

# **IMPACT OF POPULATION AGEING IN NEW ZEALAND ON THE DEMAND FOR HEALTH AND DISABILITY SUPPORT SERVICES, AND WORKFORCE IMPLICATIONS**

Background Paper prepared for the  
Ministry of Health

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# INTRODUCTION

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New Zealand has an ageing population. This is one of three demographic trends that characterise recent changes in New Zealand's population structure: declining fertility, the ageing of the baby boom generation and an increase in average life expectancy. As a result, the composition of New Zealand's population pyramid is changing, with a widening at the top in the older age groups (Stephenson and Scobie 2002). New Zealand is not alone in addressing the implications of population ageing. Many countries are facing the prospect or reality of an increase in the proportion of the population aged 65 and over (Jacobzone 1999, WHO 2002). One of the main concerns created by an increasing older population is the impact this might have on the demand for and provision of health care and disability services (Ministry of Health 2002d).

For the average older person, the process of ageing is often associated with some decline in functional capacity. Chronic diseases disproportionately affect older adults and contribute to ongoing disability, diminished quality of life and increased demand and need for long-term health care (Goulding et al 2003). These impairments may be physical (eg, arthritic and rheumatic joints), sensory (eg, a decline in eyesight and hearing), or related to cognitive functioning and loss of memory, the most serious of which are the dementias. Thus, as ageing progresses it is associated with a growing need for acute health care services, and ongoing chronic illness that sometimes necessitates long-term care (Evans et al 2001).

However, not all researchers see old age as automatically associated with ill health and long-term disability. Conditions that influence health in early life, such as diet and access to medical care, have an impact on later life morbidity and mortality. Given the improvements in health care in early life over the last century, successive cohorts reaching old age may experience much better levels of health and longevity than previous generations (UNESCAP 1999, Metz 2001). For example, Shaw (2002) challenges the validity of the claims that older people are more prone to illness, and that increases in life expectancy automatically translate into increased disease and thus a higher demand for health services. He argues that the health demands of younger age groups may fall, offsetting growth in the demand arising from ageing. Shaw also contests the view that old age automatically brings on permanent states of disability, noting that most people over 65 in the UK are fit and healthy. Cohort effects are also apparent. Each subsequent generation is becoming healthier, as a result of both life-style factors and advances in medical technology. Shaw also cites mounting evidence that serious disease is concentrated in a shorter period of time at the end of life and that morbidity and age do not rise in strict proportion to each other – a phenomenon known as the 'compression of morbidity'. Thus, in the UK currently, older people generally remain free of prolonged morbidity or disability until they reach their 70s, after which they may face increasing and accelerating health problems and disability levels until death (Shaw 2002).

Other research divides the older population into two sub-groups, the ‘young-old’ and the ‘older-old’. Thus while researchers concede that people over the age of 65 are associated with higher health needs, in the form of doctors’ visits and prescription medicine use, it is people over the age of 80 to 85 years who are most likely to require long-term residential or home-based care for chronic and debilitating conditions and disabilities (UNESCAP 1998, Stone 2000).

Given these competing views, the focus of this paper is a review of the literature from selected OECD<sup>1</sup> countries on the projected impact of population ageing on health and disability support services. The literature review was completed in June 2003. The paper examines the relationship between age and health care and disability support service use in New Zealand, and presents projections of demand for these services to 2011 and 2021. The paper will cover basic demographic data on population ageing and these will form the basis for projections. The following chapters explore the implications of these projections for policy in the New Zealand health sector. Trends and data for specific age-related illnesses, central to the demand for health services in the future, will also be examined. Trends and projection data are disaggregated by gender and ethnicity where possible, in order to acknowledge the differential health status and rates of service use between men and women, and between Pākehā New Zealanders and those of Māori or Pacific Island descent.

Much of the international literature has focused on the fiscal and economic implications for the health sector arising from population ageing (see Department of Health and Aged Care 1999, Emmerson et al 2000, Evans et al 2001, OECD 2001b, Robson 2001, Jacobzone and Oxley 2002). The New Zealand Government addressed the economic impact of population ageing on health services in a 1999 report (Johnston and Teasdale 1999). As a general finding, the international literature on projecting future health expenditure suggests that ageing will have a considerable, but manageable, effect on projected health expenditure (eg, Department of Health and Aged Care 1999). However, future health costs due to ageing will also be influenced by other factors, such as advances in technology, increases in life expectancy, and labour costs (Jacobzone and Oxley 2002). The OECD estimates that New Zealand will face an increase of 4 percentage points of GDP<sup>2</sup> expenditure on health between 2000 and 2050 (OECD 2001b). This background paper does not directly address fiscal implications, but it must be acknowledged that future health service demand is inextricably linked with both policy and funding levels.

<sup>1</sup> Organisation for Economic Co-operation and Development.

<sup>2</sup> Gross domestic product.

## NEW ZEALAND DEMOGRAPHIC TRENDS

Population ageing can be measured by change in the median age of the population. In New Zealand this is now 35, but it will be 46 by 2051. This means that half the population, and half the workforce, is already over 35. More commonly, ageing is seen as growth in the percentage of the population above a certain age. Projections from Statistics New Zealand<sup>3</sup> suggest that the population aged 65 and over will grow by about 100,000 during the next decade, to reach 566,000 by 2011. After that, the increase will accelerate as the baby boom generation enters this age group, so that between 2011 and 2021 the population aged 65 and over is expected to grow by 215,000 and between 2021 and 2031 by another 250,000. By 2051, there will be 1.18 million people aged 65 and over in New Zealand, representing an increase of 165% since 1999. At that stage, older people are expected to make up 26% of the New Zealand population of 4.63 million. Within the older population, it is the age group 85 and over that has the highest growth rate. Population projections indicate that by 2051 there will be 290,000 people aged 85 and over – a six-fold increase over the turn of the 21st century (Khawaja 2000).

### AGE COMPOSITION OF THE POPULATION AGED 65 AND OVER

The data show that people aged 80 and over will form an increasing proportion of the population aged 65 and over (Table 1). Thus the older population is itself ageing. There are no clear trends for change in the other five-year age groups.

**Table 1: Percentage of total population 65 and over, by age group, 2001 base and series 4 projections**

| Age group (years) | Percentage of population |      |      |
|-------------------|--------------------------|------|------|
|                   | 2001                     | 2011 | 2031 |
| 65–69             | 28.4                     | 30.2 | 27.5 |
| 70–74             | 26.2                     | 24.3 | 24.5 |
| 75–79             | 21.0                     | 18.0 | 19.1 |
| 80–84             | 13.6                     | 14.2 | 14.7 |
| 85 plus           | 10.8                     | 13.3 | 14.2 |

Source: Khawaja 2000, updated in November 2002 using 2001 base data

<sup>3</sup> These observations draw on the 'medium' series of the 1999 base New Zealand population projections, which cover the 52-year period to 2051. This series assumes that, during the projection period, the life expectancy at birth for males will increase from 75.2 years to 82.0 years and for females from 80.4 years to 86.5 years (as a result of medical advances, changes in lifestyle, etc), and that there will be a net migration gain of 5000 per year (the annual average for the last 99 years).

The ethnic composition of older New Zealanders is also changing. The figures in Table 2 are derived from Statistics New Zealand's (2001) projections. Projections are provided for the Māori, Pacific and Asian populations and for total population<sup>4</sup> based on unprioritised ethnicity data, where people are included in all of the ethnic groups with which they identify.

Median ages will increase in all three ethnic groups. The Asian figure is closest to that for the total population, with the Pacific population having the lowest median, now and in the future. Māori, Pacific and Asian people are expected to represent an increasing proportion of all three age groups over the 20-year period (Table 3). Again these figures are based on unprioritised ethnicity data, which may inflate the projected proportions in different ethnic groups. In the age group 65 and over the increasing proportions are most marked for the Māori and Asian populations.

**Table 2: Projected population, by age group and ethnicity, 2001 (base) and projections for 2011 and 2021**

|                | Population by age group (years) |       |         |         |       |         | Median age (years) |
|----------------|---------------------------------|-------|---------|---------|-------|---------|--------------------|
|                | 0–14                            | 15–64 | 65 plus | 0–14    | 15–64 | 65 plus |                    |
|                | Number (000)                    |       |         | Percent |       |         |                    |
| <b>Māori</b>   |                                 |       |         |         |       |         |                    |
| 2001 (base)    | 216                             | 350   | 20      | 37      | 60    | 3       | 22.1               |
| 2011           | 214                             | 418   | 33      | 32      | 63    | 5       | 24.1               |
| 2021           | 225                             | 468   | 57      | 30      | 62    | 8       | 26.8               |
| <b>Pacific</b> |                                 |       |         |         |       |         |                    |
| 2001 (base)    | 100                             | 153   | 9       | 38      | 58    | 3       | 21.4               |
| 2011           | 117                             | 200   | 14      | 35      | 60    | 4       | 22.1               |
| 2021           | 136                             | 252   | 25      | 33      | 61    | 6       | 24.0               |
| <b>Asian</b>   |                                 |       |         |         |       |         |                    |
| 2001 (base)    | 61                              | 200   | 11      | 23      | 73    | 4       | 28.6               |
| 2011           | 104                             | 359   | 26      | 21      | 73    | 5       | 30.7               |
| 2021           | 118                             | 431   | 55      | 19      | 71    | 9       | 36.1               |
| <b>Total</b>   |                                 |       |         |         |       |         |                    |
| 2001 (base)    | 877                             | 2543  | 461     | 23      | 66    | 12      | 35                 |
| 2011           | 822                             | 2850  | 577     | 19      | 67    | 14      | 38                 |
| 2021           | 791                             | 2922  | 792     | 18      | 65    | 18      | 40                 |

<sup>4</sup> The projection series are based on different assumptions because of inter-ethnic mobility and different migration levels. The following assumptions are made in the projections given in Table 2.

**Māori population:** Series 6: assuming medium fertility, medium mortality, annual net migration of 2500 and medium inter-ethnic mobility.

**Pacific population:** Series 6: assuming medium fertility, medium mortality, annual net migration of 500 and medium inter-ethnic mobility.

**Asian population:** Series 6: assuming medium fertility, medium mortality, medium annual net migration and medium inter-ethnic mobility.

**Total population:** Series 4: Assuming medium fertility, medium mortality and long-term annual net migration of 5000.

**Table 3: Ethnic groups as a percentage of total population, 2001 (base) and projections for 2011 and 2021**

|                | Percentage by age group (years) |       |         |
|----------------|---------------------------------|-------|---------|
|                | 0–14                            | 15–64 | 65 plus |
| <b>Māori</b>   |                                 |       |         |
| 2001 (base)    | 24.6                            | 13.8  | 4.3     |
| 2011           | 26.0                            | 14.7  | 5.7     |
| 2021           | 28.4                            | 16.0  | 7.2     |
| <b>Pacific</b> |                                 |       |         |
| 2001 (base)    | 11.4                            | 6.0   | 2.0     |
| 2011           | 14.2                            | 7.0   | 2.4     |
| 2021           | 17.2                            | 8.6   | 3.2     |
| <b>Asian</b>   |                                 |       |         |
| 2001 (base)    | 7.0                             | 7.9   | 2.4     |
| 2011           | 12.7                            | 12.6  | 4.5     |
| 2021           | 14.9                            | 14.8  | 6.9     |

Table 4 gives the numerical estimates for the age group 65 and over, the current and predicted share this age group represents of the ethnic group population, and the current and predicted share of total population.

**Table 4: Age group 65 and over, by ethnicity, 2001 (base) and projections for 2011 and 2021**

|                | Number (000) | Percent of ethnic group population | Percent of total population 65 plus |
|----------------|--------------|------------------------------------|-------------------------------------|
| <b>Māori</b>   |              |                                    |                                     |
| 2001 (base)    | 20           | 3                                  | 4.3                                 |
| 2011           | 33           | 5                                  | 5.7                                 |
| 2021           | 57           | 8                                  | 7.2                                 |
| <b>Pacific</b> |              |                                    |                                     |
| 2001 (base)    | 9            | 3                                  | 2                                   |
| 2011           | 14           | 4                                  | 2.4                                 |
| 2021           | 25           | 6                                  | 3.2                                 |
| <b>Asian</b>   |              |                                    |                                     |
| 2001 (base)    | 11           | 4                                  | 2.4                                 |
| 2011           | 26           | 5                                  | 4.5                                 |
| 2021           | 55           | 9                                  | 6.9                                 |
| <b>Total</b>   |              |                                    |                                     |
| 2001 (base)    | 461          | 12                                 |                                     |
| 2011           | 577          | 14                                 |                                     |
| 2021           | 792          | 18                                 |                                     |

In 2011 and in 2021 Māori, Pacific and Asian people aged 65 and over will still represent a smaller proportion of their respective ethnic groups than the 65 and over age group will in the total population. People aged 65 and over are expected to represent 18% of the total population in 2021, but only 9% of Asian, 8% of Māori and 6% of Pacific peoples. These ethnic groups will also represent only a small proportion of the total population 65 and over. In 2001 Māori, Pacific and Asian peoples combined represented 8.7% of the population aged 65 and over, but this will grow to 12.6% in 2011 and 17.3% in 2021.

The expected numerical increase in people 65 and over in the three ethnic groups is, however, significant. Between 2001 and 2021 the Māori population 65 and over is expected to grow by 185%, the Pacific population by 178% and the Asian population in this age group by 400%. This compares with an estimated growth of 72% for the total population aged 65 and over. Future demographic projections were not available by gender, and no further breakdowns were available by age.

# 1 IDENTIFYING THE ISSUES AND FUTURE CHALLENGES FOR HEALTH SYSTEMS: AN OVERVIEW OF THE INTERNATIONAL LITERATURE

---

In the international literature there is a wide range of opinions and debate about the impact population ageing will have on health systems. It is generally recognised that increased life expectancy, due partly to the success of health interventions, has resulted in many countries facing a growing challenge of chronic illnesses and disabilities and an increasing demand for both acute and long-term health services (Goulding et al 2003).

There has been great concern about whether the increasing numbers of older people with health problems will create a major problem for health services. Two main views can be distinguished in the literature, known as the ‘crisis’ and the ‘manageability’ perspectives. The former predicts dire consequences for future health systems and argues that population ageing justifies making major structural adjustments to public health services (eg, Marzouk 1991, Henripin 1994, Foot 1996).

