications at level 5 and above (diploma, bachelors and postgraduate)[4]
    - Growth in the number of employees with a tertiary qualification at level 5 and above over the 5- and 10-year periods to 2006[5]
- Skill shortages:
    - Proportion of job vacancies filled by an adequately qualified and experienced person within 10 weeks (fill rate)[6]
    - Percentage of employees in the broad occupational group in specific (five-digit code) occupations included on the long-term and immediate skill shortage list for immigration.[7]

Table 3.1 sets out the indicators across the major occupational groups. For each indicator, the average across all occupations is given and the occupations that fare worse than average are highlighted.

[2] Source: Statistics New Zealand, Census of Population and Dwellings.

[3] Source: Statistics New Zealand, Migration Data.

[4] Source: Statistics New Zealand, Census of Population and Dwellings.

[5] Source: Statistics New Zealand, Census of Population and Dwellings.

[6] Source: Department of Labour, Survey of Employers who have Recently Advertised 2006. As the report was being finalised, the 2007 survey results became available. These mostly confirm the patterns in the 2006 survey. Where there are difference, these are noted in the text.

[7] Source: Statistics New Zealand, Census of Population and Dwellings.

The summary section provides an assessment of each occupational group as to whether it has relatively high, medium or low employment growth, tertiary qualifications and skill shortages. These provide a demand profile for each occupational group.

Table 3.1: Indicators of growth, tertiary qualifications and skill shortages for all occupations

		Legislators, administrators and managers	Professionals	Technicians and associate professionals	Clerks	Service and sales workers	Agriculture and fishery workers	Trades workers	Plant and machinery operators and assemblers	Elementary occupations	All occupations
Growth in employment 1996-2006	5-year	31%	19%	35%	-4%	11%	-6%	16%	6%	21%	15%
	10-year	50%	46%	46%	-2%	19%	-16%	13%	10%	10%	21%
Net migration	5-year	0.8%	3.2%	0.6%	1.4%	-0.5%	-0.3%	0.8%	-1.1%	-1.0%	0.7%
	10-year	-0.9%	5.4%	-2.6%	0.6%	-3.7%	-1.4%	-1.4%	-3.7%	-3.1%	-1.0%
Percent tertiary qualified 2006	All levels	51%	85%	56%	34%	32%	31%	52%	24%	20%	47%
	Level 5 +	36%	78%	39%	21%	15%	16%	9%	7%	8%	30%
Growth in tertiary qualified – Level 5 +	5-year	49%	25%	42%	19%	27%	3%	1%	16%	59%	30%
	10-year	87%	49%	65%	62%	86%	3%	1%	55%	88%	57%
Fill rate 2006		67%	56%	54%	75%	63%	70%	48%	54%	61%	61%
Percent of employees in occupations on skill shortage lists	Long-term	12%	47%	16%	0%	5%	0%	38%	0%	0%	15%
	Immediate	3%	16%	13%	1%	35%	63%	43%	34%	6%	21%
	Total	15%	63%	29%	1%	40%	63%	81%	34%	6%	36%
Summary	High growth	H	H	H	L	L	L	M	L	M	
	Tertiary qualified	H	H	H	L	L	L	M	L	L	
	Skill shortage	L	H	M	L	M	M	H	M	M	

There are three major occupational groups that score high or medium across all three areas:

- Professionals – where there has been high growth, a high proportion of tertiary-qualified employees and high skill shortages
- Technicians and associate professionals – where there has been high growth, a high proportion of tertiary-qualified employees and medium-level skill shortages
- Trades workers – where there has been medium-level growth and a more moderate proportion of employees with tertiary education, but high skill shortages.

There has also been high growth in legislators, administrators and managers, and this occupation has a high proportion of tertiary-qualified employees. However, skill shortages are relatively low for this group overall. The other occupations, with the exception of clerks, have experienced medium levels of skill shortages; however, they have relatively low proportions with tertiary qualifications.

4 Professional occupations

As discussed in section 3, across the professional occupations there has been:

- high growth in employment over the last 10 years, with the highest rates of net migration of any occupation group
- the highest proportion of tertiary-qualified employees, with 85 percent holding a tertiary qualification and 78 percent holding a qualification at level 5 or above
- high levels of skill shortage, with only 56 percent of advertised jobs filled within 10 weeks and 63 percent of employees in occupations listed on the immigration skill shortage lists.

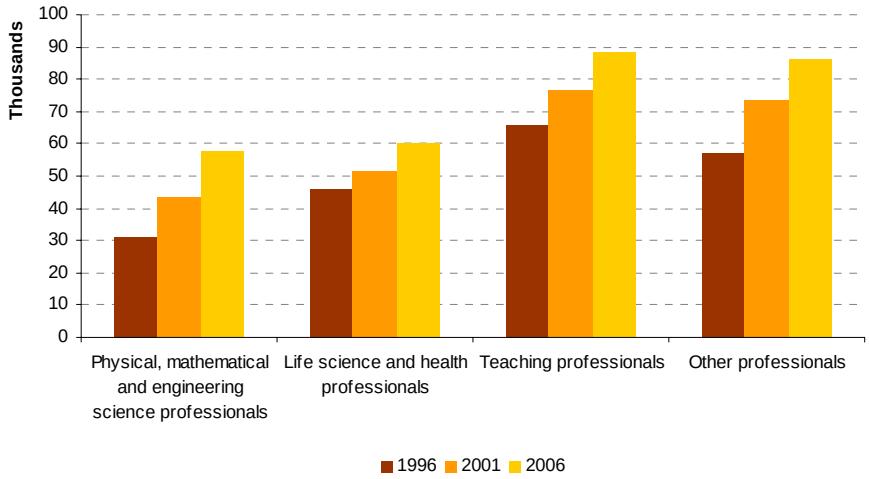
Table 4.1 provides a breakdown of the key indicators for each of the four groups of professional occupations, as well as a summary profile.

Table 4.1: Indicators of growth, tertiary qualifications and skill shortages for professional occupations

		Physical, mathematical and engineering science professionals	Life science and health professionals	Teaching professionals	Other professionals	All occupations
Growth in employment 1996-2006	5-year	32%	17%	16%	17%	15%
	10-year	85%	31%	34%	51%	21%
Net migration	5-year	4.9%	4.8%	1.9%	2.7%	0.7%
	10-year	7.9%	10.2%	4.5%	1.1%	-1.0%
Percent tertiary qualified 2006	All levels	76%	90%	91%	85%	47%
	Level 5 +	61%	84%	88%	77%	30%
Growth in tertiary qualified – Level 5+	5-year	41%	21%	20%	27%	30%
	10-year	88%	36%	38%	59%	57%
Fill rate 2006		41%	54%	66%	58%	61%
Percent of employees in occupations on skill shortage lists	Long-term	60%	80%	59%	2%	15%
	Immediate	20%	12%	3%	31%	21%
	Total	80%	92%	61%	33%	36%
Summary	High growth	H	M	M	H	
	Tertiary qualified	H	H	H	H	
	Skill shortage	H	H	M	M	

From 1996 to 2006, the number of people employed in professional occupations grew by 92,000, representing a 46 percent increase. The largest growth in employment has been in the physical, mathematical and engineering science professionals and other professionals groups. There has also been steady growth in the numbers of life science and health professionals and teaching professionals.

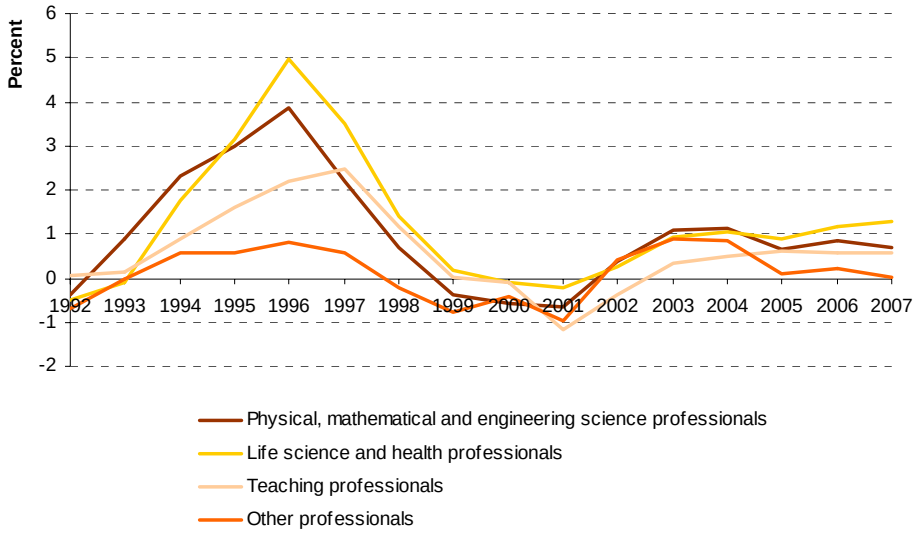
Figure 4.1: Number of people employed in professional occupations



Source: Statistics New Zealand, Census of Population and Dwellings

Net migration for the professional occupations has followed a similar pattern to overall migration, but with much wider fluctuations. In the mid- to late-1990s the highest net migration rate was for life science and health professionals, followed by physical, mathematical and engineering science professionals. The migration rate has been lower over the last five years. However, there is sustained net migration for all professional occupations, with the exception of other professionals. This results from arrivals being consistently higher than departures in each of these occupations and runs against the trend of balanced migration across all occupational groups.

Figure 4.2: Annual net permanent and long-term migration rate for professional occupations

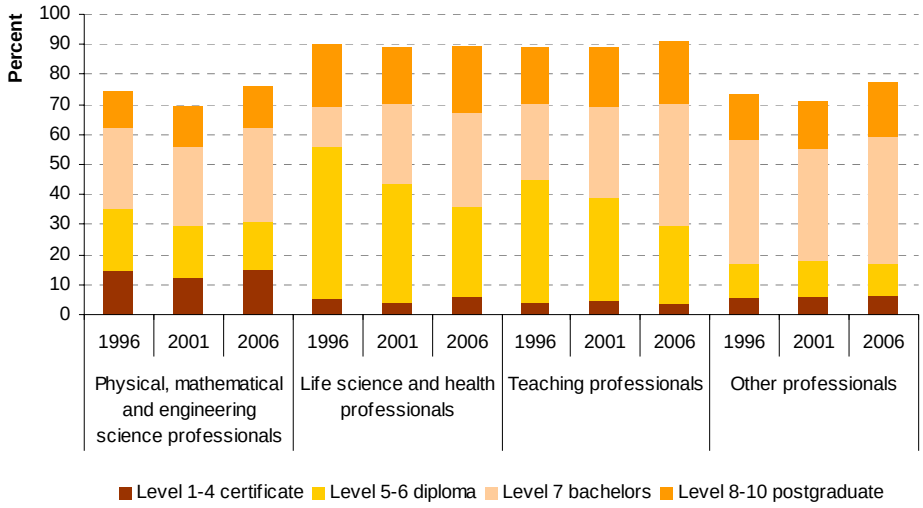


Source: Statistics New Zealand, Migration Statistics

Around 90 percent of health and teaching professionals are tertiary qualified. Both occupations have seen a shift from a predominance of qualifications at diploma level to bachelors level. In the other two occupational groups, around 70 percent of employees are tertiary qualified. In the physical, mathematical and engineering science professionals group, around 30 percent of employees have below-degree-level qualifications. This proportion is less than 20 percent in the

other professionals group. The distribution across qualification levels has been reasonably stable in both of these occupations.

Figure 4.3: Proportion of professional occupations with tertiary qualifications



Source: Statistics New Zealand, Census of Population and Dwellings

The greatest skill shortages have been in physical, mathematical and engineering science professionals and life science and health professionals. In the former, the fill rate in 2006 was only 41 percent, placing the occupation in almost extreme shortage, and 80 percent of employees were in occupations on the immigration skill shortage lists. In the latter, while the fill rate was somewhat better at 54 percent, 92 percent of employees were in occupations on the immigration skill shortage lists.