In contrast, proponents of the ‘manageability’ view argue that ageing, while important, will be manageable without placing an uncontrollable burden on either costs or service provision (eg, Jacobzone et al 2000, Evans et al 2001, Hogan and Hogan 2002). However, the proponents of this position also acknowledge that population ageing is a serious concern, and that important issues need to be addressed by the health service sector in order to manage demographic change and avert a crisis in the future.

The starting point for these debates, and for any analysis of future demand for health and disability services, is to project current utilisation trends while taking into account likely demographic changes. However, there are many uncertainties about whether current trends will continue into the future, and there are many different opinions about what assumptions should be made when projections are calculated. In their report to the European Commission, Triantafillou et al (1999) argued that when making both demographic and epidemiological projections, consideration must be given to the powerful cohort effects that exist in many states of the European Union (EU).

The baby boom generation coming into retirement in the next decades will result in an expansion of the older population. However, they argue that the growing numbers of the very old (those over 85 years and over) in the EU in the next three decades could be more indicative of increased demand on health services, given that the ‘older-old’ group contains a high proportion of those needing health and disability services. A third of people aged 80 and over in the EU require care at present. But the authors concede that changing rates and prevalence of serious disability could affect their predictions (Triantafillou et al 1999).

The issue of changing disability rates is taken up by Carey (1999), who compares Organisation for Economic Co-operation and Development (OECD) projections with those developed in Australia. The

OECD assumes that people 65 years and over will spend a smaller proportion of their remaining lives with severe disabilities, which serves to moderate increases in the costs of long-term care. Australian research does not, however, show older people in that country experiencing a decline in disability rates.

Clearly, the proportion of older people in a population is a central issue in predicting the demand for and use of health and disability services, given assumptions about rates of physical disability, dementia and related disorders. However, an increase in life expectancy will have an impact on disability trends and whether these remain constant between cohorts (Gibson and Liu 1994). This must also be factored into projections.

Increased good health among older people may offset the economic impact on the health system as the population ages (Jacobzone et al 1998). A significant issue is whether increasing life expectancy equates with improving or deteriorating age-specific health status. Although mortality trends are declining in many Western countries, this does not tell us much about the relative health of the people who are living longer (Evans et al 2001). As a result, there is a great deal of debate about rates of morbidity among older people as life expectancy continues to rise.

At the very basic level the growth in numbers of older people will certainly increase the demand for both formal and informal health services in the future (Triantafillou et al 1999). Older people are known to 'consume' three to four times the amount of health care services than would be consistent with their share of the population. For example, health expenditure for people over 65 in Australia is 3.8 times higher than for those under 65. This rises to five times greater for those over the age of 75. The greatest area of expenditure is for nursing homes and acute hospital services (Carey 1999).

Changes in the trends in age-specific illnesses will have an impact on the demand for future health and disability services. Jacobzone et al (1998) and Garber et al (1998) indicate that it is not old age *per se* that results in increasing health costs and demands, but the increased survival of people with poor health into old age. Increased demand for health services may relate to the growth of unhealthy lifestyles in Western countries, with a reliance on processed foods, reduction in exercise and an increase in sedentary jobs. These are associated with increasing obesity, diabetes and heart disease (Jackson 2002). Wanless (2001) reported that the major causes of death and disease in the UK are likely to remain similar, with mental illness, cancer and cardiovascular diseases ranked foremost in mortality rates. However, he also makes the point that intervention programmes (such as smoking cessation programmes) may alter the impact of the burden of disease in the future.

Meerding et al (1998) examined the determinants of the demand for health care resources caused by different types of illness in the Netherlands. They found that costs rose slowly throughout life, but from the age of 50 they rose exponentially. The top five areas of health demand and cost were mental retardation, musculoskeletal disease, dementia, other mental disorders and ill-defined conditions. Stroke, cancers and coronary heart disease ranked 7, 8 and 9 respectively. For people over 85, mental retardation and dementia ranked first in terms of health care costs, followed by stroke and accidental falls. Clearly a large part of the health and disability service budget is spent on older people with cognitive and mental conditions who require long-term nursing care.

While the ageing population is expected to increase demand for health and disability services, the most pressing requirement is to reduce the time spent in dependency and long-term care (OECD 1998b). Research has found that a large number of older people will use long-term residential care at some point during their later years. For example, Carey (1999) found that 40% of those over the age of 70 enter residential care in Australia. The incidence of severe or profound disability rises sharply with age: 17% of people aged 65 and over in Australia have a severe or profound handicap, rising to 41% for people aged over 80 years, and many of these people require residential care (Carey 1999).

Similarly, in the EU high health care costs and demand for health services are disproportionately accounted for by older people with chronic conditions that require long-term care, including long-term mental conditions and degenerative neurological conditions. Greater numbers of people with these conditions surviving into old age is predicted to increase the demand on long-term-care health systems (Triantafyllou et al 1999). The demand for long-term care will also depend on government policies, especially the extent to which users will be expected to pay for those services. Clearly the delivery of long-term care for frail older people requires in-depth analysis in terms of policy, funding and effectiveness (OECD 1998b, Jacobzone 1999).

In addition to trends in disability, health status and specific age-related illnesses, several other factors are likely to impact on future acute and long-term care provision. Metz (2001) and Hogan and Hogan (2002) argue that while demographic ageing can be predicted reasonably well, the future relationship between age, health needs and advances in medical technology cannot. Projections of long-term care needs must factor in the impact of medical and other technologies. Wanless (2001), in his report on the UK health service, argues that the main pressures on the health care system will arise from increasing patient expectations, the impact and availability of medical technology, the rising costs of providing care, and the availability of informal carers.

These issues have implications for health and disability services and will also affect the composition of the future health workforce. Increased and changing demands for the care of older people may result in a shortage of skilled workers (Jackson 2002). Hogan and Hogan (2002), in their review of the Canadian health system, considered it imperative that governments prioritise and plan future workforce needs.

In summary, the international literature raises numerous issues that will affect future demand for health and disability services as a result of population ageing, including:

- health status
- life expectancy trends
- disability rates
- age-related disease trends
- the impact of these factors on future long-term care requirements.

In the following chapters, each of these issues will be examined separately, with a review of the international literature and an analysis of New Zealand data and projections. Other variables may play a significant role as the population ages, but could not be reliably factored into the projections. These include advances in medical technology, consumer expectations, and the availability of informal caregivers to look after dependent older people in the community. Information from the international literature is used to highlight the potential impact of these issues on future health service demand.

## 2 HEALTH STATUS AND LIFE EXPECTANCY

---

The potential impact of population ageing on health systems is closely linked to theories about how trends in disability associated with chronic medical conditions and increases in life expectancy might interact with the demand for health services. Mortality data specifying age at death are used in all European countries to calculate life expectancy at birth and at different ages. Life expectancy is an indicator that is taken to reflect the overall health of the population, and is used as the basis for comparing the health status of different population groups, both within and between countries (Triantafyllou et al 1999).

### LIFE EXPECTANCY

International demographic data show large increases in life expectancy at birth and particularly at the age of 65 years, and it is assumed that this trend will continue. A report prepared in 1999 for the European Commission examined trends in the health status of older people and potential demands on the health care system as the population ages. This found that life expectancy at the age of 65 in all the EU member states, except for Ireland, had improved greatly due to declines in late-age mortality (Triantafyllou et al 1999). An OECD report examined life expectancy rates in Australia, Canada, France, Germany, Japan, Sweden, the UK and the US, and found life expectancy at age 65 years increased in all eight countries, although at varying rates. The highest increases were in Japan and France for both men and women (Jacobzone 2000).

In the UK, increases in life expectancy are apparent for all social classes and for both men and women, both at birth and at age 65 years (National Statistics 1999, Health Promotion England 2001). Between 1972 and 1999 male life expectancy at birth rose from 69.2 years to 75.0 years; for women in the same period it rose from 75.1 to 79.7. Similar trends are reported in Australia, with life expectancy increasing for both men and women, although the difference between males and females has decreased. However, much lower life expectancy is recorded for aboriginal people and Torres-Strait Islanders of both sexes (Australian Bureau of Statistics 1995).

During 1995–97 New Zealand life expectancy at birth was 74.3 years for males and 79.6 years for women, which was comparable with other OECD countries (Ministry of Health 1999a). Table 5 details New Zealand life expectancy by age and gender.

**Table 5: Life expectancy at selected ages, by gender, New Zealand, 1995–97**

| Exact age | Life expectancy (years) |        | Gender difference |
|-----------|-------------------------|--------|-------------------|
|           | Male                    | Female | Female–male       |
| 0         | 74.27                   | 79.61  | 5.34              |
| 1         | 73.81                   | 79.12  | 5.31              |
| 15        | 60.11                   | 65.36  | 5.25              |
| 45        | 32.13                   | 36.42  | 4.29              |
| 65        | 15.47                   | 19.02  | 3.55              |
| 85        | 4.93                    | 6.09   | 1.16              |

Source: Ministry of Health 1999a

Life expectancy is consistently greater for females than males. Between 1955 and 1975 female life expectancy increased at a faster rate than male life expectancy. However, since then increases in female life expectancy have slowed, and male life expectancy has been increasing at a faster rate (Ministry of Health 1999a). Consistent with international trends, life expectancy at birth in New Zealand has been increasing, and during the 1950–95 period it increased by 7.1 years for males and 8.3 years for females.

Over the 1950–70 period life expectancy at age 65 increased for females from 14.8 to 16.0 years, but declined slightly for males from 12.8 to 12.6 years. During this period there were no apparent changes in life expectancy at age 85 and over for either gender. In the more recent 1970 to 1995–97 period, however, both male and female life expectancy at age 65 increased significantly: women from 15.9 to 19.0 years and men from 12.6 to 15.5 years. In the last decade the rate of increase in life expectancy for men has been more rapid than for women. Between 1970 and 1995–97 life expectancy at age 85 increased by more than one year for both males and females, with the relative increase at 85 years being greater than at age 65 (Ministry of Health 1999a).

However, as in Australia (see Australian Bureau of Statistics 1995), there are ethnic difference in New Zealand life expectancy rates. In the 1995–97 period Māori life expectancy at birth was more than eight years lower than that for non-Māori for both genders (Ministry of Health 1999a). Estimates for Pacific peoples lie in between those for Māori and non-Māori. Table 6 presents a comparison of Māori and non-Māori life expectancy rates for 1995 to 1997.

The gap between Māori and non-Māori life expectancy remains wide at all ages for both males and females. Māori male life expectancy lags approximately eight years behind the rate for non-Māori males, and for Māori females life expectancy is nine years less than the non-Māori female rate at birth (Ministry of Health 1999a). Life expectancy for Pacific peoples is slightly higher than for Māori, but again lags behind non-Māori rates. Estimates of life expectancy without disability at age 65 also emphasise the disparity between Māori and non-Māori. At this age Māori males can expect an average of 7.4 years without a disability and Māori females 7.5 years, while non-Māori males and females can expect an average of 9.9 and 11.9 disability-free years respectively (Ministry of Health 2002c).

**Table 6: Life expectancy (years) at selected ages, by gender and ethnicity, 1995–97**

| Age | Non-Māori |        | Māori |        | Pacific |        | Pacific gap |        | Māori gap |        |
|-----|-----------|--------|-------|--------|---------|--------|-------------|--------|-----------|--------|
|     | Male      | Female | Male  | Female | Male    | Female | Male        | Female | Male      | Female |
| 0   | 75.31     | 80.60  | 67.23 | 71.61  | 69.82   | 75.63  | 5.49        | 4.97   | 8.08      | 8.96   |
| 1   | 74.73     | 79.98  | 66.99 | 71.31  | 69.46   | 75.08  | 5.27        | 4.90   | 7.74      | 8.51   |
| 15  | 61.00     | 66.20  | 53.37 | 57.69  | 55.80   | 61.35  | 5.20        | 4.85   | 7.63      | 8.51   |
| 45  | 32.81     | 37.13  | 26.16 | 29.36  | 28.00   | 32.77  | 4.81        | 4.36   | 6.65      | 7.77   |
| 65  | 15.79     | 19.33  | 12.23 | 14.54  | 13.44   | 16.58  | 2.35        | 2.75   | 3.56      | 4.79   |
| 85  | 5.06      | 6.16   | 3.94  | 5.19   | 4.40    | 5.59   | 0.66        | 0.57   | 1.12      | 0.97   |

Source: Ministry of Health 1999a

## MORTALITY RATES

Mortality rates for older people have been decreasing in New Zealand over time, with the biggest reduction in the 65–74 years age range. Between 1980 and 1998 mortality rates in this group decreased by 37%, and for the 75–84 and 85 and over age groups by 35% (Ministry of Health 2002c).

The most common cause of death over 65 years, regardless of ethnicity and gender, is ischaemic heart disease, with the rate increasing exponentially with age. Deaths from stroke, chronic obstructive respiratory disease and cancer also increase with age, although there are both gender and ethnic differences in the relative importance of each disease.<sup>5</sup> The impact of such diseases has a significant effect. It has been estimated that eliminating cancers would improve life expectancy by 3.7 and 3.9 years for males and females respectively. The removal of ischaemic heart disease would add 3.6 and 2.7 years, respectively, to male and female life expectancy and the elimination of strokes would add 0.8 years for males and 1.3 years for females (Ministry of Health 1999a).

<sup>5</sup> See Ministry of Health 2002c for detailed data on the relative contributions of these diseases to mortality rates by gender and ethnicity.

## HEALTH STATUS

While life expectancy is rising, it is not clear whether the additional years will be healthy. Information from the UK suggests that, while severe incapacitating conditions may be declining, the number of more moderate health problems may increase as the population ages and lives longer (Evandrou and Falkingham 2000, Kelly et al 2000, Wanless 2001). A recent study found that although life expectancy had increased, the majority of measures did not indicate that health among those aged 55–64 had improved (Dunnell and Dix 2000). Given these people will be 65–70 years old in 2005, lower health status in these younger cohorts may affect the future demand for health services.

Other work on morbidity in older people in Britain over a 15-year period found no evidence that health status is deteriorating and indicated improvements in perceived health, particularly among women (Jarvis and Tinker 1999). A common measure used in the international literature to estimate what proportion of life expectancy is lived in good health is healthy life expectancy (HLE). A British study examined the rates of life expectancy and HLE and reported that HLE has not increased as much as life expectancy, leaving people living longer in states of ill health. It also suggested that, while life expectancy and HLE rates are higher for women than men, women would be spending an increased amount of their later years in poor health or limited by a long-term disability (Kelly et al 2000). In his review of the evidence, Wanless (2001) concluded that while levels of very serious ill health or disability are falling, older people are experiencing greater levels of minor health problems. He also argued that even if health status remains constant, current levels of service use by older people is likely to increase over the next two decades in the UK.

Canadian research indicates that the health status of that country's older population is improving (Evans et al 2001). Chen and Millar (2000) examined the health status and behaviour of men and women in three age groups: 32–49, 50–67 and 68–85 in 1996/97, and compared them with older cohorts who were in the same age ranges in 1978/79, to examine cohort differences in health status. They found that between 1978 and 1996 mortality rates from all causes had decreased for both men and women, but the decrease was greater for men.

Much of the decline in overall age-specific death rates was due to lower cardiovascular disease. This decline was echoed by a fall in the prevalence of heart disease in the same period. High blood pressure was also found to have declined, but, in contrast, diabetes was more prevalent in the younger cohort. The percentage of men with diabetes increased significantly at all ages, although the proportion of women with diabetes rose slightly. Arthritic diseases were found to be less prevalent in the younger cohort, and older cohorts exhibited greater rates of functional limitation.

The results indicate that improved health in younger cohorts is due mainly to decreased rates of heart disease. However, the increase in diabetes, particularly for men, is a major risk factor for cardiovascular disease. In terms of age, people in their 50s and 60s were generally in better health than those two decades earlier, possibly reflecting better health service delivery for younger cohorts and increasing education and income levels in this group of Canadians (Chen and Millar 2000).

The results from these international studies indicate that improvements in the general health status of the baby boom generation may mitigate the demand and need for health services as the population ages.

In New Zealand, risk factors associated with cardiovascular disease, cancer and diabetes (such as obesity, lack of exercise, cigarette smoking and poor nutrition) are widespread (Ministry of Health 1999b). One-third of New Zealand adults are not sufficiently physically active and levels of obesity have been rising rapidly, with a 50% increase in adult obesity in the past 10 years. It has been predicted that the proportion of adults who are obese will increase from 17% in 1996 to 29% by 2011 (Ministry of Health 2002d).

In the 1996/97 New Zealand Health Survey, 24.9% of the adult population reported that they were current smokers (Ministry of Health 1999b). Males were more likely to smoke than females (26.4% and 23.5% respectively). In terms of age, approximately 10% of men and 5% of women over 75 years were smokers in 1996. In the 65–74 age group approximately 19% of men and 13% of women smoked, while in the 45–64 age group 23% of men and 20% of women classified themselves as smokers (Ministry of Health 1999b). These rates of smoking are likely to have a negative effect on the health status of people approaching older age. Smoking also varies by ethnicity. Nearly half (45.5%) of all adult Māori reported they were current smokers compared to 23.2% of Pākehā adults, 27.7% of Pacific adults and only 10.1% of other ethnic groups (Ministry of Health 1999b).

Both current and ex-smokers are significantly more likely to use general practitioner (GP) services six or more times in a year than non-smokers, and 16% of current and ex-smokers were admitted to hospital in the 12 months prior to the survey compared with 13% of non-smokers.

High blood pressure is also a risk factor associated with cardiovascular diseases. In New Zealand the proportion of people with high blood pressure increases significantly with age, and well over a third of those aged 65 and over in the 1996/97 Health Survey had high blood pressure, compared with only 2.3% in the 25–44-year-old group. In the same survey there were also significant age- and sex-specific differences across ethnic groups in the proportions with high blood pressure. For Pākehā the proportion was 11.0%, with 14.1 % for Pacific peoples and 16.6% for Māori (Ministry of Health 1999b).

The health status of New Zealanders clearly varies by ethnicity, with Māori experiencing a greater burden of disease than non-Māori. Even when age, gender and socioeconomic factors are controlled for, Māori still experience a higher prevalence and incidence of diabetes, cardiovascular disease, cancer, respiratory diseases and some infectious diseases like meningitis, rheumatic fever and tuberculosis (in some cases 50 to 100% higher than non-Māori age-adjusted rates). Māori are also one-third more likely to be disabled than non-Māori (Ministry of Health 1999a, 2002d). Older Māori also report lower levels of health status than younger Māori, with physical health rapidly declining in Māori over the age of 45 (Te Puni Kokiri 2000). Overall, the health status of New Zealanders is marked by disparities related to ethnicity and socioeconomic status, with the health of Māori, Pacific peoples and those who are economically deprived significantly poorer than that of other New Zealanders.

International comparisons of mortality rates reveal that New Zealand ranks below average on most indicators in comparison with other OECD countries (Ministry of Health 1999a). Given rapid population ageing in New Zealand over the coming decades, health status has become a high priority for health planners. Of particular concern is whether the reduction in mortality rates evident in New Zealand in recent decades reflects a reduction in the incidence of diseases. If mortality is declining but the incidence of diseases has remained stable, then it is possible that an expansion in the prevalence of diseases – and associated disability – may create a major demand for future health and disability support services. The prevalence and incidence of disability and specific diseases more common in older age will be discussed with reference to the international literature in later chapters, incorporating projections of specific disease rates and health service use.

### 3 TRENDS IN HEALTH CARE USE

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The use of health services increases with age. In the USA, adults aged 65 and older, while comprising only 12% of the population, made 24% of all physician office visits in 1999 (Merck Institute of Ageing and Health 2002). By age 65 and over, nearly 40% of Australian people surveyed had consulted a doctor in the previous two weeks and 10% had experienced periods of reduced activity (Brown 2001). Women were higher users of medical services than men: 9.8% of women aged 75 and over had used more than 50 Medicare services in a year compared with 8.6% of men (Brown 2001).

In the UK, according to Health Promotion England (2001), 53% of those aged 65 and over reported attending an outpatient or casualty department in the three months prior to being interviewed. Of people admitted, those aged 65–74 spent on average nine nights in hospital, and those aged 75 and over spent an average of 13 nights. People aged 65 and over also accounted for 33% of all completed consultant sessions in National Health Service hospitals. Overall, levels of health care provided for older people in the UK increased significantly between 1986/87 and 1996/97 (Health Promotion England 2001).

In an analysis of health and disability demands in the Australian Capital Territory, Gilbert (1997) found that while people over the age of 60 constituted 9.8% of the total population, they accounted for 24.6% of all acute-care hospital admissions. The major causes of hospitalisation were circulatory disease, neoplasms, digestive problems, genitourinary problems and musculoskeletal disorders. The study reported an increase in hospital usage with age and a corresponding increase in bed days. Those remaining in hospital for four or more days increased from 27% of people aged 60–64 to 57% of those aged 75 and over.

Triantafillou et al (1999) found that over-70-year-olds attended the accident and emergency department of a large Athenian hospital twice as often as other age groups, and they were much more likely to be admitted and referred for a further assessment. Heikkinen et al (1983) and Waters et al (1989) examined 10,000 older people living in the community in 11 countries, and while there were variations in regional patterns of service use, older people reported the highest overall use of health services. Comparisons between 60–74-year-olds and 75–89-year-olds showed only a modest increase in doctors' visits and rates of hospitalisation. However, both studies reported that the use of services by individuals with poor self-rated health and functional ability was significantly higher than for those with good self-ratings.

Demand for both intensive care unit and pulmonary services by older people in the USA is very high. The authors of a study investigating future supply and demand for specialists in these areas contended that there is no evidence that the incidence of pulmonary or other disorders that require critical care for older people is declining (Angus et al 2000). Instead, they predicted increases in the demand for services as the population ages. In this study more than half of intensive care unit care days (55.8%) were incurred by patients aged 65 and over. In days per year per 1000 person-years, the number

varied from 37.3 years for adults under 65 years through to 178.4, 244.9 and 230.9 for those aged 65–74, 75–84 and 85 and over, respectively. Similar figures are found for inpatient pulmonary care. Patients aged 65 and over used 66.8% of care days, and days per year per 1000 person-years increased from 38.3 for adults under 65, to 261.7, 443.1 and 634.1 for those aged 65–74, 75–84 and 85 and over, respectively (Angus et al 2000).

Older people are also higher users of prescribed medication. In Australia older people use 22% of all prescription drugs (Byles and Flicker 2002). Ninety percent of people over the age of 60 had used medication in the two weeks prior to the Australian National Health Survey. Medication for heart and blood pressure was used by half of all people 60 and over, and arthritis medication by 14.6% of people over the age of 75 (Brown 2001). In this survey 22% of all episodes of care in public and private hospitals involved people over the age of 70. This age group accounted for 58% of rehabilitation, 21% of acute episodes and 47% of non-acute episodes.

## **PROXIMITY TO DEATH**

Acute health care costs and service utilisation are strongly associated with proximity to death (Zweifel et al 1999, McGrail et al 2000). More than a quarter of all acute health care costs occur in the last year of life, regardless of age at death (Wanless 2001). Carey (1999) argues that high outlays at the end of life are partly due to nursing home costs for older people with severe disabilities. Health care expenditures tend to rise sharply in the last months of a person's life mainly because they are frequently hospitalised and receive intensive care. The costs during the last three months of life are eight times those for survivors.

Research in the EU also indicates that high health care costs and demands occur mainly in the last 12 months of life, irrespective of the age of death (Garber et al 1998). Given increased life expectancy rates, this increase relates mainly to older people. Triantafyllou et al (1999) claim that greater health expenditure associated with increased life expectancy occurs because people use health services for longer, but do not necessarily require higher intensity of care.

Health costs associated with proximity to death may be mediated by socioeconomic status. In a Scottish study, Graham et al (2001) found that significantly higher costs were associated with more affluent groups in the year prior to death up to the age of 75, but from this age onwards higher rates of use were found among lower socioeconomic groups. These researchers concluded that population ageing would result in increased demand, but that it would not be a major factor in health care expenditure. Wanless (2001) reported that the majority of the burden of disease in the UK is related to old age and over a third of health expenditure is for people over the age of 65. However, he concluded that, on average, about a quarter of health service use by individuals is taken up in the last year of their lives. He therefore suggests that population ageing postpones health services use to the end of life rather than producing an overall increase in costs and demand.

Lubitz et al (1995) examined the effects of future demographic changes on Medicare expenditure in the USA. They argued that this is not associated with greater life expectancy at age 65, but is more directly related to the substantial increase in absolute numbers of older people in the population.

In summary, analysts in OECD countries generally expect that the baby boom generation will create an increase in overall health service use.

## **NEW ZEALAND PATTERNS OF USE**

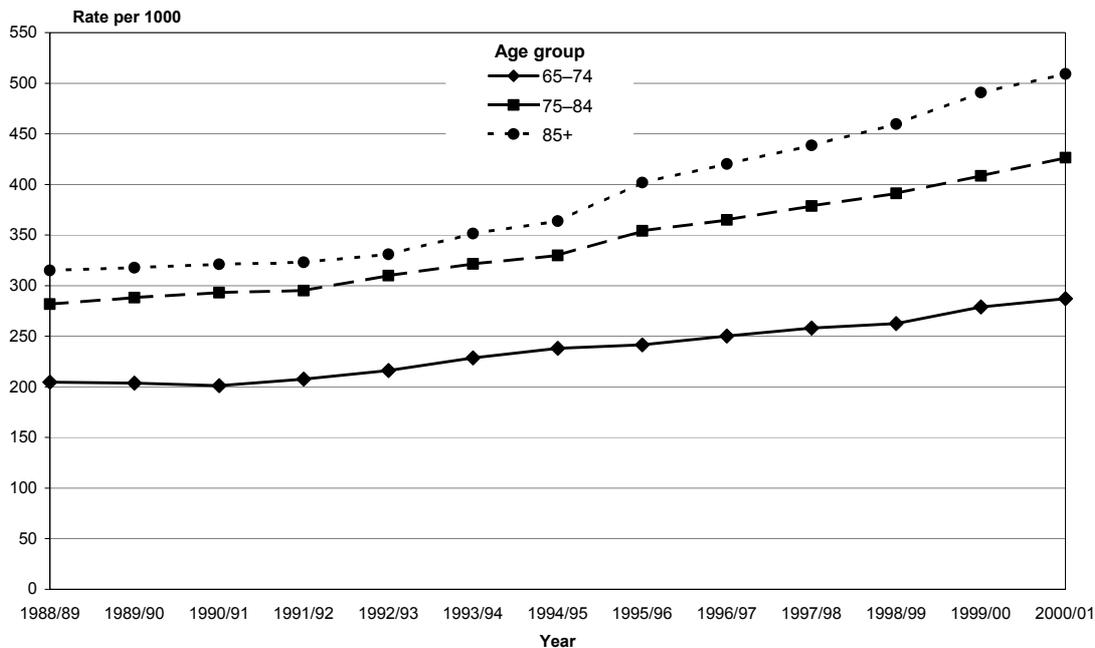
In New Zealand, older people are high users of general practice services. People aged between 65 and 74 visit GPs on average six or seven times a year, rising to nine times a year for those over the age of 85 (Ministry of Health 2002c). Similarly, expenditure on pharmaceutical and laboratory services on a per capita basis increases rapidly with age. In the 1996/97 New Zealand Health Survey, 66% of Māori adults had used health services in the year prior to the survey compared with 76% of non-Māori (Te Puni Kokiri 2000). The pattern of specific service use differed between Māori and non-Māori, with Māori adults slightly more likely to use a public hospital service than non-Māori, but use of GP services was similar (Māori 78% and non-Māori 80%). Māori were slightly less likely to use pharmacy services and less likely to collect prescriptions issued to them. In both ethnic groups people aged 65 and over were more likely to have visited a GP compared to younger age groups. Use of public hospital services was related to self-reported health status. Only 15% of Māori and 18% of non-Māori who reported excellent health used hospital services, compared with 60% of Māori and 63% of non-Māori with poor self-reported health (Te Puni Kokiri 2000).