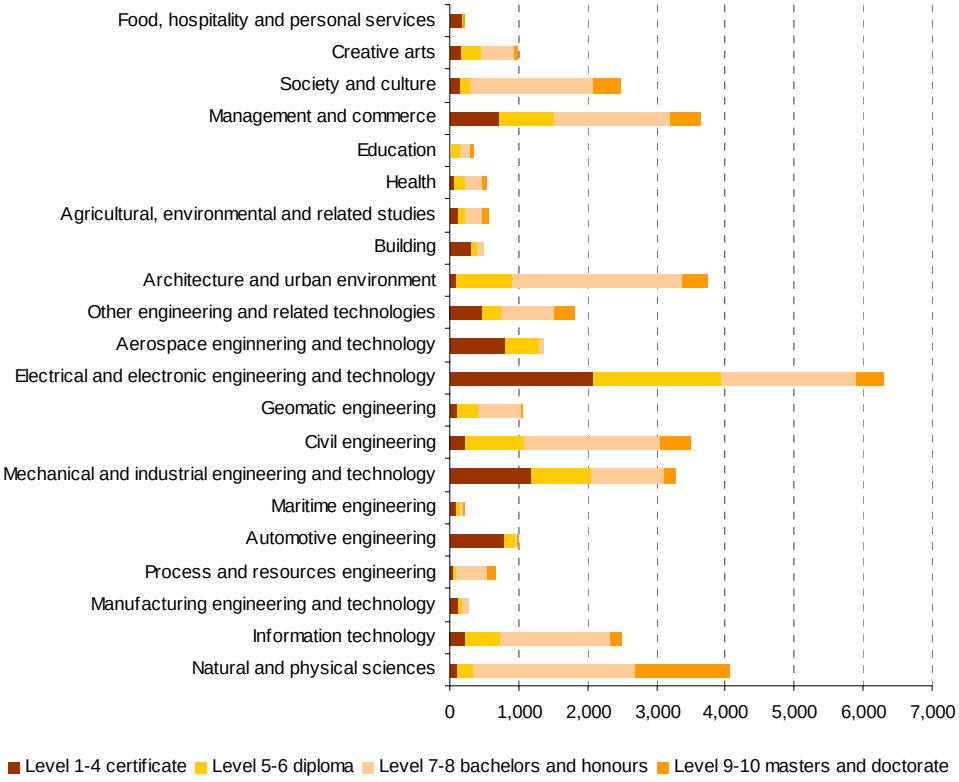
Skill shortages were not as severe for teaching professionals. They had a fill rate above the overall average and around 60 percent of employees were in occupations on the immigration skill shortage lists. Other professionals had a fill rate just below the overall average and only 33 percent of employees were in occupations on the immigration skill shortage lists.

4.1 Physical, mathematical and engineering science professionals

Forty-three percent of tertiary-qualified physical, mathematical and engineering science professionals are employed in companies offering professional, scientific and technical services. There are also significant numbers employed in manufacturing, particularly of machinery and equipment (12 percent), construction (6 percent), public administration and safety (6 percent), and wholesale trade, particularly machinery and equipment (5 percent).

Half of physical, mathematical and engineering science professionals have their highest tertiary qualification in engineering – with electrical engineering being the most common sub-field. The other common fields of study are sciences and architecture. However, there are also substantial proportions whose highest qualifications are in management and commerce (9 percent) and society and culture (6 percent).

Figure 4.4: Physical, mathematical and engineering science professionals by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

Within this group, architects, engineers and related occupations had the lowest fill rate at 32 percent in 2006, with individual occupations ranging from 0 percent to 52 percent. Fill rates for computing professionals were somewhat better at 53 percent, and for physicists, chemists and related professionals were just below the overall average at 59 percent (Department of Labour, 2007a). In 2007, fill rates for computing professionals improved to 73 percent, putting them only in moderate shortage (Department of Labour, 2008b).

Computer professionals, engineers, architects and planners featured fairly heavily on both the long-term and immediate skill shortage lists for immigration purposes. In most cases, immigrants need to hold a bachelors degree and have work experience in the field (Department of Labour, 2006a and 2007b).

Table 4.2: Proportion of employees in physical, mathematical and engineering science professional occupations on the immigration skill shortage lists

	Physicists, chemists and related professionals	Mathematicians, statisticians and related professionals	Computing professionals	Architects, engineers and related professionals
Long-term	0%	0%	100%	25%
Immediate	48%	0%	0%	40%
Neither	52%	100%	0%	35%
Total	100%	100%	100%	100%

Assessments of skill shortages for selected occupations within this group found all of them to be experiencing genuine skill shortages.

For information technology professionals shortages have been due to decreasing numbers of people completing degrees and postgraduate diplomas in information technology against increasing demand for information technology professionals. The decreased completions are likely to be an effect of the slow-down in the industry around 2000. However, since then there has been strong growth in demand (Department of Labour, 2005f and 2006c). McCallum (2006) notes that the drop in information technology degree graduations is part of a global pattern. He predicts this will result in serious ongoing shortages in New Zealand if not addressed quickly by providers and industry together.

The recent boom in the construction industry has driven up the demand for architects and engineers. The supply of new architects and engineers has not been sufficient to meet increased demand (Department of Labour, 2005a, 2005b, 2006d).

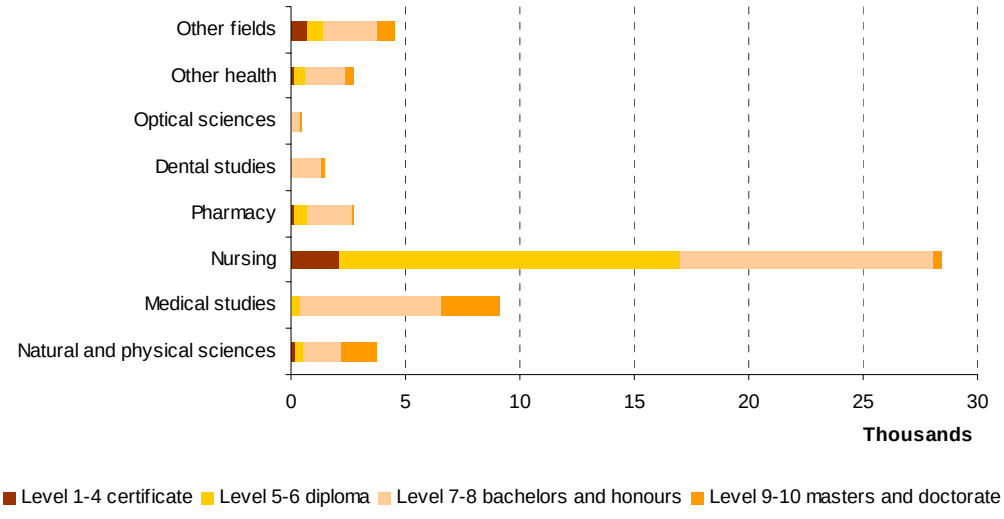
The demand for electronic and mechanical engineers has also been rising due to the increased use of electronics and new machinery in business and industry (Department of Labour, 2005e and 2006d).

4.2 Life science and health professionals

Seventy-seven percent of tertiary-qualified life science and health professionals are employed in the health care and social assistance industry. In addition, 7 percent are employed in professional, scientific and technical services and 5 percent in retail trade (e.g. pharmacies).

The largest number of tertiary-qualified life science and health professionals have their highest qualification in nursing – at either diploma or bachelors level. The next largest group are those with qualifications in medical studies. There are also notable numbers with science qualifications.

Figure 4.5: Life science and health professionals by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

Within this group, health professionals (excluding nurses) had the lowest fill rate at 41 percent, with individual occupations ranging from 19 percent for physicians to 67 percent for dentists. Rates for nurses were slightly better at 54 percent, with shortages being most severe for psychiatric nurses. Life science professionals had the best fill rates at 64 percent (Department of

Labour, 2007a). In 2007, shortages for nurses deepened overall, however, availability of psychiatric nurses improved somewhat (Department of Labour, 2008b).

Health professionals, including specialist physicians and nurses, feature heavily in the long-term skill shortages list. In most cases, immigrants need at least a bachelors degree and relevant work experience (Department of Labour, 2006a and 2007b).

Table 4.3: Proportion of employees in life science and health professional occupations on the immigration skill shortage lists

	Life science and health professionals	Health professionals (except nursing)	Nursing and midwifery professionals
Long-term	5%	69%	100%
Immediate	21%	31%	0%
Neither	74%	0%	0%
Total	100%	100%	100%

Medical Reference Group (2006) highlights particular shortages for general practitioners, pathologists and psychiatrists, which are likely to worsen as demand increases. The Group raised concerns about the difficulty of retaining New Zealand-trained medical practitioners within the country and the high reliance on overseas recruitment to fill gaps. These concerns are reinforced in the 2007 report to Ministers on the health workforce (Workforce Taskforce, 2007). Tertiary Education Commission (2004) found that across health qualifications, medicine had the fewest graduates relative to workforce size.

An assessment of skill shortages for pharmacists found genuine skill shortages (Department of Labour, 2006i). There has been steady growth in the number of pharmacists but a reasonably small group of students graduating each year. A new pharmacy qualification is likely to increase supply in the future. In the meantime, updated data indicates worsening shortages (Department of Labour, 2007a).

An assessment of skill shortages for nurses found that the occupation faced recruitment and retention difficulties but not skill shortages (Department of Labour, 2005g). The assessment found that while employers were finding it difficult to fill positions, this was more due to current pay and conditions than a lack of supply of newly qualified nurses. More recent data suggests that difficulties in filling nursing positions continue to persist (Department of Labour, 2007a).

The Nursing Workforce Strategy (DHBNZ, 2006b) highlights growing demand for nursing services as the population ages. It also concludes that retention is an issue. It points out that a broader skill base is and will be required by nurses, with a mix of generalist and specialist nurses being required.

An assessment of skill shortages for midwives found the occupation to have genuine skill shortages (Department of Labour, 2006e). Demand for midwives increased in the mid-1990s as professional autonomy increased. While the number of new midwives is growing, it is not matching increased demand.

The Midwifery Workforce Strategy (DHBNZ, 2006a) also notes shortages in the profession. These are likely to be compounded by the aging workforce and the changes to practice settings that require a higher level of skills and knowledge. Both the Nursing and Midwifery Workforce Strategies emphasise the need for more ethnic diversity in these professions and greater regional access to services. This point is also reinforced in the health workforce taskforce report (Workforce Taskforce, 2007).

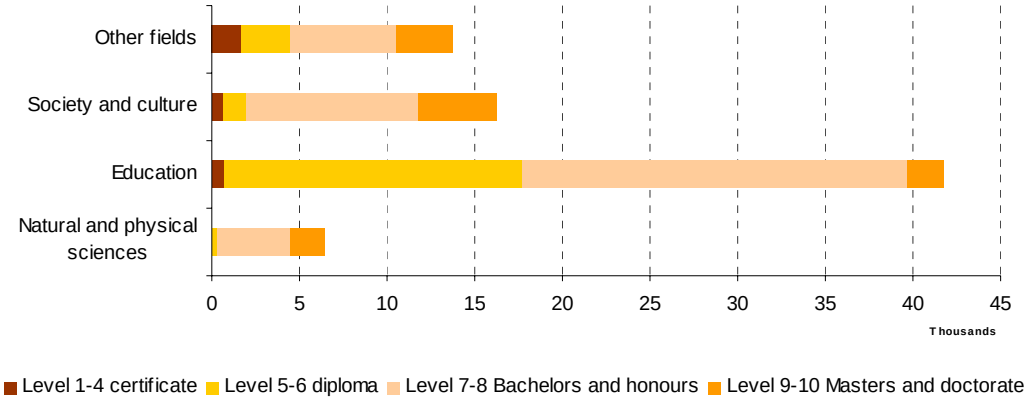
Assessments of skill demands for optometrists and for dentists found no skill shortage evident (Department of Labour, 2006f and 2005c). While there is growth in demand, this has been matched by new graduates and immigrants entering these occupations.

4.3 Teaching professionals

Eighty-five percent of tertiary-qualified teaching professionals are employed in education and training and a further 6 percent in health care and social assistance.

Just over half of tertiary-qualified teaching professionals have their highest tertiary qualification in education. Twenty percent have their highest tertiary qualification in society and culture and 8 percent in science. The latter will represent the subject-based qualifications required for secondary school and tertiary teaching.

Figure 4.6: Teaching professionals by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

Within teaching professionals, early childhood teachers had the lowest fill rate at only 46 percent. Tertiary teachers and secondary school teachers had fill rates above the overall average at 63 and 70 percent respectively. No shortage was found for primary school teachers, who had a fill rate of 89 percent. Some shortages of special education teachers and other educational professionals were evident (Department of Labour, 2007a). The 2007 survey found increasing shortages of early childhood teachers, as well as shortages deepening for secondary school teachers (Department of Labour, 2008b).

The Ministry of Education's survey of school staffing (Ng, 2007) shows that vacancies at schools are generally stable, with some decrease in primary schools. There has been some increase in re-advertising, particularly at secondary schools. The subject areas in greatest shortage at secondary school are technology, sciences, mathematics, English and physical education.

University lecturers, secondary teachers and early childhood teachers are included on the long-term skill shortage list, as are speech language therapists. In nearly all cases, immigrants are required to hold at least a bachelors degree (Department of Labour, 2006a and 2007b).

Table 4.4: Proportion of employees in teaching professional occupations on the immigration skill shortage lists

	Tertiary teaching professionals	Secondary teaching professionals	Primary and early childhood teaching professionals	Special education teaching professionals	Other teaching professionals
Long-term	100%	100%	32%	13%	0%
Immediate	0%	0%	0%	49%	0%
Neither	0%	0%	68%	38%	100%
Total	100%	100%	100%	100%	100%

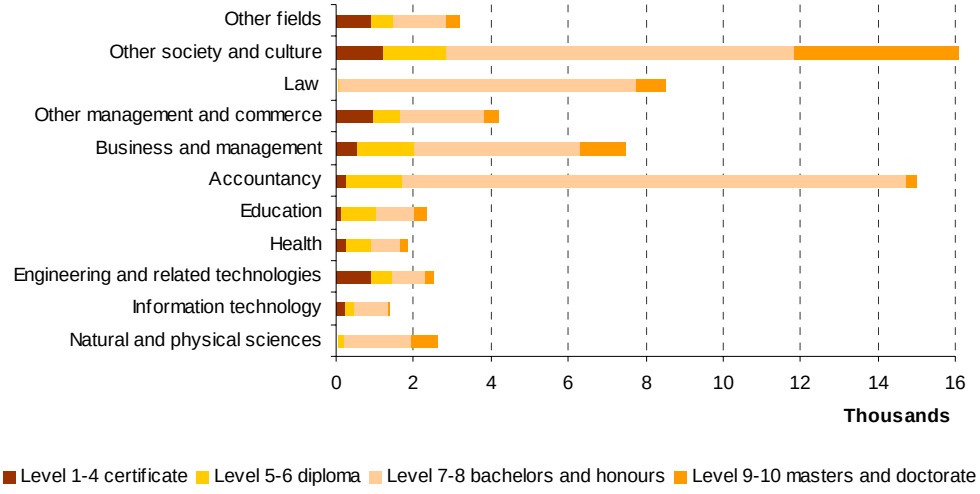
An assessment of skill shortages for early childhood teachers found both genuine skill shortages and recruitment and retention difficulties (Department of Labour, 2005d). The genuine shortage arises from demand outstripping supply of qualified teachers. Growth has been driven by increased numbers of teacher-led centres and the phased introduction of requirements for centres to have all of their teachers to holding recognised early childhood education qualifications by 2012. However, there is a significant number of trained teachers who do not wish to work in the industry, indicating difficulties with recruitment and retention. More recent data suggests shortages are worsening (Department of Labour, 2007a).

4.4 Other professionals

Thirty-six percent of tertiary-qualified other professionals are employed in companies providing professional, scientific and technical services. There are also significant numbers in public administration and safety (12 percent) and financial and insurance services (8 percent).

The largest number of tertiary-qualified other professionals had qualifications in accountancy, law or business and management. There was also a considerable number with qualifications spread across various management and commerce and society and culture fields of study.

Figure 4.7: Other professionals by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

Within other professionals, social and related science professionals had the lowest fill rate at 47 percent, with policy analysts and psychologists having very low rates of 36 and 30 percent respectively. Business and legal professionals had fill rates similar to the overall average at 60

and 62 percent respectively. However, there was an extreme shortage for auditors at 18 percent fill rate. Archivists and librarians had the highest fill rate at 71 percent (Department of Labour 2007a).

Auditors and psychologists are both on the long-term skill shortages list for immigration. Senior accountants and senior policy analysts are both on the immediate skill shortage list. In all cases, immigrants require at least a bachelors degree (Department of Labour, 2006a and 2007b).

Table 4.5: Proportion of employees in other professional occupations on the immigration skill shortage lists

	Business professionals	Legal professionals	Archivists, librarians and related information professionals	Social and related science professionals	Religious professionals
Long-term	0%	0%	0%	14%	0%
Immediate	42%	0%	0%	34%	0%
Neither	58%	100%	100%	52%	100%
Total	100%	100%	100%	100%	100%

An assessment of skill shortages for accountants found the occupation to be in genuine skill shortage, with the increased supply of new chartered accountants not matching the growth in demand. This situation was predicted to continue in the future as global demand for accountants increases (Department of Labour, 2006b).

5 Technicians and associate professionals

As discussed in section 3, across technician and associate professional occupations there has been:

- high growth over the last five and ten years, although there have been net losses through migration over the last 10 years
- the second highest proportion of tertiary-qualified employees, with 56 percent holding a tertiary qualification and 39 percent holding a qualification at level 5 or above
- medium levels of skill shortage, with 54 percent of advertised jobs filled within 10 weeks and 29 percent of employees in occupations listed on the immigration skill shortage lists.

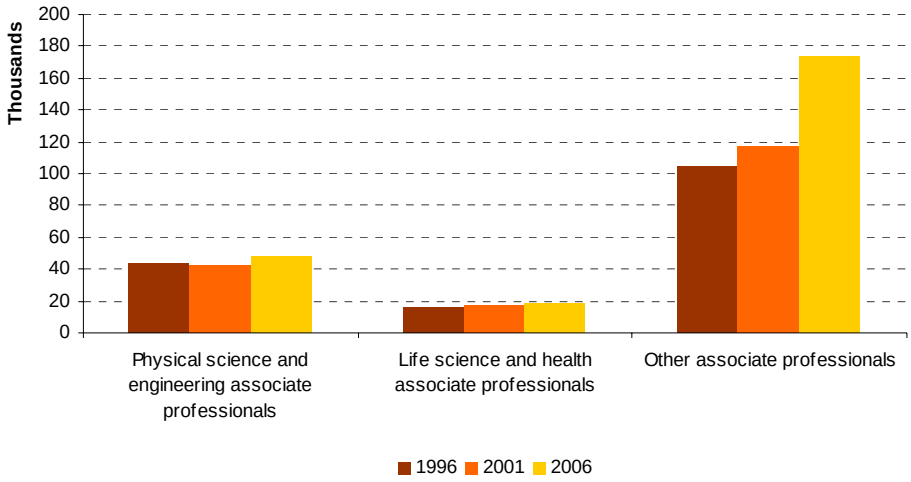
Table 5.1 provides a breakdown of the key indicators for each of the three groups of technician and associate professional occupations.

Table 5.1: Indicators of growth, tertiary qualifications and skill shortages for technician and associate professional occupations

		Physical science and engineering associate professionals	Life science and health associate professionals	Other associate professionals	All occuations
Growth in employment 1996-2006	5-year	12%	8%	47%	15%
	10-year	10%	18%	66%	21%
Net migration	5-year	1.3%	2.2%	0.1%	0.7%
	10-year	-1.7%	1.7%	-3.7%	-1.0%
Percent tertiary qualified 2006	All levels	66%	78%	56%	47%
	Level 5 +	45%	60%	39%	30%
Growth in tertiary qualified - Level 5+	5-year	-1%	-5%	36%	30%
	10-year	-4%	2%	59%	57%
Fill rate 2006		42%	63%	65%	61%
Percent of employees in occupations on skill shortage lists	Long-term	19%	53%	11%	15%
	Immediate	32%	12%	8%	21%
	Total	51%	65%	19%	36%
Summary	High growth	**M**	**M**	**H**	
	Tertiary qualified	**H**	**H**	**H**	
	Skill shortage	**H**	**H**	**M**	

From 1996 to 2006, the number of people in technician and associate professional occupations grew by 76,000, representing a 46 percent increase. The largest growth has been in the other associate professionals group, which has increased by 69,000, representing a 66 percent increase. Growth in the other occupational groups has been more modest.

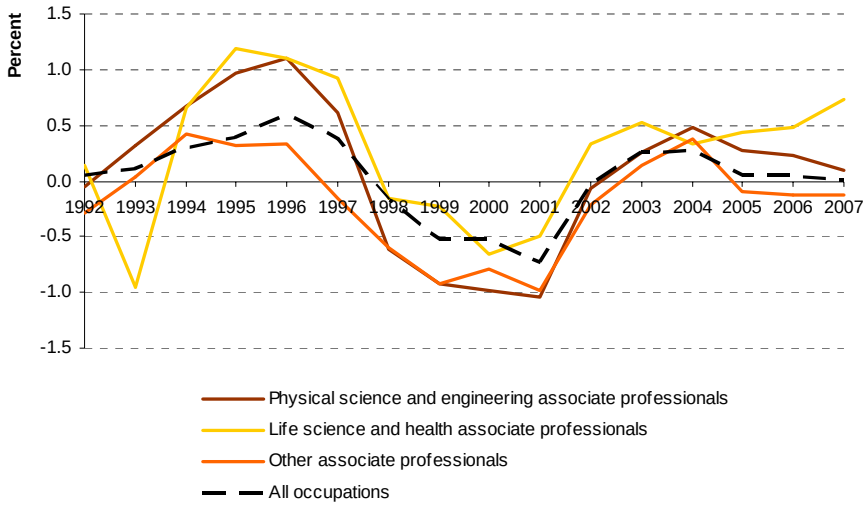
Figure 5.1: Number of people employed in technician and associate professional occupations



Source: Statistics New Zealand, Census of Population and Dwellings

Net migration rates for technician and associate professional occupations have followed a similar cyclical pattern to that of all occupations. In the 1990s, net migration rates for physical science and engineering associate professionals and life science and health associate professionals were higher than for all occupations. This has been the case again since 2003, with migration rates increasing for life science and health associate professionals, at a time when rates are decreasing for other occupations. For all three occupations, departure rates have been decreasing over the last five years. For life science and health associate professionals, this has been matched with small overall increases in arrival rates, leading to growing net gains. In the other two professionals, arrival rates have also been decreasing.

Figure 5.2: Net annual permanent and long-term migration rates for technician and associate professional occupations

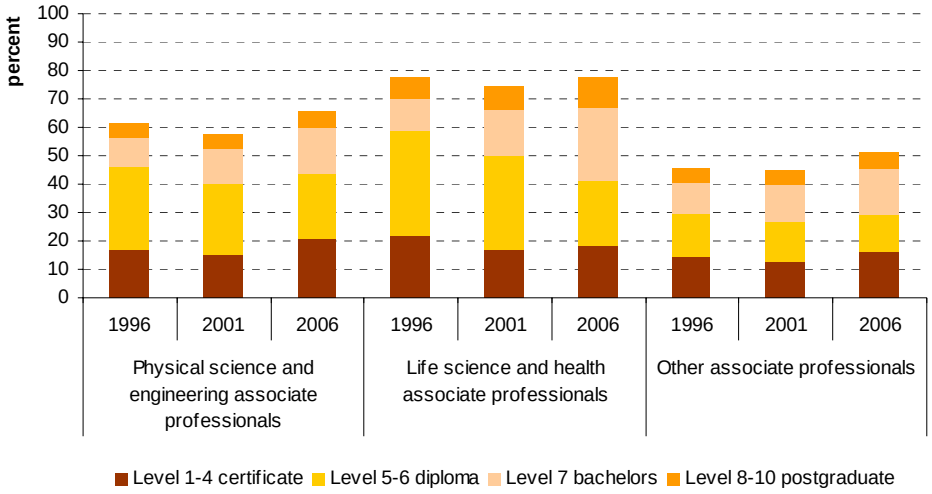


Source: Statistics New Zealand, Migration Statistics

Around 65 percent of physical science and engineering associate professionals were tertiary qualified in 2006. Nearly 80 percent of life science and health associate professionals were tertiary qualified. From 1996 to 2001 there has been a shift from diploma-level qualifications to

degrees. Just over half of other associate professionals are tertiary qualified, with a quarter having bachelors degrees or higher.

Figure 5.3: Proportion of technicians and associate professionals with tertiary qualifications



Source: Statistics New Zealand, Census of Population and Dwellings

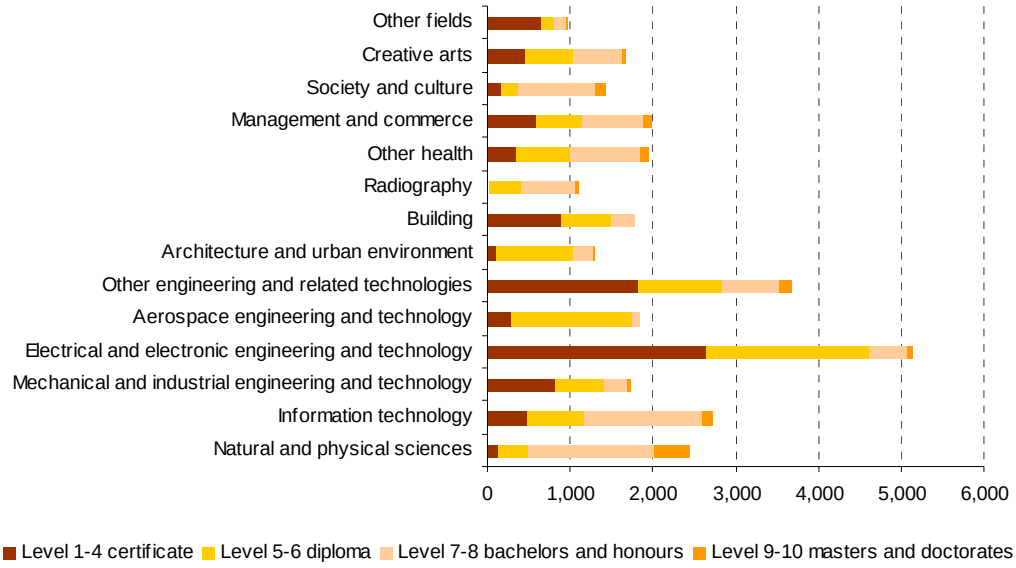
The greatest skill shortages have been in physical science and engineering associate professionals with a fill rate of 42 percent. Life science and health associate professionals and other associate professionals had fill rates just above the overall average, at 63 and 65 percent respectively (Department of Labour, 2007a).

5.1 Physical science and engineering associate professionals

Physical science and engineering associate professionals are more spread across industries than physical, mathematical and engineering science professionals. Twenty-two percent of tertiary-qualified associate professionals work in companies offering professional, scientific and technical services, compared with 43 percent of tertiary-qualified professionals. Tertiary-qualified associate professions were also strongly represented in manufacturing (11 percent), health care and social assistance (10 percent) and construction (9 percent).