Data on medical and surgical hospital admissions in 2000/01 (recorded on discharge, and not including outpatients or maternity services) showed that 32% of admissions in that year were for people aged 65 and over. Within that group there were much higher rates for people aged 85 and over than for those aged between 65 and 74 (534 and 260 per 1000, respectively) (Ministry of Health 2002c). Hospitalisation rates have been increasing for older people compared with those under 65. Between 1988/89 and 1996/97 hospital discharges grew by 3.1% per annum for people aged 65 and over, and since 1996/97 this growth has increased to 4.3% per annum. The highest increase is for the age group 85 and over (see Figure 1). The complexity of surgical procedures has also increased since the early 1990s and more complicated procedures are required for patients aged 65 and over (Ministry of Health 2002c). While discharge rates have increased by 4.2% per annum in the age group 65 and over, they have grown more rapidly for Māori and Pacific patients, at 6.1% and 9.6% respectively (Ministry of Health 2002c).

Older people not only use hospital services to a greater extent than those under 65, but there are also differences in the types of medical and surgical services used. Diseases of the circulatory system are the most common cause of hospitalisation, with 28% of admitted patients aged 65–74, and 25% of those aged 75–84 needing treatment for these disorders. Musculoskeletal conditions are the next most likely causes of hospital admission in both of these age groups. For those aged 85 and over the

reasons for admission are reversed, with musculoskeletal diseases taking primary importance, followed by circulatory disorders (Ministry of Health 2002c). Over the last decade length of stay in hospital for older people has been decreasing, with a corresponding increase in day cases, although both of these trends show signs of flattening out.

**Figure 1: Medical and surgical hospital discharge rates for people aged 65 and over, by age group, 1988/89 to 2000/01**



Source: Ministry of Health 2002 (presented in Ministry of Health 2002c)

In 1999/2000 6% of accident and emergency service usage was for people aged 65–74, but the percentage was lower for people aged 75 and over. Medical and surgical outpatient services were accessed at a much higher rate by older people than those under 65. People aged 65 and over accounted for 25% of medical and surgical treatments and 25% of total outpatient services (Ministry of Health 2002c). The highest use of medical outpatient services was by the 65–74 age group, and the highest use of surgical outpatient services was for those aged 75 and over.

## NEW ZEALAND PROJECTIONS

Clearly health service use increases with advancing age, as reflected in both the New Zealand data and the international literature reviewed earlier. In order to estimate the demand for primary and secondary health services, projections to 2011 and to 2021 were calculated. These projections were generated using Statistics New Zealand medium assumptions for birth and death rates, and immigration flows. Ethnicity- and age-specific cost data for primary care and disability services were not available, so ethnicity could not be included as a characteristic in the calculations. The projections

used the National Minimum Data Set discharge data by age group and service type and data on primary and secondary health service expenditure by over 65-year-olds from the *Health of Older People* statistical report (Ministry of Health 2002c). Expenditure is considered to be a more accurate measure of the level of care than utilisation data.

The primary care projections detailed below include doctors visits, pharmaceuticals and tests as specified in the *Health of Older People* report. For example, the cost of a GP visit is critically dependent on the tests ordered and the medication prescribed. Within each category, numbers of items are available, but this obscures the differences between types of tests, different drugs and different types of visits. The advantage of using cost is that this recognises these within-category differences and can be collated across categories. For the secondary care projections, the data presented in Table 7 are based on cost, and the source data are drawn from the *Health of Older People* report. The projections presented in Table 8 are based on weighted discharges that have been given a cost based on diagnostic-related groups (DRGs) drawn from the National Minimum Data Set data. While different data sets were used for the projections, the overall figures and projected increases were similar.

Table 7 provides projections for hospital and primary care costs, by gender, for the total population. Both types of costs are projected to increase over the two periods, 2001–11 and 2011–21. However, hospital costs will remain higher than primary care costs and will also be subject to greater percentage increases. Growth over the two decades is likely to amount to 42% for hospital costs and 31% for primary care. In both areas the growth incurred for men will be higher than for women, possibly associated with increased male life expectancy. Males will continue to incur higher hospital costs than females, although primary care costs will continue to be significantly higher for females.

**Table 7: Estimated hospital and primary care costs in New Zealand, by gender, 2001, 2011 and 2021**

|                            | <b>Hospital cost projection (\$000)</b>     |                  |                  |
|----------------------------|---|------------------|------------------|
|                            | <b>2001</b>                                 | <b>2011</b>      | <b>2021</b>      |
| Males                      | 757,086                                     | 905,535          | 1,091,821        |
| Females                    | 732,999                                     | 856,289          | 1,017,146        |
| Total                      | 1,490,084                                   | 1,761,824        | 2,108,967        |
| <b>Percentage increase</b> | <b>2001–2011</b>                            | <b>2011–2021</b> | <b>2001–2021</b> |
| Males                      | 20  | 21               | 44               |
| Females                    | 17  | 19               | 39               |
| Total                      | 18  | 20               | 42               |
|                            | <b>Primary care cost projection (\$000)</b> |                  |                  |
|                            | <b>2001</b>                                 | <b>2011</b>      | <b>2021</b>      |
| Males                      | 352,900                                     | 407,615          | 474,737          |
| Females                    | 530,725                                     | 603,118          | 683,769          |

|                            |                  |                  |                  |
|----------------------------|------------------|------------------|------------------|
| Total                      | 883,626          | 1,010,733        | 1,158,506        |
| <b>Percentage increase</b> | <b>2001–2011</b> | <b>2011–2021</b> | <b>2001–2021</b> |
| Males                      | 16               | 16               | 35               |
| Females                    | 14               | 13               | 29               |
| Total                      | 14               | 15               | 31               |

Table 8 estimates hospital discharges by age and by type. Medical and surgical discharges are relevant for the population aged 65 and over. The former are projected to rise by 27% in the 2001–11 period and by 36% in the 2011–21 period. Percentage increases for surgical discharges are likely to be similar, at 25% and 37% in the two periods. This gives increases of 72% for both areas for the full 20-year period. Taking the population as a whole, increases of around 40% can be expected. At the same time, neonatal discharges are expected to decrease and maternity cases will increase only slightly.

Taken together, the projections suggest that significant increases are likely in the demand for both primary and hospital health services, and that a very significant factor in these increases is population ageing.

**Table 8: Discharges and weighted discharges 2001/02, 2011/12 and 2021/22, and percentage change in weighted discharges**

|           | Discharges |         |         |         |         |         |         |         |         |         |         |         |
|-----------|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|           | 2001/02    |         |         |         | 2011/12 |         |         |         | 2021/22 |         |         |         |
|           | 0–14       | 15–64   | 65 plus | Total   | 0–14    | 15–64   | 65 plus | Total   | 0–14    | 15–64   | 65 plus | Total   |
| Medical   | 55,699     | 120,678 | 98,912  | 275,289 | 51,582  | 142,127 | 125,063 | 318,772 | 51,609  | 150,347 | 170,363 | 372,319 |
| Surgical  | 44,904     | 142,833 | 70,528  | 258,265 | 41,860  | 161,466 | 88,506  | 291,833 | 40,759  | 168,096 | 121,014 | 329,869 |
| Neonate   | 65,552     | 0       | 0       | 65,552  | 60,219  | 0       | 0       | 60,219  | 62,123  | 0       | 0       | 62,123  |
| Maternity | 67         | 77,692  | 0       | 77,759  | 64      | 78,921  | 0       | 78,985  | 59      | 83,397  | 0       | 83,456  |
| Total     | 166,222    | 341,203 | 169,440 | 676,865 | 153,725 | 382,514 | 213,569 | 749,808 | 154,551 | 401,839 | 291,377 | 847,767 |

|           | Weighted discharges |         |         |         |         |         |         |         |         |         |         |         |
|-----------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|           | 2001/02             |         |         |         | 2011/12 |         |         |         | 2021/22 |         |         |         |
|           | 0–14                | 15–64   | 65 plus | Total   | 0–14    | 15–64   | 65 plus | Total   | 0–14    | 15–64   | 65 plus | Total   |
| Medical   | 36,072              | 97,206  | 110,667 | 243,945 | 33,419  | 117,127 | 140,024 | 290,570 | 33,409  | 125,678 | 190,631 | 349,718 |
| Surgical  | 28,120              | 142,583 | 115,440 | 286,142 | 26,286  | 166,657 | 144,615 | 337,558 | 25,468  | 176,539 | 198,091 | 400,098 |
| Neonate   | 37,759              | 0       | 0       | 37,759  | 34,687  | 0       | 0       | 34,687  | 35,783  | 0       | 0       | 35,783  |
| Maternity | 55                  | 40,675  | 0       | 40,730  | 52      | 41,000  | 0       | 41,052  | 49,000  | 43,421  | 0       | 43,470  |
| Total     | 102,005             | 280,463 | 226,107 | 608,577 | 94,444  | 324,784 | 284,639 | 703,867 | 94,709  | 345,638 | 388,722 | 829,069 |

|          | Weighted discharges            |       |         |       |                                |       |         |       |                                |       |         |       |
|----------|--------------------------------|-------|---------|-------|--------------------------------|-------|---------|-------|--------------------------------|-------|---------|-------|
|          | Percent change 2001/02–2011/12 |       |         |       | Percent change 2011/12–2021/22 |       |         |       | Percent change 2001/02–2021/22 |       |         |       |
|          | 0–14                           | 15–64 | 65 plus | Total | 0–14                           | 15–64 | 65 plus | Total | 0–14                           | 15–64 | 65 plus | Total |
| Medical  | -7                             | 20    | 27      | 19    | 0                              | 7     | 36      | 20    | -7                             | 29    | 72      | 43    |
| Surgical | -7                             | 17    | 25      | 18    | -3                             | 6     | 37      | 19    | -9                             | 24    | 72      | 40    |
| Neonate  | -8                             | 0     | 0       | -8    | 3                              | 0     | 0       | 3     | -5                             | 0     | 0       | -5    |

|           |    |    |    |    |    |   |    |    |     |    |    |    |
|-----------|----|----|----|----|----|---|----|----|-----|----|----|----|
| Maternity | -5 | 1  | 0  | 1  | -7 | 6 | 0  | 6  | -12 | 7  | 0  | 7  |
| Total     | -7 | 16 | 26 | 16 | 0  | 6 | 37 | 18 | -7  | 23 | 72 | 36 |

## 4 DISABILITY TRENDS

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Generally speaking, the conditions that result in chronic disabilities in daily life do not affect life expectancy, and conditions that contribute most to mortality rates, such as cancer and circulatory disease, are not usually associated with long-term care needs and demands (Metz 2001). Rather, the diseases that generally make the greatest demand on the health system or impact the most on older individuals are chronic conditions or disabilities such as sensory impairments, arthritis, and dementia (Triantafillou et al. 1999). Disability is not an all-or-nothing concept but represents a gradation between mild and serious functional limitation, which is in turn associated with increasing levels of dependency and the need for health services and support. Disability is frequently measured in terms of limitations on the ability to perform, or the need for assistance with, ‘activities of daily life’ (ADL), such as bathing, dressing, eating and personal care, and ‘instrumental activities of daily life’ (IADL), which include the ability to perform household tasks such as cleaning and meal preparation, and life management skills such as shopping, money and medication management (Stone 2000).

There is a sharp increase in the prevalence and incidence of disability with increasing age, as well as a greater prevalence of disability in older women (Fried and Guralnik 1997). For example, Australian data indicate that over half the population experience a disability after the age of 70, rising to 84% for those aged 85 and over (Brown 2001). Similarly, in the UK 49% of people reporting a disability were over 65 years of age, and 73% of men and 75% of women aged 85 and over reported at least one serious disability (Health Promotion England 2001).

In a comprehensive study of disability trends in 191 WHO member states, Mathers et al (2000) examined healthy life expectancy (HLE) using disability-adjusted life expectancy (DALE) estimates. DALE is calculated by weighting the severity of functional limitations, and differs from another common measure of disability-free life expectancy (DFLE), which does not factor in different levels of impairment. Using a combination of both health status and condition-specific data, this study used the Sullivan method to calculate the observed prevalence of a disability at each age in the 1999 population, and divided the hypothetical years of life lived by a period life table cohort at different ages, estimating years with and without disability. Estimates of life expectancy and DALE were calculated for each country. The results showed that Japan leads the world in HLE, followed by Australia and France (Table 9). New Zealand is ranked 31st in the world, between Singapore and Chile. The bottom 10 countries were all African countries, with Sierra Leone having the lowest HLE of 25.9 years.

**Table 9: DALE estimates at birth and at age 60, for selected WHO member states**

| Rank |             | Total population | Men           |                | Women         |                |
|------|-------------|------------------|---------------|----------------|---------------|----------------|
|      |             | DALE at birth    | DALE at birth | DALE at age 60 | DALE at birth | DALE at age 60 |
| 1    | Japan       | 74.5             | 71.9          | 17.5           | 77.2          | 21.6           |
| 2    | Australia   | 73.2             | 70.8          | 16.8           | 75.5          | 20.2           |
| 3    | France      | 73.1             | 69.3          | 16.8           | 76.9          | 21.7           |
| 4    | Sweden      | 73.0             | 71.2          | 16.8           | 74.9          | 19.6           |
| 5    | Spain       | 72.8             | 69.8          | 16.8           | 75.7          | 20.1           |
| ...  |             |                  |               |                |               |                |
| 12   | Canada      | 72.0             | 70.0          | 16.0           | 74.0          | 18.9           |
| ...  |             |                  |               |                |               |                |
| 14   | UK          | 71.7             | 69.7          | 15.7           | 73.7          | 18.6           |
| ...  |             |                  |               |                |               |                |
| 24   | USA         | 70.0             | 67.5          | 15.0           | 72.6          | 18.4           |
| ...  |             |                  |               |                |               |                |
| 31   | New Zealand | 69.2             | 67.1          | 14.4           | 71.2          | 17.0           |

Source: Mathers et al 2000

The estimated DALE for New Zealand is 69.2 years, four years lower than for Australia. The difference between the top five countries and New Zealand may be due to higher rates of cardiovascular disease, diabetes and injuries in New Zealand (Mathers et al 2000). The expectation of years lived with a disability was also calculated. This indicated that older New Zealanders can expect to live with disability for up to a year longer than people in other leading OECD countries (Table 10).