Thirty-four percent of tertiary-qualified physical science and engineering associate professionals had a level 5 to 6 diploma as their highest qualification and 30 percent had a bachelors or bachelors with honours degree. The most common field of study was engineering, with 41 percent of tertiary-qualified people employed in this occupation. Among these, qualifications in electrical engineering were most common. The rest of the people in the occupation had qualifications spread over a wide range of fields, including management and commerce, society and culture, and creative arts.

Figure 5.4: Physical science and engineering associate professionals by field of study and highest level of qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

Within this group in 2006, physical science and engineering technicians had the lowest fill rate at 34 percent. Particularly extreme shortages were found for surveyors, drafters and telecommunications technicians. Ship and aircraft controllers and technicians had a slightly higher fill rate at 37 percent. Optical and electronic equipment controllers had a fill rate close to the overall average of 61 percent. However, within this group, medical radiation technicians experienced a very low fill rate of 36 percent. Safety and health inspectors also had a fill rate of 61 percent, while computer equipment controllers had the highest fill rate, at 72 percent. However, the fill rate for computer programmers was only 46 percent (Department of Labour, 2007a). In 2007, shortages for computer equipment controllers and safety and health inspectors had worsened (Department of Labour, 2008b).

Engineering technicians are heavily represented in both the long-term and immediate skill shortage lists for immigration purposes. Two draughting specialties are included in the immediate skill shortage list, and medical technicians are included in the long-term skill shortage list. In most cases immigrants require at least a level 6 national diploma (Department of Labour, 2006a and 2007a).

Table 5.2: Proportion of employees in physical science and engineering associate professional occupations on the immigration skill shortage lists

	Physical science and engineering technicians	Computer equipment controllers	Optical and electronic equipment controllers	Ship and aircraft controllers and technicians	Safety and health inspectors
Long-term	10%	44%	41%	0%	0%
Immediate	62%	0%	21%	18%	0%
Neither	28%	56%	39%	82%	100%
Total	100%	100%	100%	100%	100%

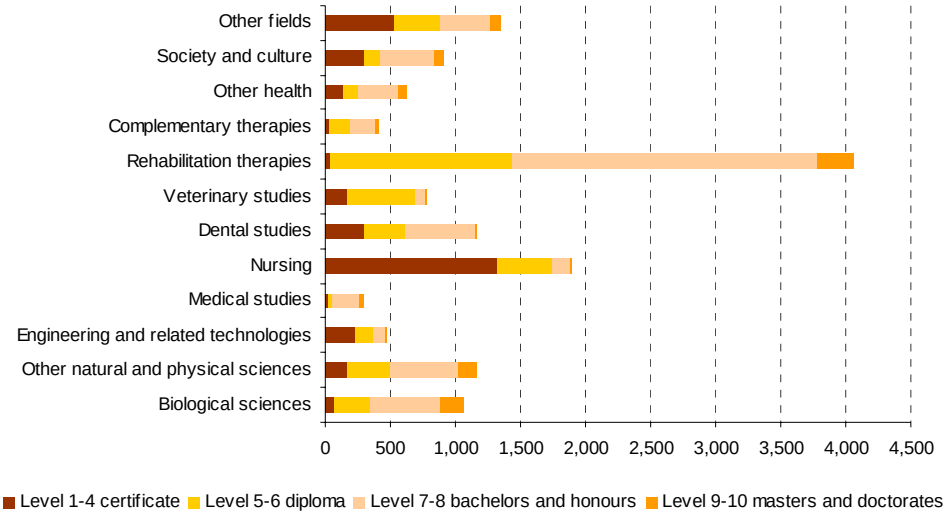
An assessment of skill shortages for information technology technicians found that over the period to 2005 demand had fluctuated, but overall employment had fallen by nearly 1 percent per annum. At the same time, there was growth in the supply of new graduates, indicating that there should not be a shortage in this occupation (Department of Labour, 2006c).

5.2 Life science and health associate professionals

Sixty-five percent of tertiary-qualified life science and health associate professionals were employed in the health care and social assistance industry. In addition, 12 percent are employed in professional, scientific and technical services and 5 percent in education and training.

The largest number of tertiary-qualified life science and health associate professionals have their highest qualification in rehabilitation therapies – at either diploma or bachelors level. The next largest group have qualifications in nursing, mostly at certificate level, followed by dental studies. There are also substantial numbers with science qualifications, with almost half of these in the biological sciences.

Figure 5.5: Life science and health associate professionals by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

Within this group, health associate professionals had the lowest fill rates at 51 percent in 2006. This included dental therapists, who had an extremely low rate of only 21 percent, and physiotherapists, retail dispensary assistants and occupational therapists, with fill rates ranging from 44 to 55 percent. Enrolled nurses had a relatively good fill rate at 76 percent, as did life science technicians at 80 percent (Department of Labour, 2007a). In the 2007 survey, shortages of enrolled nurses had substantially increased, with fill rates falling to 29 percent (Department of Labour, 2008b).

The skill shortage lists for immigration feature several of the health associate professional occupations in either long-term or immediate skill shortages. Two life science technician occupations are also included on the long-term list. Most occupations require at least a bachelors degree (Department of Labour, 2006a and 2007b).

Table 5.3: Proportion of employees in life science and health associate professional occupations on the immigration skill shortage lists

	Life science technicians and related workers	Health associate professionals	Nursing associate professionals
Long-term	54%	62%	0%
Immediate	0%	20%	0%
Neither	46%	18%	100%
Total	100%	100%	100%

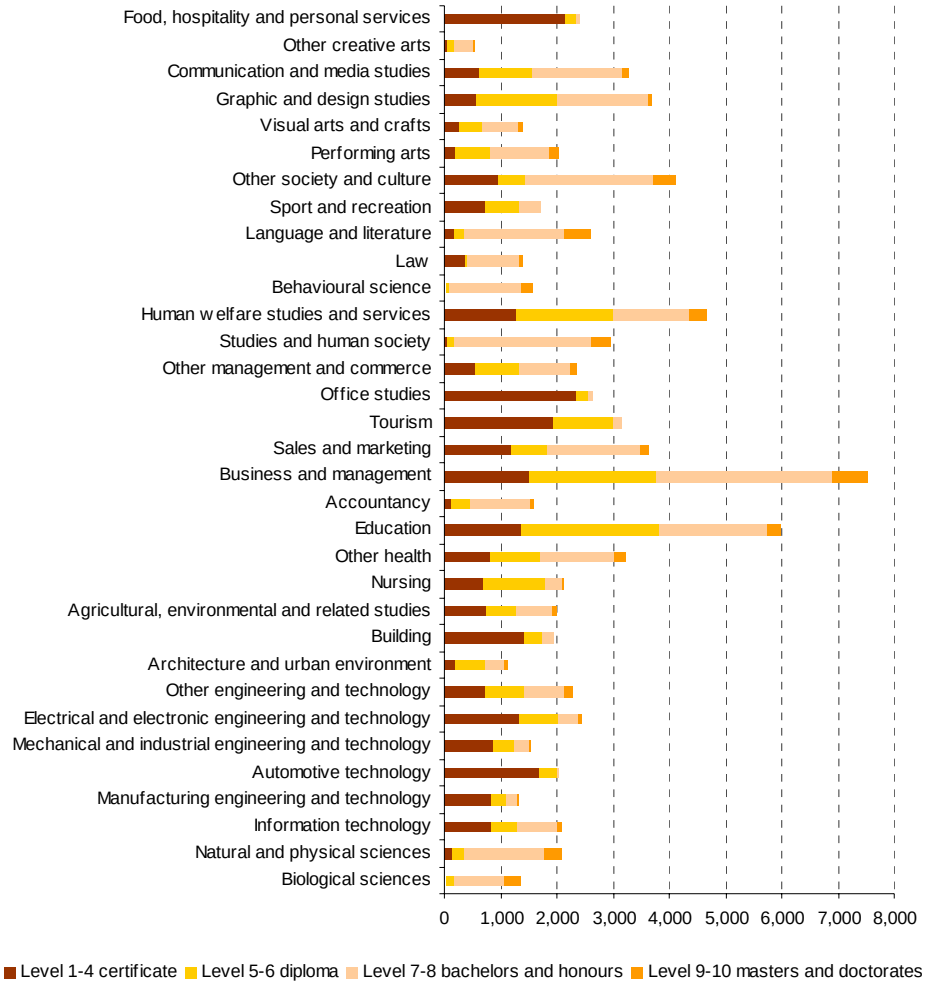
An assessment of skill shortages for occupational therapists found no genuine skill shortages in 2004, but rather difficulties due to recruitment and retention (Department of Labour, 2005h). The assessment found an adequate level of supply of qualified occupational therapists; however, many did not want to take up positions at current levels of remuneration and other conditions of employment. Fill rates have remained low for this occupation (Department of Labour, 2007a).

5.3 Other associate professionals

The other associate professionals group includes the areas of finance and sales, administration, government, social work, careers and employment advice, writing, art, entertainment and sport, religion and environmental protection. As such, this occupational group is spread across a wide range of industries. The largest proportion of tertiary-qualified other associate professionals are employed in professional, scientific and technical services (12 percent), followed by education and training (10 percent) and health care and social assistance (9 percent).

Tertiary-qualified other associate professionals have qualifications from a wide range of fields of study, reflecting the range of individual occupations and industries covered. The most common fields of study are business and management, education, and human and welfare studies and services.

Figure 5.6: Other associate professionals by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

The lowest fill rate amongst other associate professionals was for finance and sales associate professionals, with an overall rate of 55 percent. All other occupations had fill rates ranging from 67 percent for social work associate professionals to 84 percent for careers and employment advisers (Department of Labour, 2007a).

The immigration skill shortage list includes social workers and film animators in the long-term list. The immediate shortage list includes senior travel consultants and occupations related to snow sports and sky-diving, which both have a strong tourism dimension. Graphic artists, jockeys and building inspectors are also included. Qualification requirements range from level 4 certificates to bachelors degrees (Department of Labour, 2006a and 2007b).

Table 5.4: Proportion of employees in other associate professional occupations on the immigration skill shortage lists

	Finance and sales associate professionals	Administrative associate professionals	Social work associate professionals	Writers, artists, entertainment and sports associate professionals
Long-term	0%	0%	47%	15%
Immediate	6%	1%	0%	24%
Neither	94%	99%	53%	61%
Total	100%	100%	100%	100%

Note: Government associate professionals, careers and employment advisers, non-ordained religious associate professionals and environmental protection associate professionals are not shown in this table as they had no occupations on either list.

An assessment of skill shortages for social workers found both genuine skill shortages and worsening recruitment and retention difficulties in 2004 (Department of Labour, 2005j). The assessment found that growth in demand had outstripped supply of qualified social workers. However, the occupation was also characterised by recruitment and retention difficulties, evidenced by the number of trained social workers who do not want to take up positions offered. It noted that shortages may be exacerbated by the return of currently employed social workers to full-time study in order to obtain a recognised social work qualification necessary for registration. More recent figures show that social workers continue to be in short supply (Department of Labour, 2007a).

6 Trades workers

As discussed in section 3, across trades workers there has been:

- medium growth over the last five years, with some small recent gains through migration
- the third highest proportion of tertiary-qualified employees, with 52 percent holding a tertiary qualification, but only 9 percent holding a qualification at level 5 and above
- high levels of skill shortages, with the lowest fill rate of any occupational group and 81 percent of employees in occupations listed on the immigration skill shortage lists.

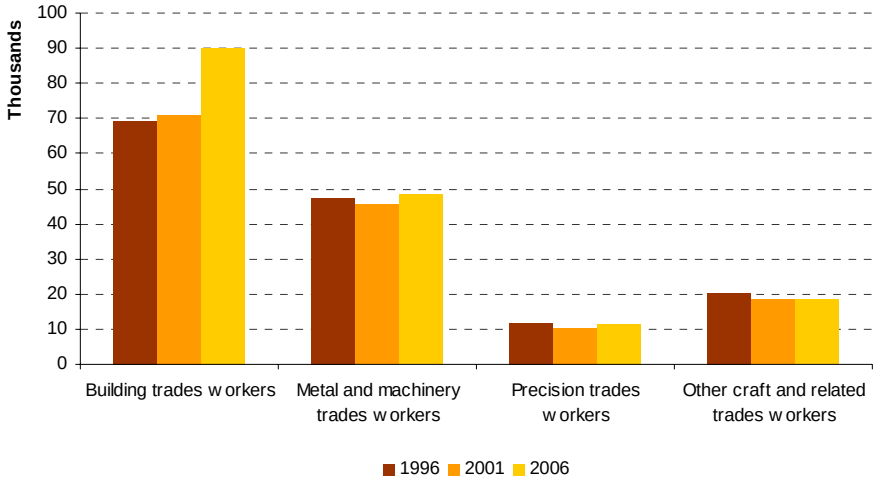
Table 5.1 provides a breakdown of the key indicators for each of the four groups of trades workers.

Table 6.1: Indicators of growth, tertiary qualifications and skill shortages for trades workers

		Building trades workers	Metal and machinery trades workers	Precision trades workers	Other craft and related trades workers	All occupations
Growth in employment 1996-2006	5-year	27%	7%	7%	0%	15%
	10-year	31%	2%	-5%	-9%	21%
Net migration	5-year	1.1%	1.0%	0.5%	-1.0%	0.7%
	10-year	-2.8%	2.6%	-1.7%	-5.4%	-1.0%
Percent tertiary qualified 2006	All levels	53%	57%	47%	52%	47%
	Level 5 +	8%	10%	12%	9%	30%
Growth in tertiary qualified - Level 5+	5-year	10%	-15%	22%	2%	30%
	10-year	11%	-18%	33%	11%	57%
Fill rate 2006		44%	49%	56%	57%	61%
Percent of employees in occupations on skill shortage lists	Long-term	42%	47%	0%	19%	15%
	Immediate	39%	38%	51%	67%	21%
	Total	82%	86%	51%	86%	36%
Summary	High growth	M	L	L	L	
	Tertiary qualified	M	M	M	M	
	Skill shortage	H	H	M	M	

From 1996 to 2006, the number of people employed as trades workers increased by 19,800, representing a 13 percent increase. Most of the increase was in building trades workers from 2001 to 2006. There was a small overall increase in the number of metal and machinery trades workers and a small decrease in the number of precision trades and other craft and related trades workers.

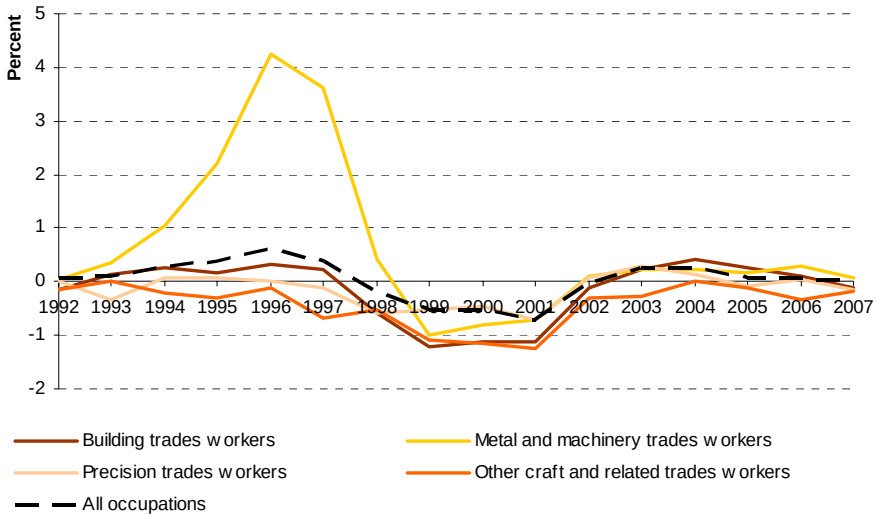
Figure 6.1: Number of people employed as trades workers



Source: Statistics New Zealand, Census of Population and Dwellings

The annual net migration rates for trades workers have been quite close to those for all occupations. The exception was high rates of net migration of metal and machinery trades workers in the 1990s. In spite of the recent growth in the construction industry, there hasn't been any notable growth in net migration in the construction-related trades. In the building and metal and machinery trades both arrivals and departures have stayed at a steady level over the last five years. In the precision trades, both arrivals and departures have been decreasing at a similar rate, while in other trades both arrivals and departures have been increasing at a similar rate.

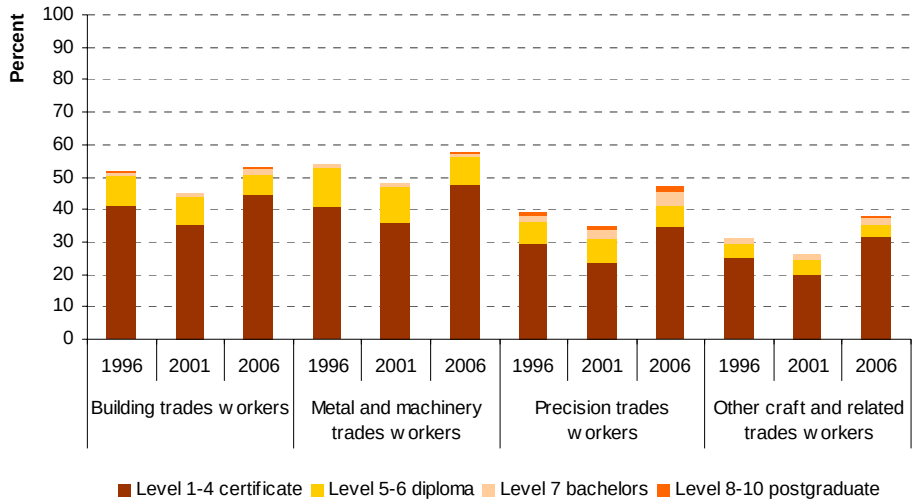
Figure 6.2: Annual net permanent and long-term migration rates for trades worker occupations



Source: Statistics New Zealand, Migration Statistics

Around half of building trades workers were tertiary qualified in 2006, with 45 percent having their highest qualification as a level 1 to 4 certificate. Sixty percent of metal and machinery trades workers were tertiary qualified and 50 percent had a level 1 to 4 certificate as their highest qualification. Nearly half of precision trades workers were tertiary qualified in 2006, and they were more likely than other trade worker groups to have bachelors degrees, with 5 percent holding a bachelors degree or above. Just under 40 percent of other craft and related trades workers were tertiary qualified in 2006.

Figure 6.3: Proportion of trades workers with tertiary qualifications



Source: Statistics New Zealand, Census of Population and Dwellings

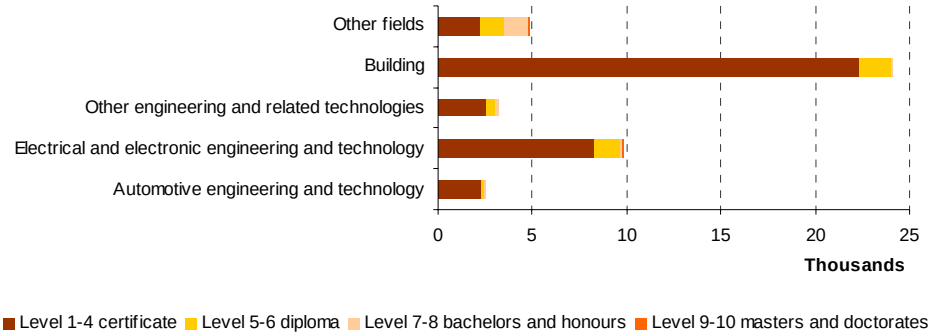
In 2006, the lowest fill rate across trades workers was for building trades workers at 44 percent, followed by metal and machinery trades workers at 49 percent. Precision trades workers and other craft and related trades workers had rates closer to the overall average at 56 and 47 percent (Department of Labour, 2007a). Fill rates decreased for all trades workers in 2007 (Department of Labour, 2008b).

6.1 Building trade workers

Seventy-two percent of tertiary-qualified building trades workers were employed in the construction industry and 10 percent in manufacturing.

Fifty-four percent of tertiary-qualified building trades workers had a qualification in building, mostly at levels 1 to 4. Another 22 percent had a qualification in electrical and electronic engineering and technology.

Figure 6.4: Building trades workers by field of study and highest level of qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

In 2006, building frame and related trades workers had the lowest fill rate at 42 percent, closely followed by electricians at 43 percent. Building finishers and related trades workers had slightly better fill rates at 49 percent (Department of Labour, 2007a). Fill rates decreased across all these trades in 2007, with the fill rate for electricians dropping to 29 percent (Department of Labour, 2008b).

Both the long-term and immediate skill shortage lists for immigration include a number of building trades occupations. These include trades in construction, boat building, plumbing, electrical and automotive. Most occupations require immigrants to hold level 3 and level 4 certificates (Department of Labour, 2006a and 2007b).

Table 6.2: Proportion of employees in building trades worker occupations on the immigration skill shortage list

	Building frame and related trades workers	Building finishers and related trades workers	Electricians
Long-term	38%	22%	93%
Immediate	60%	21%	0%
Neither	1%	57%	7%
Total	100%	100%	100%

NZIER (2006) found that building and construction employers are generally comfortable with the overall training system and number of new staff now being trained. The recent upturn in construction has highlighted some issues, such as the quality of training being provided and intergenerational tensions between the experienced workforce and newly trained staff. The report notes that the new licensing system will require more existing staff to complete qualifications and add to the push for specialisation of skills and knowledge. Trades workers will need both specialist knowledge and general knowledge of the overall process of construction projects.

In-depth assessments of skill shortages for selected building trade occupations found all of them to be experiencing genuine skill shortages. The recent construction boom has driven up demand, while the supply of new graduates has been variable.

There has been little growth in the supply of new skilled bricklayers. Predicted future growth in graduates is unlikely to meet demand. (Department of Labour, 2005n and 2006i). There has also been little growth evident in qualification completions for plumbers (Department of Labour, 2005x).

The number of carpenters in employment has been constrained by supply. Future changes to building regulations are expected to drive up demand. There has been an increase in enrolments in level 4 qualifications, but completions are still low in comparison with the growth in demand. Completions are expected to increase within the next few years, following increased enrolments (Department of Labour, 2006k).

The number of electricians employed has also been constrained by the shortage of qualified electricians. There has been an increase in supply through new graduates, people returning to the occupation, and migration. However, this growth is insufficient to meet the increased demand (Department of Labour, 2005r and 2006n).

Demand for boat builders has grown as New Zealand has become known as a supplier of custom built boats internationally. The supply of new boat builders has remained stable and some employees are being attracted into better pay and conditions in the construction industry and internationally (Department of Labour, 2005m and 2006h).

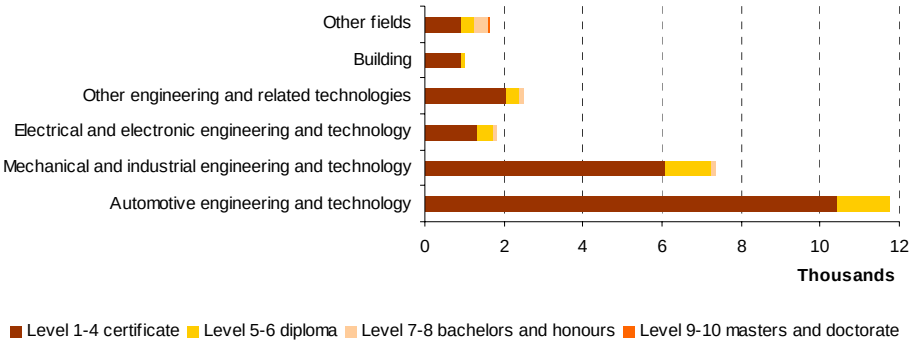
Demand has also increased for automotive electricians. This change is due to a number of factors including the increased sophistication of electronic equipment used in vehicles. While the number of new automotive electrician graduates is increasing, it is insufficient to meet the shortfall (Department of Labour, 2005k and 2006g).

6.2 Metal and machinery trades workers

Thirty-three percent of tertiary-qualified metal and machinery trades workers were employed in the manufacturing industry and 27 percent in other services, which includes repair and maintenance services. There were also a number employed in retail and wholesale trade and construction.

Most tertiary-qualified metal and machinery trades workers hold qualifications in automotive engineering or mechanical and industrial engineering.

Figure 6.5: Metal and machinery trades workers by field of study and highest level of qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

In 2006, fill rates were very low for fire alarm technicians and heating, ventilation and refrigeration mechanics, at 13 and 30 percent respectively. Most of the other occupations had fill rates ranging from 40 to 60 percent, with the exception of fitters and turners, with a fill rate of 80 percent (Department of Labour, 2007a).

A number of metal and machinery trades occupations are included in the immigration skill shortage lists. These occupations cover metal workers, motor mechanics and electrical technicians. In most cases, immigrants require a level 4 or 5 national certificate (Department of Labour, 2006a and 2007b).

Table 6.3: Proportion of employees in metal and machinery trades worker occupations on the immigration skill shortage lists

	Metal moulders, sheet-metal and related workers	Blacksmiths, toolmakers and related workers	Machinery mechanics and fitters	Electrical and electronic instrument mechanics and fitters
Long-term	34%	56%	54%	33%
Immediate	57%	0%	37%	29%
Neither	9%	44%	8%	38%
Total	100%	100%	100%	100%

In-depth assessments of selected metal and machinery trades worker occupations found that in all cases there were genuine skill shortages.

While the number of people employed as sheet-metal workers has not increased since the early 1990s, the supply of new workers has diminished, and is inadequate to cope with retirements. New Zealand has also lost workers to overseas migration (Department of Labour, 2005y and 2006s).

Employment of fitters and welders has also remained flat since 2001. This is partly due to labour-saving technology, but also to a lack of supply of qualified workers. While there has been a slight increase in the numbers attaining qualifications, it has been insufficient to cope with the loss of fitters and welders through migration and movement into other occupations (Department of Labour, 2005t).

Demand for fitters and turners fluctuates from year to year and was higher in the period to 2005, at a point where a lot of fitters and turners were retiring. However, training levels rose during this period as well and this may have resulted in some equilibrium in demand and supply at the present point (Department of Labour, 2005s and 2006o).