**Table 10: Expectation of years lived with disability, men and women, selected WHO member states, 1999**

| Rank |           | LE <sup>(1)</sup> at birth | Men                                       |                                       | LE at birth | Women                                     |                                       |
|------|-----------|----------------------------|---|---------------------------------------|-------------|---|---------------------------------------|
|      |           |                            | Expected years with a disability at birth | Percent of total LE with a disability |             | Expected years with a disability at birth | Percent of total LE with a disability |
| 1    | Japan     | 77.6                       | 5.7                                       | 7.3                                   | 84.3        | 7.1                                       | 8.4                                   |
| 2    | Australia | 76.8                       | 6.0                                       | 7.8                                   | 82.2        | 6.7                                       | 8.1                                   |
| 3    | France    | 74.9                       | 5.6                                       | 7.5                                   | 83.6        | 6.7                                       | 8.0                                   |
| 4    | Sweden    | 77.1                       | 5.9                                       | 7.7                                   | 81.9        | 7.0                                       | 8.5                                   |
| 5    | Spain     | 75.3                       | 5.5                                       | 7.3                                   | 82.1        | 6.4                                       | 7.7                                   |
| ...  |           |                            |   |                                       |             |   |                                       |
| 12   | Canada    | 76.2                       | 6.2                                       | 8.1                                   | 81.9        | 7.8                                       | 9.6                                   |
| ...  |           |                            |   |                                       |             |   |                                       |
| 14   | UK        | 74.7                       | 5.0                                       | 6.7                                   | 79.7        | 6.0                                       | 7.5                                   |

|     |             |      |     |     |      |     |      |
|-----|-------------|------|-----|-----|------|-----|------|
| ... |             |      |     |     |      |     |      |
| 24  | USA         | 73.8 | 6.3 | 8.6 | 79.6 | 7.0 | 8.8  |
| ... |             |      |     |     |      |     |      |
| 31  | New Zealand | 74.0 | 6.8 | 9.2 | 79.4 | 8.1 | 10.2 |

Note: LE – life expectancy

Source: Mathers et al 2000

Trends in the rates of disability over time will arguably indicate how demand for disability support services (DSS) might increase as a result of population ageing. Three scenarios have been postulated in the international literature, suggesting how increases in life expectancy and the ageing population might affect morbidity rates and a consequent demand for health and disability services:

- **scenario 1: the ‘crisis scenario’**, where the age of onset of disability or chronic illness remains as at present but death is postponed, leaving an increasing interval of disability that will drive up the demand for health and disability services
- **scenario 2: the ‘receding horizon’ hypothesis**, where the onset and progression of disease and disability is postponed to the same extent as the age of mortality, so that the number of years with disability or poor health remains unchanged
- **scenario 3: the ‘compressed morbidity’ model**, postulated by Fries (1980, 2002), in which both disability and chronic illness are postponed until closer to death, with the interval between onset of disability and death becoming reduced (from Shaw 2002).

The empirical evidence assessing trends in rates of disability is somewhat equivocal. For example, Parker et al (1997) studied data collected between 1989 and 1994 on people over the age of 65 years in England and Wales, and found a greatly increased prevalence of disability in the very old population, especially for women. Similarly, Kelly et al (2000) analysed time trends in the UK using two different measures of health expectancy, and found that while both life expectancy and HLE had increased between 1980 and 1996, HLE increased at a slower rate, with the result that both men and women were living for more years, but either in a state of poor health or with an ongoing disability.

However, an OECD report that examined disability trends in Australia, Canada, France, Germany, Japan, Sweden, the UK and the USA reported mixed results. Disability trends in the institutional population declined in the five countries that had data available, except for the over-80-year-olds in France. Trends in disability rates in the non-institutional older population showed reduced disability for men in most age groups, except for men in the oldest groups in Australia and Canada. Disability rates also declined for women, but to a lesser extent than for men, and in some cases these increased; for example, among women aged 65–75 in the UK, Australian women aged 70–75 and 75–84-year-old women in Canada (Jacobzone 2000).

Robine et al (1996) summarised several time-series studies of disability-free life expectancy from the USA, UK and Australia. They argued that overall the studies show an increase in life expectancy at

birth among females in developed countries, but with a static rate of disability-free life expectancy at 63 years. The increased years of life expectancy were therefore associated with disability. The data indicated that life expectancy without severe or very severe disability is similar to total life expectancy, so the gains in female life expectancy may represent extra years in a state of mild disability.

Freedman et al (2002) conducted a systematic review of the literature on disability trends in the USA over the 1990s and found that the prevalence of disability declined significantly for older adults during this period, with estimates across the studies ranging from -1.55% to -0.92% per year. However, these improvements were not apparent for all types of disability. A reduction in the level of disability in late life was primarily associated with reductions in limitations in IADL such as shopping, household chores and medication, and basic physical tasks like walking, climbing stairs or lifting. In contrast, their review revealed conflicting evidence regarding reducing rates of limitation in ADL, which are generally associated with intensive long-term care needs. Across the six studies that provided estimated limitations in ADL there was a wide range of average annual percentage change.

Waidmann and Manton (2000) reviewed the international literature on disability trends and concluded that in many countries there has been a moderate reduction in 'chronic' disability among older people (eg, in Italy, the Netherlands, Switzerland, UK, Canada, Belgium, Taiwan and France). In the countries where a decline was not observed (eg, Australia) they argued that there was little evidence to suggest that 'chronic' disability was increasing once population age and institutional trends were accounted for.

Work on disability and ageing in Australia found that there has been little change in disability rates over the 17-year period during which surveys have been conducted. Comparisons across the surveys indicate consistency in rates of impairment (Brown 2001). In 1998 more than half of Australian men and women aged 65 years and over had a disability (54% for each). Most of them had a functional restriction, which meant they had difficulty with one or more ADLs or IADLs (87% for men and 93% for women) (Australian Bureau of Statistics 1999).

Mobility restriction was the most common type of restriction for older people (39% for men and 46% for women), followed by self-care restriction for women (27%). Both disability and core activity restrictions were found to increase with age, with 92% of those over the age of 85 years needing assistance, compared with 32% of those between 65 and 74 (Australian Bureau of Statistics 1999).

There has been no increase in years of life expected to be disability-free at age 65 for Australian men (measured by DALY) but an increase for women (from 8.6 to 9.9) (Australian Bureau of Statistics 1999). In 1997 information was gathered on growth factors for services provided by the Commonwealth/State Disability Agreement (CSDA), to project growth in demand for specialist disability services between 1997 and 2003. The prediction was that the number of Australians with a severe or profound handicap would increase in this period by 19.5% in the 45–64 years age group and by 17.3% in those aged 65 and over (Australian Institute of Health and Welfare 1997).

A more recent Australian study did a comparative analysis of four disability surveys and found a general increase in the proportion of people aged 65 and over with a disability, from 42.9% to 54.6%, between 1981 and 1998 (Australian Institute of Health and Welfare 2000). There was also an increase in those aged 65 and over classified with a severe or profound core activity restriction, rising from 16.2% in 1981 to 19.6% in 1998.

The report also projected future disability trends, based on 1993 and 1998 Australian Bureau of Statistics surveys and assuming stable age- and sex-specific prevalence rates of severe or profound core activity restrictions, population growth as forecast by Australian Bureau of Statistics 1998 projections and no change in other influential factors. The results showed that population ageing is likely to have a significant impact on the numbers of people with severe or profound disabilities or functional restrictions, with an overall increase of 11.6% between 2000 and 2006. The increase is mainly attributable to the rapid increase in the numbers of people in the 45–64 year age group (19.3% increase) and the 65-and-over group (15% increase). Translating this into demand for services, the results indicate that the age distribution of service recipients for CSDA services has been changing, from a high level of demand in the 20–39 year age group toward older ages, and the utilisation rate for people between 45 and 65 years is expected to increase.

## **COHORT EFFECTS**

Another issue is the extent to which changes are occurring in the average level of age-specific needs in the older population. Many projections use observed rates of health service use at a particular time and take these rates as normative for all subgroups within the population. The rates are then assumed to remain constant, ignoring cohort effects and changing patient needs, related underlying health status or technological changes in health care delivery (Evans et al 2001).

Some studies have investigated whether disability and mortality trends differ between different cohorts. Manton et al (1997) reviewed the literature in the USA and found that different epidemiological mechanisms operating over a long time period do influence the mortality risks for current older cohorts, and that clear period effects were evident, which affect cohorts differently. They examined mortality and disability experiences in three cohorts of older people using 1982, 1984 and 1989 data, and found significant differences in both mortality and disability. Those in the younger age groups were healthier and had less disability than older cohorts. An English study also reported a reduction in the proportion of dependent older people in younger cohort groups, as measured by difficulty with at least one of five ADLs (Spiers et al 1996). However, while there was an improvement in health as measured by ADLs, the younger cohort's self-perceived health was poorer. The authors suggest that self-perceived health measures capture aspects of health not measured by ADLs, and the finding may indicate an increasing prevalence of mild chronic conditions in younger cohorts, but with less severe levels of disability.

## COMPRESSION OF MORBIDITY

In a review of international trends in health expectancies, disability trends and disability-free life expectancy, Mathers and Robine (1997) concluded that there is no evidence of an expansion of morbidity (scenario 1) based on measures of severe disability. Their review of the international evidence suggested that declines in mortality rates did result in increased disability levels, but that these increases were confined to the more moderate and less severe end of the disability spectrum. They concluded that prevalence rates of severe disability among older people may be declining, and that a compression of morbidity (scenario 3) is starting to appear.

While the evidence indicating a compression of morbidity is not unequivocal (Crimmins 1996), there is evidence for a trend towards decreasing disability rates and later onset of disability. Data from the USA indicate compression of morbidity over the last two decades, with severe disability declining among the over-65s (Singer and Manton 1998). Research in the UK reports similar trends, with indications that rates of severe disability (defined as the inability to perform ADLs) may be declining, with disability-free life expectancy at age 65 rising between 1976 and 1991 from 11.0 to 13.6 years for men and from 13.0 to 16.9 years for women (Bone et al 1995, cited in Wanless 2001:141). Shaw (2002) argues that in the UK recent trends point to the second scenario (receding horizon) but may move further towards the third scenario (compression of morbidity). Malmberg et al (2002), in a longitudinal study of Finnish elders, reported that the prevalence of disability associated with older age, as measured by difficulties in stair climbing and running, declined in the 1980s and 1990s.

International time series data gathered by Mathers and Robine (1997) suggest that, although there have been increases in disability among older people from the late 1960s and 1970s when mortality rates in developed countries began to decline, the overall level of severe disability is now lower. They argue that the increase in European life expectancy is not paralleled by an increased period of time spent with a severe disability. Their results indicate that the worst scenario would be an increase in light to moderate disability, and that increases in life expectancy are the result of slowing in the progression of chronic disease.

Crimmins et al (1997) analysed trends in disability in the National Health Interview Survey (NHIS) and the Longitudinal Study on Ageing (LSOA) data sets for different time periods in the USA. They reported a statistically significant decrease in overall disability among older people, arising primarily from a decrease in IADL limitations in the NHIS data. The LSOA data produced different rates depending on the base year used. Using 1984 data, they found an increase in ADL limitations between 1984 and 1988 and no change in IADL limitations. However, if 1986 was used as the base measure then the LSOA data are similar to the NHIS data and indicate a significant decrease in overall disability between 1986 and 1990, with no change in ADL limitations but a significant decrease in IADL limitations. The LSOA data also indicated a greater likelihood of recovery from a disability.

Manton et al (1993) used data from the 1982, 1984 and 1989 National Long Term Care Surveys to estimate trends in disability and institutionalisation among older people in the USA. They found that

‘chronic disability days’ (limitations in IADL and ADL) declined by 1.98 percentage points between 1982 and 1989 for seniors living in the community and those in institutional care. However, while life expectancy above 65 years improved and was associated with declines in ‘chronic’ disability, these declines would not necessarily compensate for population ageing, and the authors expected increases in long-term care needs.

Manton et al (1995) followed up this work and examined trends in morbidity using the same data set. To examine how morbidity prevalence might have changed as ‘chronic’ disability declined, they examined 16 specific age-related medical conditions reported in the National Long Term Care Surveys, and looked at how the prevalence of these diseases was mediated by age, sex, and disability status (limitations in ADL or IADL). They reported that both disability and morbidity prevalence declined between 1982 and 1989, and was associated with increased life expectancy at late ages. The researchers also concluded that despite these declining disability trends, population ageing and increases in the proportion of people over 65 and over 85 would result in an increase in levels of acute and long-term care needs. However, they argued that the declines they reported would help to mediate the extent of future demand for health and disability services.

The results of some studies indicate that changes in the health status of populations will affect rates of disability. Hubert et al (2002) tested the compression of morbidity hypothesis and assessed the degree to which individuals with healthier lifestyles and fewer risk factors would experience reduced rates of disability. In 1986 they commenced a longitudinal study of risk factors for physical disability. In their sample they measured disability on the Health Assessment Questionnaire, and examined health risk factors related to life style that had been associated with functional status in other ageing studies, such as obesity, smoking and exercise levels. The results of this study indicated that individuals with fewer health risk factors experienced less overall disability and delayed increase in functional limitation before their death. Individuals with two or more risk factors reached greater levels of disability earlier in their life and maintained that increased level, but also experienced earlier onset and more rapid reduction in functional ability in the two years prior to death. The authors argued that the results of their study provide support for the compression of morbidity hypothesis. They also suggested that healthier life styles and preventive health measures may offset increased disabling morbidity associated with population ageing.

Similarly, a Dutch study which examined the effect of smoking on disability levels and morbidity found that the non-smoking population have fewer years with disability (Nessleder et al 2000). As well as having a lower incidence of disability, non-smokers also had a higher rate of recovery from functional limitation, leaving them in a generally healthier state than those who smoked. Again the results suggest that the elimination of smoking is likely to result in an extension of disability-free life and compression of disability into a shorter period at the end of life.

## **INTERNATIONAL DISABILITY PROJECTIONS**

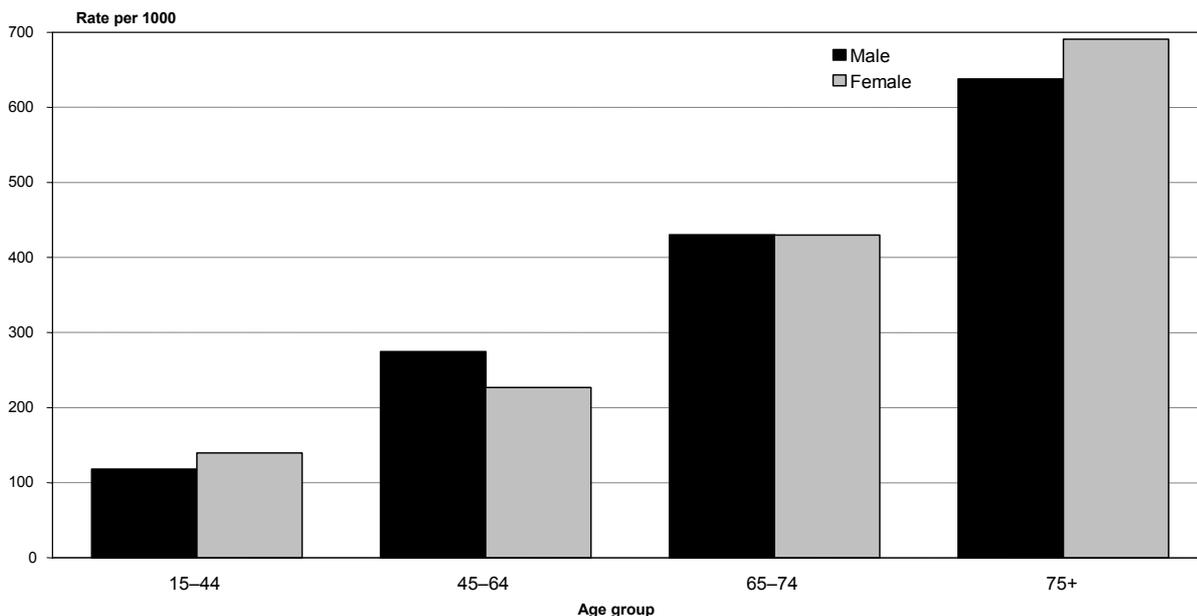
Jacobzone et al (1998) examined trends in disability at older ages in several OECD countries up to 2020 and their impact on long-term care needs. They made two projections: the first was based on stable rates of disability, and the second assumed that trends in disability would decline. While international differences in disability trends were apparent, overall the trends indicated a significant decline in disability. This decline was most apparent among older disabled people living at home, but was offset by an increase in rates of disability among people in institutions. The decline in severe disability was more substantial for men and those aged between 65 and 80 under the second projection scenario. The authors make the point that increasing health among older people does not necessarily equate with lower health spending or fewer demands on the health system. To achieve health gains, increased technological input may be required. De-institutionalisation of older people also presents significant but different challenges for health policy, given the increased pressure on home-care services.

In summary, the international literature on disability trends is characterised by mixed findings, but, overall, the evidence points towards lower rates of severe disability for older people in the future. However, the extra years gained from increases in life expectancy at age 65 years may be affected by light to moderate disability. While this does not provide outright support for the ‘compression of morbidity hypothesis’, it suggests a movement in that direction. As seen in the studies by Hubert et al (2002) and Nessler et al (2000), changes in health status – particularly life-style factors such as smoking – can make a significant impact on the disability burden. Current rates of smoking, obesity, and insufficient levels of physical exercise in the New Zealand population, in combination with population ageing, may impact negatively on future disability rates and the demand for DSS. Trends in disability rates in New Zealand and projections of future utilisation of DSS are presented in the next section.

## **NEW ZEALAND DISABILITY TRENDS**

In New Zealand the likelihood of having a disability increases with age, with 69% of women and 64% of men aged 75 and over reporting a disability, compared with 14% of women and 12% of men in the 15–44 year age group (Figure 2).

**Figure 2: Prevalence of disability, by age and gender, 2001**

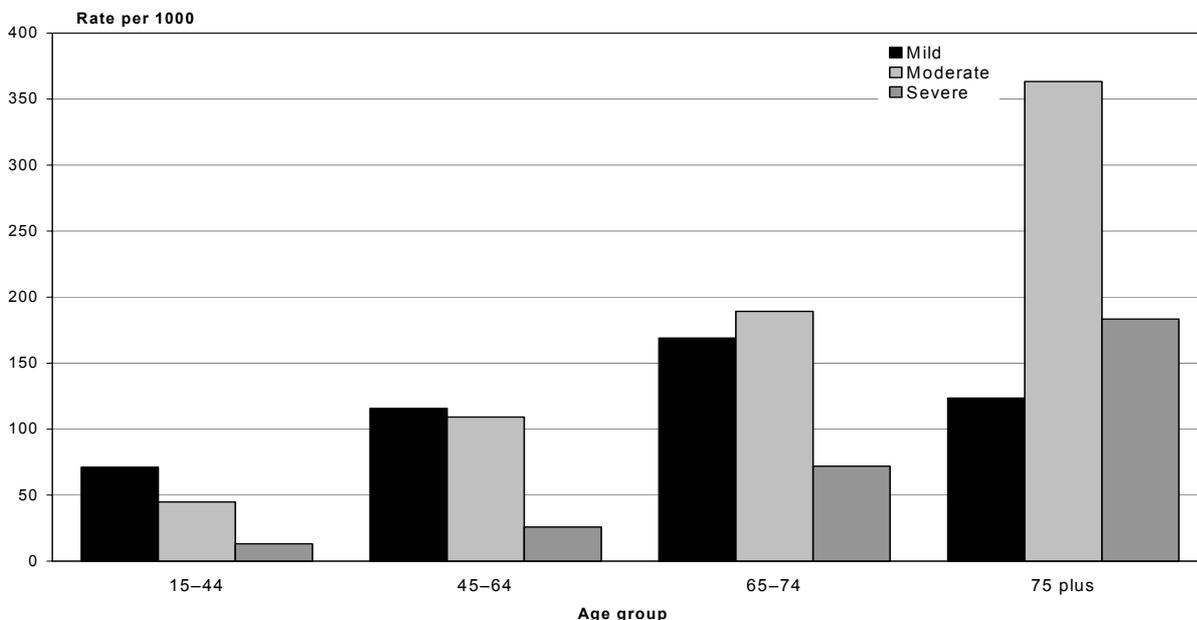


Note: Rates are per 1000 people in the age group.

Source: Statistics New Zealand 2001 Household Disability Survey and 2001 Disability Survey of Residential Facilities (Ministry of Health 2002c)

The incidence of moderate and severe disability also increases significantly with age (Figure 3).

**Figure 3: Level of disability, by age, 2001**



Note: Rates are per 1000 people in the age group.

Source: Statistics New Zealand 2001 Household Disability Survey and 2001 Disability Survey of Residential Facilities (presented in Ministry of Health 2002c)

Rates of disability for Māori and Pacific peoples also increase with age. However, the rate of severe disability for Māori over 65 years was significantly higher than for the total population (17% and 12% respectively) (Ministry of Health 2002c). Pacific peoples in this age range had a higher rate of moderate disability compared to the total population (27% compared with 14%) (Ministry of Health 2002c).

#### DISABILITY AND RESIDENTIAL STATUS

Virtually all older people in residential care require assistance with daily activities and most have severe levels of disability (72% of people aged 65–74 and 84% of those over the age of 75). People of comparable age living in community settings have much lower rates of moderate or severe impairment, but 15% in the 65–74 year age group and 14% of people aged 75 and over have mild disability (Table 11). Multiple disabilities are also significantly more prevalent in residential care clients compared to those living in the community (Table 12).

**Table 11: Level of disability, by age and residential status, 2001**

| Age group | Household<br>(rates per 1000 household population) |          |        | Residential care<br>(rates per 1000 residential care population) |          |        |
|-----------|--|----------|--------|--|----------|--------|
|           | Mild   | Moderate | Severe | Mild   | Moderate | Severe |
| 65–74     | 172  | 188      | 60     | 0  | 231      | 722    |
| 75 plus   | 138  | 391      | 106    | 2  | 135      | 835    |

Source: Statistics New Zealand 2001 Household Disability Survey and 2001 Disability Survey of Residential Facilities (presented in Ministry of Health 2002c)

**Table 12: Prevalence of multiple disability, by age and residential status, 2001**

| Age group | Household<br>(rates per 1000 household population) |                     | Residential care<br>(rates per 1000 residential care population) |                     |
|-----------|--|---------------------|--|---------------------|
|           | Single disability                                  | Multiple disability | Single disability  | Multiple disability |
| 65–74     | 154  | 267                 | 70   | 884                 |
| 75 plus   | 154  | 481                 | 26   | 945                 |

Note: 'multiple disability' refers to a positive response to more than one question on activity limitation.

Source: Statistics New Zealand 2001 Household Disability Survey and 2001 Disability Survey of Residential Facilities (presented in Ministry of Health 2002c)

Trends in New Zealand indicate that disability levels are not reducing and that the likelihood of disability and the need for long-term care increases with age. The predicted rise in the population aged 65 and over, and especially people aged 85 and over, in the coming two decades is likely to place an increased demand on DSS. On the basis of current levels of disability in people aged 65 and over, two projections were conducted to provide an estimate of the demand for DSS over the coming two

decades (Tables 13 and 14). Both projections used expenditure data for disability services from the *Health of Older People* report (Ministry of Health 2002c). As with health service use, DSS expenditure was used as a proxy for service utilisation because it is more sensitive to the level and extent of support received. The first projection presented in Table 13 used the Statistics New Zealand 2001 Census population projections, based on the assumption that there would be medium birth, death and immigration rates. The projections also assumed stable DSS utilisation rates for people aged 65 and over during the projection period.<sup>6</sup>

**Table 13: Estimated DSS expenditure by gender, 2001, 2011 and 2021**

|         | <b>Disability support service cost projection (\$000)</b> |                |                |
|---------|---|----------------|----------------|
|         | <b>2001</b>   | <b>2011</b>    | <b>2021</b>    |
| Males   | 12,738  | 18,751         | 25,883         |
| Females | 17,205  | 22,525         | 28,584         |
| Total   | 31,943  | 43,287         | 56,487         |
|         | <b>Percentage increase</b>                                |                |                |
|         | <b>2001–11</b>  | <b>2011–21</b> | <b>2001–21</b> |
| Males   | 47  | 38             | 103            |
| Females | 31  | 27             | 66             |
| Total   | 36  | 30             | 77             |

The alternative projection calculation, presented in Table 14, uses the same base data and assumptions, but allows for an increase in life expectancy of five years by 2021, and assumes that the cost of disability is moved back by the full five years. This calculation should not be taken as an accurate prediction of DSS expenditure, but represents the theoretical maximum effect for the compression process.<sup>7</sup>

The projected DSS expenditure presented in Table 13 estimate a 77% increase in expenditure in this sector by 2021. Even in the immediate term to 2011 the projections suggest substantial increases in demand and costs, with overall expenditure estimated to increase by 36%, and by an additional 30% to 2021. DSS costs are also projected to increase to a greater extent for men than for women, which may reflect greater increases in male life expectancy. Even when the alternative calculation that assumes a compression of morbidity is used, DSS expenditure is still estimated to rise by 46% between 2001 and

<sup>6</sup> Once again there was a paucity of data specifying expenditure by age and ethnicity. This makes it difficult to measure the extent to which Māori use DSS, but it has been shown that Māori access these services to a lesser extent than non-Māori (Ministry of Health 2002d). This may be because DSS providers do not meet the cultural expectations or needs of Māori people, but could also reflect the age composition of the Māori population. A recent survey found that one in seven Pacific people reported having a disability compared with one in five of all New Zealanders. This may be due to the younger age structure of the Pacific population in New Zealand, but may also be related to cultural perceptions of disability (Ministry of Health 2002d).

<sup>7</sup> The potential impact of an increase of five years in life expectancy is just one possible factor that will influence future health care costs. Other important variables may have a greater impact, such as increased government funding of residential care in line with policy changes on asset testing, for example.

2021 (Table 14). Taken together, the projections indicate that significant increases can be expected in the demand for DSS, and that population ageing is an influential factor in these increases.

**Table 14: Projections for DSS expenditure to 2011 and 2021, by gender, assuming increased life expectancy and delayed onset of disability**

|         | <b>Cost 2021</b> | <b>% Increase 2001–21</b> |
|---------|------------------|---------------------------|
| Males   | 20,650.1         | 62                        |
| Females | 25,993.3         | 51                        |
| Total   | 46,643.4         | 56                        |

## **5 TRENDS IN AGE-RELATED ILLNESS AND DISEASE**

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As seen previously, chronic age-related diseases such as diabetes and dementia can lead to severe levels of disability, which in turn place increased demands on health and disability support services (DSS). As a result, mortality rates are not necessarily the most informative measures or indicators of health problems in older people. Information on diseases that are likely to add to the overall burden of disease can be more useful for assessing the existing or likely health status of older people (Byles and Flicker 2002). In order to estimate future trends in the demand for health services and DSS it is important to analyse age-related diseases and associated disabilities that are likely to increase as the population ages.

Most developed countries have experienced an ‘epidemiological transition’ over the last 100 years that has marked the emergence of degenerative disorders, particularly cardiovascular disease and neoplasms, as the main causes of death and disability rather than infectious diseases. This has been a result of improvements in the standard of living, medical advances and public health measures (OECD 1998b, Triantafyllou et al 1999). Thus, diseases associated with ageing are gaining greater prominence in many countries (Brown 2001). While specific age-related diseases have an impact on the burden of disease, co-morbidity is another important consideration in relation to population ageing. Often older people suffer from multiple conditions, which together contribute to their health status, affecting their quality of life, their ability to perform daily activities and their use of health services (Byles and Flicker 2002).

### **RATES AND MEASURES**

There are wide variations in the incidence and prevalence rates of age-related diseases between and within countries. Data on cause-specific mortality provide the most comprehensive and reasonably comparable measures of disease rates and the state of public health. Various indicators have been developed, such as healthy life expectancy (HLE), disability-free life expectancy (DFLE) and disability-adjusted life years (DALYs). Instead of simply measuring life expectancy at birth or at different ages, these indicators give an estimate of the proportion of the total life span during which people can expect to live in good health or free from disability. DALYs are frequently used to summarise the impact of disease or mortality, disability, impairment, illness or injury arising from a comprehensive range of diseases, injuries and risk factors by bringing them into a single indicator (Vos and Begg 2000).