Demand for panel beaters is increasing with the increasing number of vehicles on the road. While training has been sufficient to replace people retiring, it has been insufficient to replace those leaving the occupation or moving overseas (Department of Labour, 2005w).

There has been growth in demand for diesel mechanics because of the increase in the number of diesel busses and trucks on the road. While training rates have increased, the number of new trainees is only sufficient to replace retirees, and insufficient to meet growth in demand (Department of Labour, 2005q and 2006m).

Demand for motor mechanics is increasing as the number of vehicles on the road increases. Training of new mechanics is barely sufficient to compensate for retirements and enrolments have not been increasing (Department of Labour, 2005v).

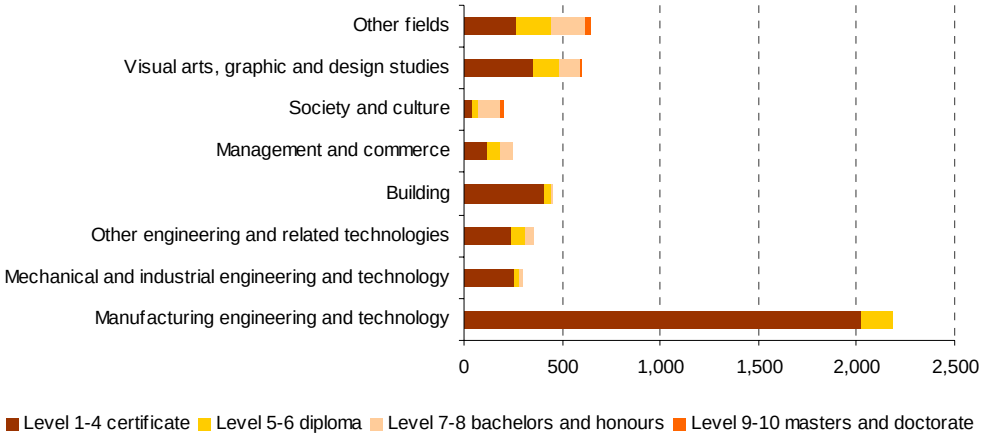
Demand for heating, ventilation, air conditioning and refrigeration mechanics has grown with the growth in the construction industry and the uptake of new technologies, such as heat-pumps. The supply of new mechanics has increased, but is insufficient to meet the growing demand (Department of Labour, 2006p).

6.3 Precision trades workers

Fifty-eight percent of tertiary-qualified precision trades workers are in the manufacturing industry. However, the rest are spread across a range of industries, including information media and telecommunications (9 percent) and construction (8 percent).

Forty-three percent of tertiary-qualified precision trades workers have their highest qualification in manufacturing engineering and technology. There is also a significant group (15 percent) with qualifications in creative arts, particularly visual and graphic arts. The greatest proportion of these qualifications are at diploma and degree level.

Figure 6.6: Precision trades workers by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

The overall fill rate for precision trades workers was 56 percent. The only occupation within the group that a fill rate could be calculated for was printing machinists, who had a slightly higher fill rate of 64 percent (Department of Labour, 2007a). The fill rate for printers decreased to 39 percent in 2007 (Department of Labour, 2008a).

The immediate skill shortage list for immigration contains a number of specific occupations for printing machinists. In most cases, immigrants require the equivalent of a level 4 national certificate in printing (Department of Labour, 2006a and 2007b).

Table 6.4: Proportion of employees in precision trades worker occupations on the immigration skill shortage lists

	Precision instrument makers and related workers	Glass cutters and related workers	Printing trades workers
Long-term	0%	0%	0%
Immediate	0%	0%	65%
Neither	100%	100%	35%
Total	100%	100%	100%

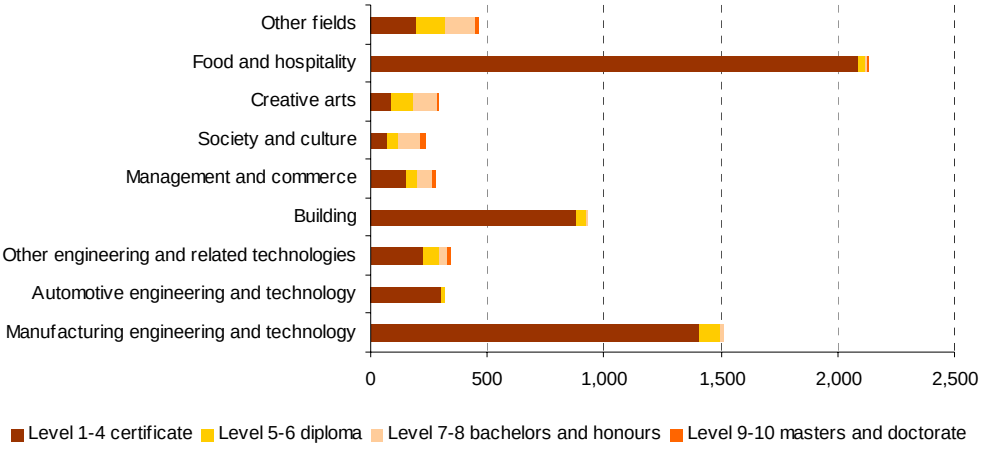
An assessment of skill shortages for printing machinists found genuine skill shortages (Department of Labour, 2006r). While employment levels have decreased in the industry due to new technology, training levels have remained low and are barely enough to compensate for retirements. There has also been loss through migration and occupational detachment.

6.4 Other craft and related trade workers

Forty-seven percent of tertiary-qualified other craft and related trades workers are employed in manufacturing. A further 28 percent are in retail trade and 10 percent in construction.

Thirty-three percent of tertiary-qualified other craft and related trades workers have their highest qualification in food and hospitality. The next largest group have their highest qualification in manufacturing engineering and technology (23 percent), followed by building (15 percent).

Figure 6.7: Other craft and related trades workers by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

In 2006, tailors and dressmakers had the lowest fill rate at 42 percent. Next highest were cabinetmakers at 51 percent. Shortages were not as critical for food processing trades workers, with a fill rate of 69 percent (Department of Labour, 2007a). In 2007, fill rates for cabinet makers decreased to 25 percent, while rates for tailors and dressmakers improved to 68 percent (Department of Labour, 2008b).

Cabinetmakers are included in the long-term skill shortage list for immigration. The immediate skill shortage list includes butchers and bakers and furniture- and flooring-related occupations. Immigrants are required to have a level 4 certificate (Department of Labour, 2006a and 2007b).

Table 6.5: Proportion of employees in other craft and related trades worker occupations on the immigration skill shortage lists

	Food and related products processing trades workers	Cabinetmakers and related workers	Tailors and dressmakers	Leather goods makers
Long-term	0%	88%	0%	0%
Immediate	99%	12%	62%	0%
Neither	1%	0%	38%	100%
Total	100%	100%	100%	100%

In-depth assessments of skill shortages for selected occupations within this group found that there were genuine skill shortages in each case.

Demand for bakers has grown as household expenditure has grown. The supply of trade-qualified bakers has diminished due to migratory outflows and low numbers achieving recognised qualifications (Department of Labour, 2005l).

While the employment of butchers has declined, there are very few new butchers being trained. Increases in completions are not sufficient to offset migratory outflows (Department of Labour, 2005o).

The food and beverage sector skills action plan (Food and Beverage Skills Working Group, 2006) identified both genuine skill shortages and recruitment issues in the industry. The plan notes that qualifications are only part of the picture, with on-job training, work experience and attitude also being important.

Employment of cabinetmakers has declined due to the increase in low-cost imported furniture. The supply of cabinetmakers has also declined, although it is showing recent signs of increasing. There has also been occupational detachment, with some workers moving into better-paid jobs in carpentry and boat building (Department of Labour, 2005p and 2006j).

7 Other occupational groups

This section looks at the other occupational groups to identify whether there are specific occupations within them that have skill shortages that could be addressed through increased achievement of advanced qualifications.

7.1 Legislators, administrators and managers

Nearly all the people employed in this occupational group are in the sub-group of 'corporate managers' (93 percent in 2006). As shown in Table 3.1 on page 23, there has been:

- substantial growth in the number of people employed, with 50 percent growth from 1996 to 2006, making this the second largest occupational group

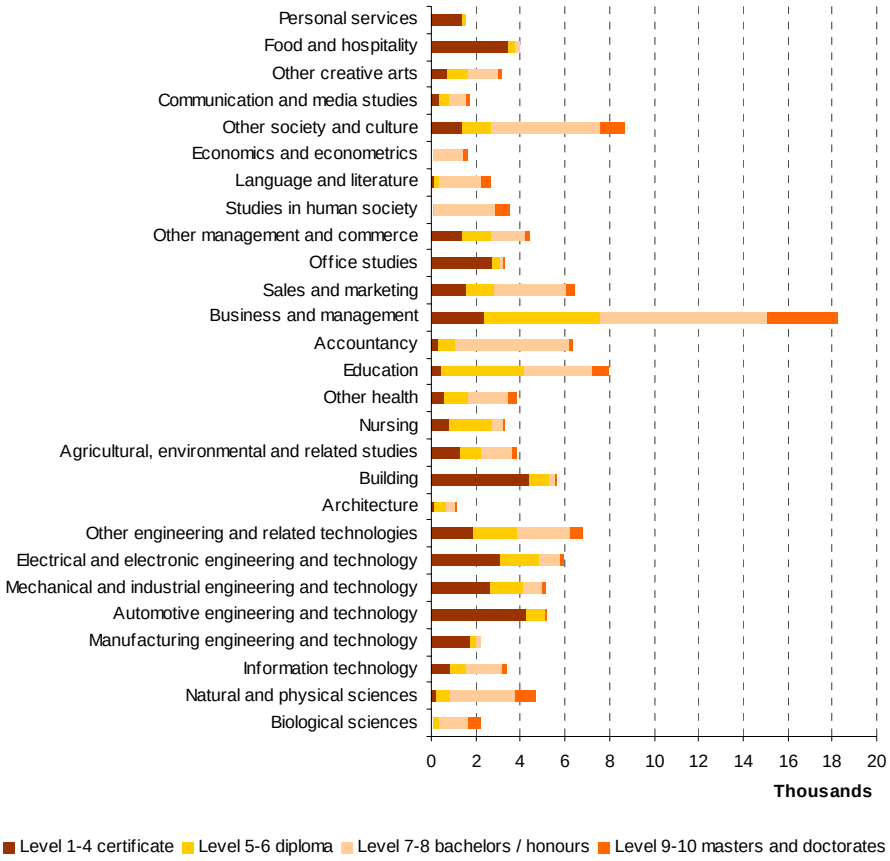
- a high proportion of employees with tertiary qualifications, with the third largest proportion across occupation groups holding qualifications at level 5 and above and one of the highest percentage increases in attainment of level 5 and above qualifications from 1996 to 2006

- relatively low levels of skill shortage, with fill rates above the overall average in 2006 and 2007, and only 15 percent of employees in occupations on the immigration skill short lists. These were in the areas of information technology, infrastructure and hospitality management.

While the largest number of tertiary-qualified corporate managers have their highest qualification within a management and commerce discipline, these people only make up 30 percent of all tertiary-qualified managers. The remainder have qualifications across a range of other areas. At bachelors level these other qualifications are likely to be in sciences, social sciences or humanities. At certificate and diploma level they are likely to be industry-related qualifications in engineering, building or hospitality. There are also a number with education, nursing and other health qualifications.

Research on management capability in small to medium enterprises (Massey et al, 2005) found that there is a good supply of management training in New Zealand. Most small business managers come up through the business, rather than being recruited directly to management levels. Management training is not well taken up by small business managers due to pressure of other demands on their time. Management training needs to be linked to the business and businesses need to see a reason to invest in it.

Figure 7.1: Corporate managers by field of study and highest level of tertiary qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

7.2 Plant and machine operators and assemblers

As shown in Table 3.1 on page 23, across plant and machine operators and assemblers there has been:

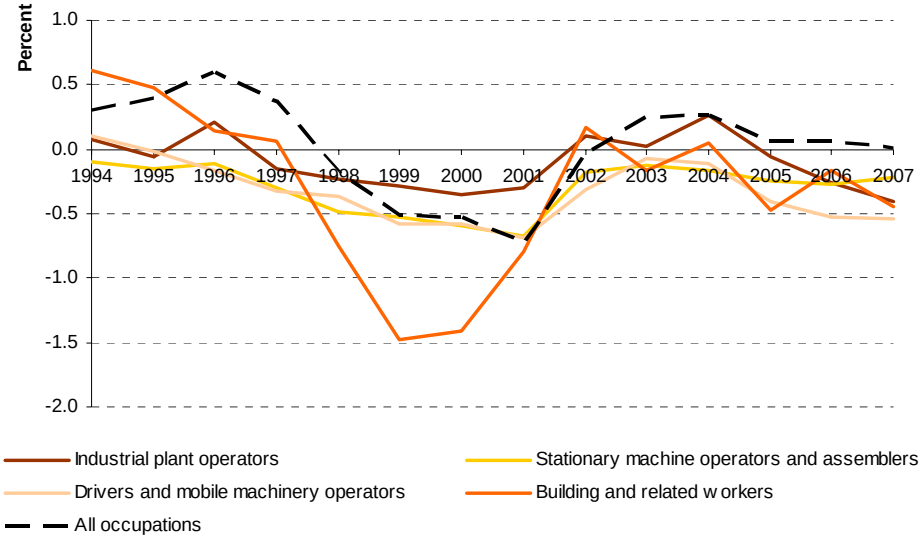
— fairly limited growth in employment, with the highest rate of loss due to migration over the last 10 years

— a low proportion of tertiary-qualified staff, just slightly above the proportions for elementary occupations

— the second highest level of skill shortage, equal to that of technicians and associate professionals, with 54 percent of advertised jobs filled within 10 weeks.