The Global Burden of Disease and Injury Study collated worldwide data on disease risk factors, incidence, prevalence, disability and mortality in 1990 and made projections to 2020 (Murray and Lopez 1997). DALYs were calculated for all disease groups. The report found that, in baseline projections, total DALYs, worldwide, in 2020 are expected to remain similar to 1990 levels, but that the relative contribution of disorders will change markedly. Table 15 presents the top 10 contributors to the burden of disease in 2020, as measured by DALYs, and their share of the total percentage of the burden of disease for the developed world.

**Table 15: Ten projected leading causes of DALYs in 2020 according to the baseline projection in the Global Burden of Disease and Injury Study**

| Rank | Disease or injury  | DALYs (x10 <sup>6</sup> ) | Cumulative % |
|------|--|---------------------------|--------------|
|      | All causes   | 160.5                     | ..           |
| 1    | Ischaemic heart disease                                      | 18.0                      | 11.2         |
| 2    | Cerebrovascular disease                                      | 9.9                       | 17.4         |
| 3    | Unipolar major depression                                    | 9.8                       | 23.5         |
| 4    | Trachea, bronchus and lung cancer                            | 7.3                       | 28.0         |
| 5    | Road traffic accidents                                       | 6.9                       | 32.3         |
| 6    | Alcohol use  | 6.1                       | 36.1         |
| 7    | Osteoarthritis   | 5.6                       | 39.5         |
| 8    | Dementia and other degenerative and hereditary CNS disorders | 5.5                       | 43.0         |
| 9    | Chronic obstructive pulmonary disease (COPD)                 | 4.9                       | 46.0         |
| 10   | Self-inflicted injury  | 3.9                       | 48.4         |

Source: Murray and Lopez 1997

DALYs due to communicable diseases, maternal disorders and respiratory infections are projected to decrease. In contrast, DALYs for cancers are expected to rise from 5.1% to 9.9%, neuropsychiatric disorders from 10.5% to 14.7%, cardiovascular disease from 11.1% to 14.7% and chronic respiratory infections from 4.4% to 7.3%. The data presented in Table 15 cover both men and women. However, Murray and Lopez (1997) found that osteoarthritis, dementia and breast cancer would figure among the top 10 diseases contributing to the burden of disease for women in developed countries in 2020.

Very similar findings were found by Mathers et al (2000). They calculated the top 10 causes of loss of healthy life expectancy (HLE), measured in DALYS, in the WHO West Pacific mortality sub-region. Cerebrovascular and ischaemic heart disease (IHD) ranked second and third, osteoarthritis fifth, dementias sixth, diseases of the stomach eighth, and diseases of the trachea, bronchus and lungs ninth. (See also Murray et al 2001 for similar findings by WHO mortality sub-region.)

The Australian Burden of Disease Study conducted by Mathers et al (2000), again using DALYs, reported that the leading causes of total burden of disease were IHD and stroke, which together accounted for 18% of the burden. Chronic obstructive pulmonary disease (COPD) ranked third, and lung cancer and dementia ranked fifth and sixth. Osteoarthritis was ranked 10th after colorectal cancer and asthma. For those aged 65 and over, the top causes of healthy years lost as a result of disability, in rank order, were dementia, adult-onset hearing loss, stroke, visual disorders, osteoarthritis, heart disease, Parkinsons disease, diabetes, benign prostatic hypertrophy, and COPD (Commonwealth Department of Health and Ageing 2003). Similar studies by Brown (2001) and Vos and Begg (2000) examined the burden of disease in Queensland and Victoria, Australia. Both studies identified cardiovascular disease, cancers, dementia, chronic respiratory disorders, diabetes mellitus and sensory disorders in the top 10 contributors to the burden of disease in those states (see also National Centre for Monitoring Cardiovascular Disease 2001, and Byles and Flicker 2002 for similar results).

Warnes (1999) analysed 16 European countries and presented data for three five-year age groups (60–64, 70–74 and 80–84) over 10-year periods. He produced weighted mean death rates per 100,000 people, reporting variable trends in cause-specific death rates in different countries. Warnes found improvements in mortality for women aged 70–74 and 80–84 of approximately 35%, a change of 1.1% per year between 1900 and 1990. In the oldest groups there were improvements for all major causes of death except cancers. Declines for stroke were substantial, with medium improvements in cardiovascular disease. For men, the improvements were more diffuse: cardiovascular death rates fell in all three age groups, but the share this played in absolute death rates did not decline. There was both a relative and a real decline in death rates from stroke and other causes, but death rates attributable to cancer rose. Similarly, another study of EU member states found that for women aged 65 and over the most important disorders affecting HLE were visual and auditory impairments, coronary and circulatory diseases, cancer, cerebrovascular disease and arthritis. For men it was coronary and circulatory disease, bronchitis, arthritis and auditory impairments. Some of these conditions, while not implicated in mortality rates *per se*, significantly impact on HLE and demand for disability support (Triantafillou et al 1999).

US research by Fried and Guralnik (1997) identified that the major underlying causes of physical disability in older people are catastrophic acute events (eg, hip fractures and strokes), and slow progressive diseases (eg, arthritis and heart disease). Co-morbidity was also identified as a risk factor for disability. Older people with mobility difficulties, pre-clinical functional changes, and those hospitalised had a higher risk of becoming disabled or having ongoing progression in their disability. Chronic conditions cause almost half of all disability among older Americans, and the prevalence of all major chronic diseases has increased in the period between 1984 and 1995 for those over the age of 70 years (Merck Institute of Ageing and Health 2002).

Another US study examined specific age-related diseases and how these interact with demand for health services (Garber et al 1998). For example, older patients with an acute myocardial infarction tend to use hospital care more than other services. Those who survive the acute event are less likely to use hospice or community-based care. Haemorrhagic stroke is another acute disorder, and about 70% of deaths in the USA occur in acute hospital settings. In contrast, lung cancer and other advanced cancer patients tend to use hospice care rather than hospital services, with a decline of 52% (to 36%) between 1998 and 1995 in deaths from lung cancer occurring in a hospital setting. COPD is a category of respiratory illness that includes chronic bronchitis, emphysema and sometimes asthma, and while hospital usage is typically very heavy prior to death, only 35% of people with COPD die while receiving hospital treatment, with the majority receiving either home-based or hospice assistance.

## **NEW ZEALAND EVIDENCE**

The New Zealand Burden of Disease and Injury Study reported similar findings to these international studies (Public Health Intelligence Group 2001b). Both fatal and non-fatal data, as measured by DALYs, indicate that 40% of the burden of disease in New Zealand is sustained by those aged 65 and over. While women overall lose as many DALYs as men, when the data are standardised by age and expressed per capita, men face a 13% greater burden than women. Māori lose DALYs at approximately 1.7 times the rate of non-Māori when the data are adjusted for age and gender, which reflects the greater burden of disease in the Māori population (Public Health Intelligence Group 2002a).

The rankings in the burden of disease in New Zealand, based on 1996 data, are dominated by chronic conditions. cardiovascular disease<sup>8</sup> accounted for 24% of DALYs lost by the whole population in 1996 (Public Health Intelligence Group 2001b), and is the leading cause of death and disability in New Zealand: 44% of all deaths are due to cardiovascular disease, of which 87% occur in those over the age of 65 (National Health Committee 2002). The rate differs by gender, with men having a significantly higher rate than women (31 per 1000 and 19 per 1000, respectively).

<sup>8</sup> The Public Health Intelligence Group (2001b) uses cardiovascular disease to include ischaemic heart disease, stroke and other cardiovascular disease.

Three types of cancers were included in the top 20 contributors to the burden of disease: colorectal cancer for both men and women, lung cancer in men and breast cancer in women. Two types of respiratory disorder were also ranked in the top 10: chronic obstructive respiratory disease (CORD) (ranked third) and asthma (ranked sixth), affecting both genders similarly. Diabetes mellitus ranks fourth overall but also contributes to both IHD and stroke, which are in turn ranked first and second overall. Dementia is ranked 11th and hearing disorders 16th. Nine of the top 15 conditions contributing to the burden of disease are major causes of fatal outcomes and are associated with older people: IHD, stroke, CORD, diabetes, lung cancer, colorectal cancer, dementia, breast cancer, and lower respiratory tract infection. Six of these diseases are also major causes of disability: IHD, stroke, CORD, diabetes, dementia and osteoarthritis.

In terms of ethnicity, cardiovascular disease accounted for the highest male and female rates of DALY loss among both Māori and Pacific peoples, and cancers were the second-highest contributors (Public Health Intelligence Group 2001a). In a separate study of Māori and Pacific health it was found that age-standardised DALY rates for Māori and Pacific peoples were 75% and 50% greater, respectively, than age-standardised DALYs for Europeans and Other groups (Public Health Intelligence Group 2001a). Of the total DALYs lost, for Māori 56% related to fatal outcomes (years of life lost – YLL) and 44% to non-fatal outcomes (years with a disability – YLD). Similar proportions were found for both Europeans and Pacific peoples (54% of DALYs lost were YLL and 46% were YLD). While the bulk of DALY loss by Europeans occurs in old age, in both Māori and Pacific groups most DALY loss occurs at younger ages. However, in both of these groups the age-specific DALY loss was greatest in those aged 65 and older. Given that Māori and Pacific populations are also ageing rapidly (Statistics New Zealand 2001), this distribution of DALYs is likely to adjust toward older groups over the coming decades.

New Zealand data for nine ageing-related diseases have been examined for this paper: IHD, stroke, dementia, CORD, diabetes mellitus, cancers, musculoskeletal disorders, osteoporotic fractures and sensory impairment. Of these diseases, mortality projections will be presented for IHD, stroke, CORD, cancer, diabetes, osteoporotic fractures and musculoskeletal diseases. The projection calculations to 2010/11 and 2020/21 are based on age-, gender- and ethnic-specific current mortality rates for each disease, multiplied by the projected age, gender and ethnic populations, using 1998/2000 base data. The population projections are taken from Statistics New Zealand 2001 Census data and assume medium birth and mortality rates and medium net migration flows during the projection period. All of the projections detail three age bands (65–74, 75–84 and 85 and over), except for osteoporotic falls, which could only estimate data in two age ranges (65–74 and 75 and over). Data on musculoskeletal diseases for Māori and Pacific peoples were insufficient and the projections are only able to provide estimates for the ‘Other’ ethnic group. It is important to stress that the projections provided are based on one scenario that assumes current death rates will continue, and these rates are then applied to the projected population. This scenario does not allow for declines in the rate of disease and may represent the worst-case scenario for some of these conditions.

## **ISCHAEMIC HEART DISEASE (IHD)**

IHD ranks first in the developed world as the leading contributor in the Global Burden of Disease Study. In a comprehensive report on age-related disease, the OECD examined health outcomes, associated disability, and disease trends for IHD (Jacobzone et al. 1999). Across OECD countries, IHD accounts for between 20 and 30% of cardiovascular deaths. Acute myocardial infarction causes about half of these deaths, and the age-specific mortality rates reveal an exponential rise with increasing age. Mortality rates for males 75 years and older are twice as high as those in the 65–74 year age group in most countries. Despite declines in mortality rates in most OECD countries during the 1990s, eastern European countries are documenting an opposite trend.

Mortality rates for IHD have been declining in most age groups, producing increased life expectancy at birth. In terms of health outcomes, mild forms of IHD are related to functional disability and limitations in activities of daily life resulting from both symptoms and pain (Jacobzone et al 1999). An OECD (2002) report has found that admission rates for acute myocardial infarction have remained steady or decreased slightly throughout the 1990s in most countries, with the exception of Norway, which has had a significant decline. Comparative estimates of the prevalence of IHD across countries is scarce (Jacobzone et al 1999). However, in Sweden IHD increased with age, with men aged between 70 and 74 years having six times greater incidence than men aged 50–54 (National Board of Health and Welfare 1997). In terms of mortality, EU countries showed an overall decline in deaths from cardiovascular disease, except for Greece, which started from a lower base rate (Triantafillou et al 1999). However, a WHO report (1996) indicates that cardiovascular disease continues to be the leading cause of death in Europe, causing half of all deaths and one-third of permanent disability.

New Zealand data for 1996 indicated that IHD accounted for approximately 13% of all DALYs (16% for men and 10% for women) and ranked as the number one contributor to the burden of disease (Public Health Intelligence Group 2001b). IHD also accounted for the highest rate of DALYs lost by Māori men (13% loss) and women (9% loss), and Pacific men (11% loss) (Public Health Intelligence Group 2001a). IHD accounted for just over 4% of day and inpatient treatment days in 1997 and 40% of all hospitalisations for cardiovascular disease. The rate of hospitalisation increased exponentially with age from 45 years onward, with the highest rate found in the 75 and over group (33 per 1000) (Ministry of Health 1999a).

Projections of mortality from IHD are presented in Table 16 and indicate significant rises across all ethnic groups, but with substantial increases for Māori in all age groups and both genders. In examining these figures it must be recognised that deaths for Māori and Pacific peoples start from much lower base numbers than for the ‘Other’ group. Overall, the projections suggest that demand for health services for the treatment of IHD will increase substantially over the next two decades for both men and women, in all ethnic groups and across the three older age ranges.