Net annual migration rates for plant and machine operators and assemblers have been consistently lower than the rate for all qualifications. The rate has been particularly low for building and related workers, where there was a substantial net loss from 1998 to 2001 that has not been recovered. This is in spite of the recent boom in construction. Across all four occupations, departures have been growing at a faster rate than arrivals. This suggests difficulty in competing internationally within these occupational groups.

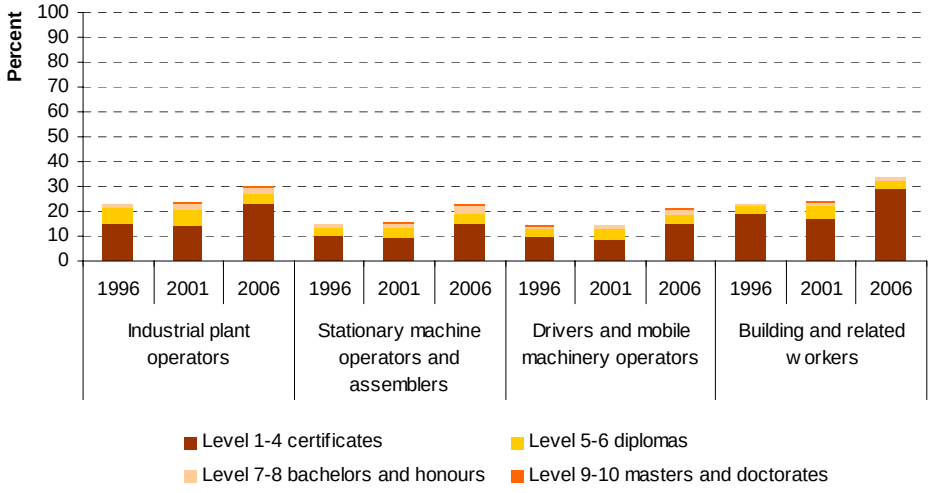
Figure 7.2: Net annual permanent and long-term migration rates for plant and machine operators and assemblers



Source: Statistics New Zealand, Migration Data

Overall, around 20 percent of plant and machine operators and assemblers were tertiary qualified in 2006. However, there has been growth over the last 10 years in the proportion with a tertiary qualification, particularly for building and related workers.

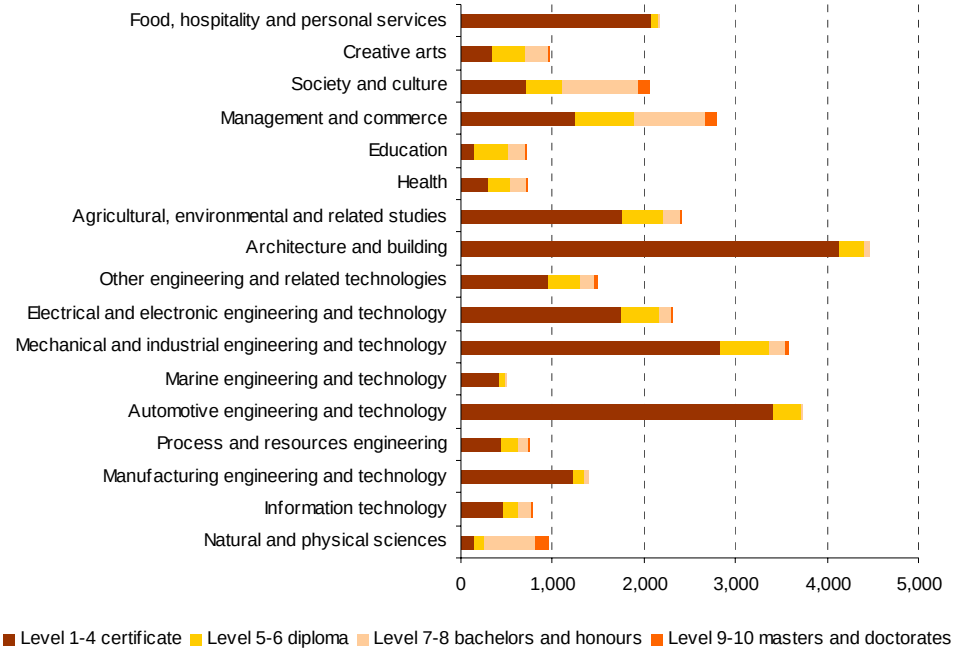
Figure 7.3: Proportion of plant and machine operators and assemblers with tertiary qualifications



Source: Statistics New Zealand, Census of Population and Dwellings

The tertiary qualifications of plant and machine operators and assemblers are spread across a range of disciplines, with 43 percent being in engineering and related technologies. However, there are also significant numbers with qualifications in building, management and commerce, and food and hospitality.

Figure 7.4: Plant and machine operators and assemblers by field of study and highest level of qualification



Source: Statistics New Zealand, Census of Population and Dwellings 2006

In 2006, driver and mobile machinery operators had the lowest fill rates at 46 percent, closely followed by building and related workers at 47 percent. Industrial plant operators and stationary machine operators and assemblers had somewhat better fill rates at 61 and 64 percent respectively (Department of Labour, 2007a). In 2007, the rate for building and related workers dropped to 37 percent (Department of Labour, 2008b).

There are no plant and machine operator and assembler occupations included in the long-term skill shortage list for immigration. However, a number of occupations are included in the immediate skill shortage list, covering plastics, textiles, driving and building. Most require a level 3 or 4 certificate (Department of Labour, 2006a and 2007b).

An assessment of skill shortages for line mechanics found genuine skill shortages (Department of Labour, 2006q). Fill rates have been low. There have been recent increases in demand for line mechanics as new investment is being made in the electricity infrastructure. This has not been matched by the increase in supply of new graduates. The occupation has also been depleted by net outward migration.

7.3 Other occupations

The remaining occupational groups are clerks, service and sales workers, agriculture and fisheries workers, and elementary occupations. As shown in Table 3.1 on page 23, across these occupations there has been:

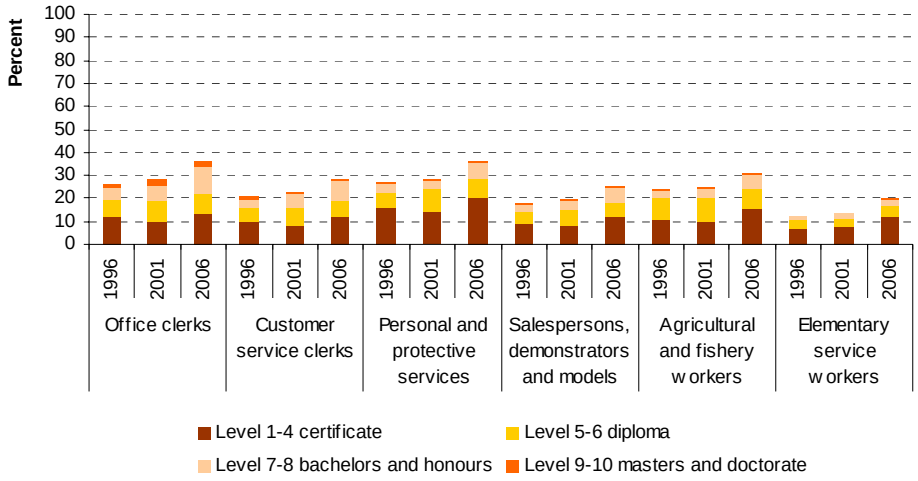
— relatively low growth in employment over the last 10 years, with the exception of recent growth in elementary occupations. In the case of clerks and agriculture and fishery workers, numbers employed have decreased over the last 10 years

— lower proportions of tertiary-qualified staff than other occupations, although there has been high relative growth in the number of employees with level 5 qualifications and above in all of these occupations, except for agriculture and fisheries workers

— medium to low levels of skill shortages, with fill rates at or above the average across all industries.

Across these occupational groups, the proportion of employees with tertiary qualifications has increased over the last 10 years. The most highly qualified group are office clerks, followed by personal and protective services.

Figure 7.5: Proportion of selected occupations with tertiary qualifications



Source: Statistics New Zealand, Census of Population and Dwellings

The overall fill rate for clerks was 75 percent, the highest of any occupational group. Within clerks, office clerks had a fill rate of 80 percent and customer services clerks of 65 percent. The overall fill rate for service and sales workers was 63 percent, just above the average fill rate across all occupations. Within this occupation, the lowest fill rates were for chefs and hairdressers, at 52 and 56 percent respectively. Agriculture and fishery workers had a fill rate of 70 percent. Within this occupation, the lowest fill rate was for forestry workers at 67 percent. The fill rate for elementary workers was equal to the average across all occupations at 61 percent, with labourers having a particularly low fill rate of 45 percent (Department of Labour, 2007a).

Chefs are included on the long-term skill shortage list for immigration, requiring a level 4 certificate in cookery. A number of agricultural occupations are included in the immediate skill shortage list for immigration. Most of these require lower-level tertiary certificates and/or experience in the area. The two exceptions are winemakers and poultry farm managers, where degrees are sought after. Two road labouring occupations are also included in the immediate skill shortage list (Department of Labour, 2006a and 2007b).

An assessment of skill shortages for chefs found genuine skill shortages and recruitment and retention difficulties (Department of Labour, 2006l). There has been strong growth in demand for chefs as a result of population growth, increased tourism and economic growth. Although the number of new chefs has increased, there is a high rate of occupational detachment due to low pay, demands of the work and unsocial working hours. The food and beverage industry skills action plan (Food and Beverage Skills Working Group, 2006) came to a similar conclusion and notes the young age profile of chefs and extensive use of work-permit staff.

An assessment of skill shortages for hairdressers found that the occupation had recruitment difficulties (Department of Labour, 2005u). Demand had increased slowly over the past decade and is likely to continue to rise. An adequate number of hairdressers are being trained. This means that the low fill rate represents employees leaving the occupation due to low wages and poor working conditions.

Within this group of occupations there appears to be only one group where there may be genuine skill shortages, that is, labourers. It has a low fill rate and some specific occupations on the immediate skill shortages list. Net losses to migration suggest that some of the shortage may be due to global competition. However, tertiary qualifications are not generally required for this occupation.

Although a number of agricultural occupations are included in the immediate skills shortage list, the Survey of Employers who have Recently Advertised suggests fill rates for these occupations are relatively good. Net losses due to migration suggest that these occupations may be sought after in a global market. The occupations that do have larger proportions of employees who are tertiary qualified, that is, office clerks and sales and service workers, do not appear to have genuine skill shortages. Skill demands in these areas have been met to some extent by immigration in recent years.

8 Conclusions

8.1 Demand for advanced-level qualifications in professional occupations

In the professional occupations, the highest levels of skill shortages are in the physical, mathematical and engineering professions and life science and health professions. The former has also had the highest levels of employment growth, followed by other professionals. In the health and education areas there has been considerable upskilling as more nurses and teachers upgrade their qualifications from diplomas to degrees.

For physical, mathematical and engineering professions, the areas of high demand are for engineers, architects and computing professionals. The key drivers for advanced skills in these occupations are technology development and increased investment in construction and infrastructure. In engineering, there is demand for employees with diplomas and bachelors degrees, especially in electrical/electronic, civil and mechanical/industrial engineering. In architecture and computing, the demand is largely for bachelors and above.

For life science and health professions, the areas of high demand are for health professionals and nurses. This is being driven by increased specialisation in health services and increased demand as the population ages. Shortages for nurses are more due to recruitment and retention difficulties than supply of new graduates. However, demand will continue to increase. Across the other health professions, including midwives, graduate undersupply is likely to be an issue. Increasing the ethnic diversity of the workforce and regional access are key issues for these occupations. These occupations generally require health qualifications at bachelors level and above.

Skill shortages for teaching professionals are more moderate. The most significant shortage is for qualified early childhood teachers with a diploma in early childhood education. Shortages are increasing for secondary school teachers, with subject teachers in technology, science and maths being in shortest supply.

For other professions, areas with evidence of skill shortage are policy analysts, psychologists and accountants, in particular auditors. Policy analysts are recruited from a wide range of disciplines, which makes it difficult to establish a link between education and occupation. Psychology and accountancy both require specific qualifications at bachelors level and above.

8.2 Demand for advanced-level qualifications in technician and associate professional occupations

In the technician and associate professional occupations, the highest level of skill shortages are in the physical science and engineering associate professions, while the highest growth has been in other associate professions.

For physical science and engineering associate professions, the areas of high demand are for surveyors and draughters and engineering technicians, including telecommunications and ship and aircraft control, medical technicians and computer programmers. This demand is driven by increased use of technology as well as investment in infrastructure development. Generally the demand is for diploma-level qualifications. However, for computer programmers and medical technicians there is greater demand for bachelors-level qualifications.

For life science and health associate professions, the areas of high demand are for health associate professionals, particularly dental therapists, physiotherapists, retail dispensary assistants and occupational therapists. This demand is driven by changing demographics and increased demand for health services. In the case of occupational therapists, recruitment and retention issues are more significant than the supply of new graduates. These occupations require diploma or degree-level qualifications. There has also been a level of upskilling from diploma to degree level in this occupation.

For other associate professions, skill shortages are not as great. The highest level of shortage is in finance and sales associates, followed by social workers. The former group includes people with diplomas and bachelors degrees in business and management, sales and marketing, and tourism, but is also likely to draw people with qualifications in other areas. The shortage of social workers is due to a combination of low graduate supply, recruitment and retention difficulties and study demand to upgrade qualifications to meet new registration requirements. The occupation requires diploma and bachelors qualifications in social work.

8.3 Demand for advanced-level qualifications in trades worker occupations

In the trades worker occupations, the highest levels of skill shortages are for building trades workers and metal and machinery trades workers. The former is largely driven by the recent boom in the construction industry and infrastructure development, while the latter reflects increased use of machinery and technology in industry.

The building trades workers group covers a range of construction trades, including plumbers and electricians. Boat builders and automotive electricians are also included. There has been high demand across these occupations. As the number of new trainees coming through increases and construction activity reduces, this demand is likely to reduce. The advanced levels in these occupations are level 4 and 5 certificates. The main fields in which employees hold qualifications are building and electrical/electronic engineering and automotive engineering.

Metal and machinery trades workers covers metal workers, motor mechanics and electrical technicians. There are high shortages of technicians for electrical and electronic equipment, such as fire alarms and ventilation. There are significant skill shortages across most of the other occupations. The advanced levels in these occupations are level 4 and 5 certificates. The main fields in which employees hold qualifications are automotive engineering, mechanical and industrial engineering and electrical and electronic engineering.

The largest occupation within precision trades workers is printing trades workers. This occupation is experiencing a medium level of shortage. Advanced-level qualifications for this trade are generally level 4 certificates in printing and/or design.

In the other craft and related trades workers group, there are ongoing shortages of cabinetmakers, largely due to more attractive wages and conditions in the construction and boat building industry. There also appear to be some shortages of butchers and bakers. Advanced-level qualifications for these trades are generally level 4 certificates, across manufacturing engineering, building and food and hospitality.

8.4 Demand for advanced-level qualifications in other occupations

Demand for advanced-level qualifications in other occupations is in greater equilibrium than for professional, technical and trade occupations. That is, the supply is generally meeting the demand.

While there has been substantial growth the number of corporate managers and increased demand for them to have tertiary qualifications, skill shortages in this occupation are relatively low. Employees are also drawn from a wide range of backgrounds and tertiary qualifications, so that there is no single set of qualifications that feed into this occupation.

While skill shortages are relatively high for plant and machine operators and assemblers, there is not a high demand in these occupations for people with tertiary qualifications. Where employees do hold tertiary qualifications, they cover similar areas highlighted as being in high demand for trades workers.

Across other occupations, employment growth has been low and the proportion of staff with tertiary qualifications is also low. One area where there is evidence of a skill shortage where an advanced qualification is required, is chefs with level 4 certificate qualifications.

References

BRANZ (2005) *Regional construction activity and skills forecasts*, Wellington: BRANZ Limited.

Department of Labour (2005a) *Architect: occupational skill shortage assessment,* Wellington: Department of Labour.

Department of Labour (2005b) *Civil engineer: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005c) *Dentist: occupational skill shortage assessment,* Wellington: Department of Labour.

Department of Labour (2005d) *Early childhood teacher: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005e) *Electronic engineer: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005f) *Information technology professional: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005g) *Registered nurse: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005h) *Occupational therapist: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005i) *Pharmacist – hospital and retail: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005j) *Social worker: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2005k) *Skill shortage assessment – occupation: automotive electrician*, Wellington: Department of Labour.

Department of Labour (2005l) *Skill shortage assessment – occupation: baker*, Wellington: Department of Labour.

Department of Labour (2005m) *Skill shortage assessment – occupation: boat builder*, Wellington: Department of Labour.

Department of Labour (2005n) *Skill shortage assessment – occupation: bricklayer*, Wellington: Department of Labour.

Department of Labour (2005o) *Skill shortage assessment – occupation: butcher*, Wellington: Department of Labour.

Department of Labour (2005p) *Skill shortage assessment – occupation: cabinetmaker*, Wellington: Department of Labour.

Department of Labour (2005q) *Skill shortage assessment – occupation: diesel mechanic (machinery mechanic)*, Wellington: Department of Labour.

Department of Labour (2005r) *Skill shortage assessment – occupation: electrician*, Wellington: Department of Labour.

Department of Labour (2005s) *Skill shortage assessment – occupation*: fitter and turner, Wellington: Department of Labour.

Department of Labour (2005t) *Skill shortage assessment – occupation: fitter and welder*, Wellington: Department of Labour.

Department of Labour (2005u) *Skill shortage assessment – occupation: hairdresser*, Wellington: Department of Labour.

Department of Labour (2005v) *Skill shortage assessment – occupation: motor mechanic*, Wellington: Department of Labour.

Department of Labour (2005w) *Skill shortage assessment – occupation: panel beater*, Wellington: Department of Labour.

Department of Labour (2005x) *Skill shortage assessment – occupation: plumber*, Wellington: Department of Labour.

Department of Labour (2005y) *Skill shortage assessment – occupation: sheet-metal worker*, Wellington: Department of Labour.

Department of Labour (2006a) *Immediate skill shortage list: December 2006*, Wellington: Department of Labour.

Department of Labour (2006b) *Accountant: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006c) *Information technology professional: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006d) *Mechanical engineer: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006e) *Midwife: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006f) *Optometrist: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006g) *Automotive electrician: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006h) *Boat builder: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006i) *Bricklayer: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006j) *Cabinetmaker: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006k) *Carpenter: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006l) *Chef: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006m) *Diesel mechanic: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006n) *Electrician: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006o) *Fitter & turner: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006p) *Heating, ventilation, air conditioning & refrigeration mechanic: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006q) *Line mechanic: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006r) *Printing machinist: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2006s) *Sheet-metal worker: occupational skill shortage assessment*, Wellington: Department of Labour.

Department of Labour (2007a) *Occupations in shortage in New Zealand: 2006*, Wellington: Department of Labour.

Department of Labour (2007b) *Long term skill shortage list: July 2007*, Wellington: Department of Labour.

Department of Labour (2008a) *Skills in the labour market at a glance, February 2008*, Wellington: Department of Labour.

Department of Labour (2008b) *Survey of employers who have recently advertised (SERA) 2007 – skill shortages: occupations in shortage in New Zealand,* Wellington: Department of Labour.

DHBNZ (2006a) *Midwifery workforce strategy,* Wellington: District Health Boards New Zealand.

DHBNZ (2006b) *Nursing workforce strategy*, Wellington: District Health Boards New Zealand.

DHBNZ (2007) *The technical health workforce employed in DHBs*, Wellington: District Health Boards New Zealand.

Food and Beverage Skills Working Group (2006) *Skills action plan for the food and beverage sector: towards a high skill, high wage, high value economy*, Report to the Food and Beverage Taskforce from the Skills Working Group, Wellington: Food and Beverage Taskforce.

McCallum, S (2006) *Computer science graduate shortage*, Technical Report OUCS-2006-10, Computer Science Department, University of Otago, Dunedin: University of Otago.

Mason, G and M Osborne (2007) *Productivity, capital-intensity and labour quality at sector level in New Zealand and the UK*, New Zealand Treasury Working Paper 07/01, Wellington: The Treasury.

Massey, C et al (2005) *Building management capability in New Zealand; an assessment of supply and demand*, Research prepared for the Ministry of Economic Development, Palmerston North: New Zealand Centre for SME Research.

Medical Reference Group (2006) *Fit for purpose and for practice: advice to the Minister of Health on the issues concerning the medical workforce in New Zealand*, Wellington: Health Workforce Advisory Committee.

Ministry of Economic Development, The Treasury and Statistics New Zealand (2007) *Economic development indicators 2007,* Wellington: Ministry of Economic Development.

Newell, J and M Perry (2006), *Trends in the contribution of tertiary education to the accumulation of educational capital in New Zealand: 1981-2001*, Report for the Ministry of Education, Wellington: Ministry of Education.

Ng, L (2007) *Monitoring teacher supply – survey of staffing in New Zealand schools at the beginning of the 2007 school year*, Wellington: Ministry of Education.

NZIER (2006) *Skills and training in the building and construction industry – findings from qualitative research with BCITO's stakeholders*, Report to the Building and Construction Industry Training Organisation, Wellington: Building and Construction Industry Training Organisation.

NZIER (2007) *NZIER consensus forecasts: December 2007*, Wellington: New Zealand Institute for Economic Research.

NZIER (2008a) *Quarterly Survey of Business Opinion: January 2008*, Wellington: New Zealand Institute for Economic Research.

NZIER (2008b) *NZIER quarterly predictions: March 2008*, Wellington: New Zealand Institute for Economic Research.

Office of the Minister for Tertiary Education (2006) *Tertiary Education Strategy 2007-12, incorporating the Statement of Tertiary Education Priorities 2008-10*, Wellington: Ministry of Education.

Organisation for Economic Cooperation and Development (2007) *Education at a glance 2007: OECD indicators*, Paris: Organisation for Economic Cooperation and Development.

Razzak, W A and J Timmins (2007a) *Education and Labour Productivity in New Zealand*, Paper prepared for the Department of Labour.

Razzak, W A and J Timmins (2007b) *A macroeconomic perspective on skill shortages and the skill premium in New Zealand*, Paper prepared for the Department of Labour.

Statistics New Zealand (2006) *Business Operations Survey 2005,* Hot Off The Press, Wellington: Statistics New Zealand.

Statistics New Zealand (2007) *Business Operations Survey 2006,* Hot Off The Press, Wellington: Statistics New Zealand.

Statistics New Zealand (2008) *Productivity Statistics: 1978-2007,* Hot Off The Press, Wellington: Statistics New Zealand.

Tertiary Education Commission (2004) *Qualifications supply analysis – the New Zealand health sector*, Wellington: Tertiary Education Commission.

Workforce Taskforce (2007) *Reshaping medical education and training to meet the challenges of the 21st century: a report to the Ministers of Health and Tertiary Education from the Workforce Taskforce*, Wellington: Ministry of Health.

Appendix: Data sources

New Zealand Census of Population and Dwellings

The data for the 2006 census comes from customised tables supplied by Statistics New Zealand. The data for 1996 and 2001 comes from tables developed for the Ministry of Education by Jamie Newell (Newell and Perry, 2006).

The census data is based on self-reports and includes a degree of underreporting of qualifications and occupations. Qualification data refers only to the highest qualification attained and may miss other occupationally relevant qualifications at a lower level. In the census, qualification field of study and level are coded on the basis of write-in responses and subject to a degree of interpretation. A comparison of census and tertiary education data demonstrated that there is a reasonable match between the two sources. Therefore, census data provides a good starting point for analysis and is also the only comprehensive source of information on qualifications and occupation currently available.

Department of Labour Skills Monitoring Project

Two information sources from this project are used. The Survey of Employers who have Recently Advertised 2006 has been used to establish relative skill shortage across occupations. Early surveys were not used due to questions of consistency of coverage and methodology. The 2007 survey results were released as this report was being finalised. Where these results differ notably from 2006, it has been noted in the text. The in-depth skill assessments conducted in 2005 and 2006 have been summarised to provide more detailed information about the nature of the skill shortages.

A related source of information is the long-term and immediate skill shortage lists used for immigration purposes. These provide triangulation of the skill monitoring data. A measure has been constructed which takes the occupation codes included on each list – at the five-digit level – and calculates the number of employees in those narrowly defined occupations as a proportion of employees across the occupational group in question. The December 2006 immediate skills shortage and the July 2007 long-term skills shortage lists were used, with employee numbers coming from the 2006 Census. This approach controls for the differing size of occupational groups. However, in some cases the list requirements are for a particular skill within the occupation, which is not captured by the classification. The lists also provide quite specific information on the levels and types of qualifications required for occupations.

Classification of occupations

The New Zealand Standard Classification of Occupations 1999 has been used to define occupations, as this is the common categorisation across available data sources. This standard has recently been superseded by the Australian and New Zealand Standard Classification of Occupations 2006.

Migration data

Migration data has been obtained from Statistics New Zealand. This data is collected when people enter and exit the country. Occupation is self-reported and is significantly underreported.

The migration rates are the number of migrants as a proportion of people employed in the occupation. This enables comparison of migration across different sized occupational groups.

1996, 2001 and 2006 census data has been used for the number of people employed, with intervening years interpolated using a straight line. Given the extent of underreporting, these rates should be interpreted as trends, rather than absolute values.