**Table 16: Base death rates and numbers of deaths for ischaemic heart disease, 1998/2000, with projected deaths to 2011 and 2021 (medium projection), by gender and ethnicity**

| Age ranges    | Other                      |                  |                       |                       | Māori                      |                  |                       |                       | Pacific                    |                  |                       |                       |
|---------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|               | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| <b>Female</b> |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 267                        | 322              | 388                   | 537                   | 721                        | 50               | 87                    | 146                   | 412                        | 11               | 21                    | 36                    |
| 75–84         | 1086                       | 947              | 1043                  | 1322                  | 2028                       | 47               | 101                   | 176                   | 1061                       | 10               | 23                    | 37                    |
| 85 plus       | 3696                       | 1158             | 1835                  | 2294                  | 4432                       | 21               | 39                    | 98                    | 3901                       | 7                | 23                    | 39                    |
| <b>Male</b>   |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 677                        | 761              | 926                   | 1278                  | 1401                       | 86               | 148                   | 250                   | 1205                       | 26               | 54                    | 95                    |
| 75–84         | 1932                       | 1130             | 1496                  | 1963                  | 2789                       | 46               | 101                   | 180                   | 2431                       | 14               | 31                    | 56                    |
| 85 plus       | 4818                       | 639              | 1198                  | 1752                  | 4405                       | 11               | 18                    | 51                    | 2677                       | 2                | 6                     | 12                    |

## ISCHAEMIC STROKE

Murray and Lopez identified cerebrovascular disease as the second-highest contributor to the burden of disease in developed countries, and ischaemic stroke is part of this category. Jacobzone et al (1999) examined both ischaemic stroke and the more mild form, transient ischaemic attacks, in older populations in OECD countries. Ischaemic stroke and transient ischaemic attacks constitute 80% of all strokes. In most countries mortality is the main outcome measure, but haemorrhagic stroke is more frequently fatal than ischaemic stroke. For patients recovering from ischaemic stroke the main health outcomes are related to function and disability. Strokes are highly disabling and often limit participation in the activities of daily life (OECD 2002). There are significant differences in mortality rates across OECD countries, but they increase exponentially with age, with significant increases between the 65–74 and 75 and over age groups (Jacobzone et al 1999).

In terms of trends, some declines in incidence have been reported in the USA, UK and Europe, but in other countries such as Japan, Denmark and Sweden rates are either stable or increasing (OECD 2002). Hospitalisation rates in Australia, Canada and the USA have declined, while rates in the Netherlands, the UK and Sweden have remained unchanged, and they have increased in Greece and Italy (OECD 2002). In Australia, ischaemic stroke represents the second-highest contributor to the burden of disease for both men and women (Brown 2001), and in the Netherlands stroke ranks as the second-highest cost for health care services for those over the age of 85 years (Meerding et al 1998).

New Zealand data indicate that stroke accounted for over 5% of DALYs in 1996 and was ranked as the second-highest burden of disease overall (Public Health Intelligence Group 2001b). An extensive study of stroke in New Zealand found that the stroke population has a much older age structure than the non-stroke population (Public Health Intelligence Group 2002d). The incidence rates for first-time stroke were found to rise exponentially with age, particularly for females. The male incidence rate exceeded that for women until age 75 and then levelled out, while the female rate continued to increase. 1991 data found that males had a higher prevalence than women at all ages. Most stroke survivors were aged between 65 and 84 years, with the male peak age between 70 and 74, and the female peak age between 75 and 79 (Public Health Intelligence Group 2002d). 1991 data also

indicated that 10% of those who had experienced a stroke were over the age of 85, 40% were 75 years and over and 70% were over 65 (Public Health Intelligence Group 2002d). The incidence of stroke in New Zealand also varies by ethnicity, with higher incidence rates in both Māori and Pacific communities (Bonita et al 1997). The finding that ischaemic stroke rates vary by ethnicity is also reflected in the international literature. A British study found that the incidence of stroke was higher among the black population in London compared with the white population (Stewart et al 1999). Similar findings have been reported in the USA, with a greater incidence of the risk factors associated with stroke in black and Hispanic communities (Sacco et al 2001).

Given the significant association of stroke with age and the finding that approximately one-fifth of people who survive a stroke are left with severe disabilities (Bonita et al 1997), it is important to examine projections of stroke incidence in the context of population ageing. Forecasts have been conducted for the period 1991–2011 under a range of scenarios (Public Health Intelligence Group 2002d). Assuming no change in incidence rates or case fatality over the 20-year period, these projections estimate that the overall number of stroke survivors would be 40,514, which represents a 54% increase over the time period. The death rate from stroke is estimated to increase by 57%, with an estimated 4608 deaths from stroke in 2011.

The projected deaths from stroke are presented in Table 17. The estimates indicate significant rises in deaths across all ethnic groups. Māori deaths from stroke over the 20-year period are also projected to increase substantially across each age group for both men and women. As with data for IHD, both Māori and Pacific estimates are based on much lower starting points, reflecting the lower proportion of Māori and Pacific elders in the 1998/2000 population. In total, the projection estimates show that increases in stroke mortality will result in significant increases in the demand for health services over the 20-year period from 1998/2001 to 2021.

**Table 17: Base death rates and numbers of deaths for stroke, 1998/2000, with projected deaths to 2011 and 2021 (medium projection), by gender and ethnicity**

| Age ranges    | Other                      |                  |                       |                       | Māori                      |                  |                       |                       | Pacific                    |                  |                       |                       |
|---------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|               | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| <b>Female</b> |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 119                        | 144              | 173                   | 240                   | 224                        | 16               | 27                    | 46                    | 387                        | 10               | 19                    | 33                    |
| 75–84         | 612                        | 534              | 588                   | 745                   | 571                        | 13               | 29                    | 50                    | 1233                       | 12               | 26                    | 42                    |
| 85 plus       | 2402                       | 753              | 1192                  | 1491                  | 2859                       | 13               | 25                    | 63                    | 2837                       | 5                | 16                    | 28                    |
| <b>Male</b>   |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 159                        | 178              | 217                   | 299                   | 244                        | 15               | 16                    | 28                    | 479                        | 10               | 21                    | 38                    |
| 75–84         | 673                        | 393              | 521                   | 683                   | 814                        | 13               | 26                    | 44                    | 1779                       | 10               | 23                    | 41                    |
| 85 plus       | 2169                       | 288              | 539                   | 789                   | 1869                       | 5                | 29                    | 53                    | 3748                       | 2                | 8                     | 17                    |

## DEMENTIA

Dementia is among the most important causes of disability in older people, and severe dementia has the highest disability weight of all ageing-related diseases (Jorm 2001). Most studies report that the rate of dementia increases with age and is particularly high among those in their 80s and 90s (Ritchie et al 1994, Wernicke and Reischies 1994, Ritchie and Kildea 1995, McGee and Brayne 1998, Lobo et al 2000, Ministry of Health 2002b). An estimate of the prevalence of dementia in developed countries, based on a number of European, North American, Australasian, and Japanese studies, has been conducted by Alzheimers Disease International (1999). On these estimates the prevalence increases with age and ranges between 1.4% of 65–69-year-olds through to 23.6% of those over the age of 85.

In Europe dementia is now the fourth-largest public health issue after stroke, heart disease and cancer (Watson 1999). In the Netherlands dementia ranks as the highest health care cost (Meerding et al 1998). In the UK 5% of the population aged 65 and over, and 20% of those aged 80 and over have some degree of dementia (Health Promotion England 2001). Scottish projections estimate that in 2001, 58,000 people had dementia and this would rise to 66,000 in 2011 (Alzheimer Scotland 2003). In Ireland just over 31,000 people are living with dementia, of whom three-quarters live in the community (Murphy and O'Shea 2000). With the ageing of the population in Ireland and the expected increase in the over-85-year-olds, dementia care has been identified as a significant health issue.

In the USA in 1997 an estimated 2.32 million people had Alzheimers disease, of whom 68% were women. The prevalence of Alzheimers disease increased with age, with 4.3% of people aged 75–80 years having Alzheimers compared to 8.5% of 80–85 year olds, 16.0% of 85–90 year olds and 28.5% of people aged 90 and over (Brookmeyer et al 1998). These researchers estimated that the future prevalence of late onset (after age 60) Alzheimers disease is likely to rise by a factor of 3.7, to 8.64 million people over the next 50 years. The annual number of new (incident) cases was also projected to treble, from 360,000 in 1997 to 1.14 million new cases in 2047. Given increases in life expectancy, individuals will be living with this disease for longer and are likely to require extensive health and disability services (Brookmeyer et al 1998).

In Australia dementia is the seventh-highest cause of mortality for women and the 19th for men. However, when disability is taken into account, its impact is much greater. For men and women over 65 years, dementia ranks as the fifth and third largest burden of disease respectively (Carey 1999, Brown 2001). The prevalence of dementia in Australia in those over the age of 85 has been estimated at around 24%, and it is the primary cause of disability in this age group. Around 60% of nursing home residents and 28% of those in assisted hostel living in Australia have dementia (Carey 1999, Brown 2001). Almost all people with dementia are disabled and use medical services more than the age-average (Access Economics 2003). In the Victoria Global Burden of Disease study, dementia was the sixth-leading cause of the burden of disease, but it is 71% higher in women over 85 due to their over-representation in that age group (Vos and Begg 2000). On their projections dementia in older

women would take over from heart disease as the largest cause of ill health in Victoria in 2016, and would shift from 11th ranking to fifth for men.

Carey (1999) argues that because dementia is closely related to age, the number of years a person has this disease is likely to rise as life expectancy increases. There will be a concomitant rise in the demand for long-term care assistance, particularly residential care. Carey suggests that this gives cause for the Australian Government to review its needs-based planning targets for long-term care. Carey also argues that, in the absence of effective treatments for dementia, there will be large outlays for long-term care, especially after 2030. Given the prevalence and increasing incidence of dementia it has been recommended that the Australian Government should deem it a national health priority (Alzheimers Australia 2002, Access Economics 2003). Other countries have made similar plans in response to this health concern. For example, an Action Plan for Dementia has been instituted in Ireland (O'Shea and O'Reilly 1999). This focuses on the complexity and range of health care needs required by people with dementia and calls for a significant investment in dementia care, both in the formal health system and in supporting informal carers.

In 1996 neuropsychiatric disorders (which include dementia) accounted for 19% of DALYs in New Zealand. The health loss was higher in women (29 per 1000) than men (23 per 1000) (Public Health Intelligence Group 2001b). The New Zealand Guidelines Group (2002) recently completed a report on the incidence and prevalence of dementia. They reported that data on the various subtypes of dementia are inadequate, and in order to plan for future health care demand, studies on the rates of this disease need to be conducted. The Ministry of Health (2002b) recently examined issues regarding dementia and developed recommendations for planning appropriate care and facilities for people with dementia and their families. This report estimates that approximately 38,000 people in New Zealand have dementia and that at least 50% of those with mild dementia live in their own home supported by community services. Of those in residential care, 60–70% have some form of dementia.

Only one study has been conducted in New Zealand on the rate of dementia, and the results indicated that prevalence here was similar to that in other developed countries, with the rate increasing exponentially with age: 3.8% of those aged 65–74 years had dementia, compared to 40.4% of those aged 90 and over (Campbell et al. 1983). Jorm and Korten (1988) developed a method for projecting increases in dementia rates based on a statistical analysis of published prevalence literature. By their calculations the number of people in New Zealand with dementia is estimated to grow by 96–100% between 1982 and 2016. Given the level of disability associated with dementia, the complex needs of people with dementia, and the greater demand this places on long-term care, the rising number of over-80-year-olds in the New Zealand population clearly poses a serious issue for dementia care over the coming decades and needs to be adequately planned for (Ministry of Health 2002b).

## **CHRONIC RESPIRATORY DISEASES**

Chronic obstructive pulmonary disease (COPD) ranks ninth in the overall burden of disease in developed regions of the world, as measured by DALYs (Murray and Lopez 1997). Deaths associated

with respiratory disease are increasing, especially in Nordic countries, but are declining in some others (Triantafillou et al 1999). In Australia COPD ranked fourth in the burden of disease of men and women in 1996 (Brown 2001), but is projected to fall in ranking for men in Victoria by 2016 (Vos and Begg 2000).

Research has found that chronic obstructive respiratory disease (CORD) contributes to a relatively high proportion of DALYS in New Zealand. In 1996 9% of the burden of disease was associated with asthma and CORD. Asthma primarily contributed to YLD rates, reflecting the extent it affects quality of life and disability rates. In contrast, CORD was associated with both YLD and YLL, illustrating its association with both disability and mortality (Public Health Intelligence Group 2001b).

The projected deaths from COPD and asthma are presented in Table 18. The estimations indicate that deaths from COPD will increase for both men and women in all age ranges and ethnic groups. The most significant increases are apparent in the age group 85 and over, although substantial increases are also estimated in the young-old age ranges. Notably, both Māori men and women face major increases in deaths from these diseases. These large increases reflect the current low representation of Māori in older age groups and the projected increase in the number of older Māori in the next two decades.

**Table 18: Base death rates and numbers of deaths for COPD and asthma, 1998/00, with projected deaths to 2011 and 2021 (medium projection), by gender and ethnicity**

| Age ranges    | Other                      |                  |                       |                       | Māori                      |                  |                       |                       | Pacific                    |                  |                       |                       |
|---------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|               | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| <b>Female</b> |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65-74         | 125                        | 151              | 183                   | 253                   | 420                        | 29               | 51                    | 85                    | 112                        | 3                | 6                     | 10                    |
| 75-84         | 287                        | 250              | 275                   | 349                   | 643                        | 15               | 32                    | 56                    | 274                        | 3                | 6                     | 9                     |
| 85 plus       | 566                        | 177              | 281                   | 351                   | 1001                       | 5                | 9                     | 22                    | 1241                       | 2                | 7                     | 12                    |
| <b>Male</b>   |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65-74         | 180                        | 203              | 246                   | 340                   | 358                        | 22               | 38                    | 64                    | 510                        | 11               | 23                    | 40                    |
| 75-84         | 603                        | 352              | 467                   | 612                   | 997                        | 16               | 36                    | 65                    | 1482                       | 8                | 19                    | 34                    |
| 85 plus       | 1468                       | 195              | 365                   | 534                   | 180                        | 2                | 4                     | 11                    | 5890                       | 4                | 12                    | 27                    |

## DIABETES MELLITUS

In many OECD countries diabetes mellitus is a significant health issue. Diabetes also leads to other chronic complications, such as diabetic retinopathy and neuropathy, which contribute to the morbidity, mortality and costs associated with the diabetes burden (Jacobzone et al 1999). Health outcomes are primarily focused on complications and their impact on morbidity, such as blindness, limb amputations, end-stage renal disease and IHD. However, diabetes is often not measured consistently across countries because mortality rates often significantly underestimate the contribution of diabetes to heart disease and renal failure. Often the cause of death is attributed to these diabetic complications (Jacobzone et al 1999).

Comparison of the frequency and prevalence of diabetes is also problematic due to variation in diagnostic methods in different countries. A WHO study estimated that the prevalence of diabetes ranges between 2% and 10% of the population in several OECD countries (WHO 1994). WHO has also projected that between 1995 and 2005 there will be a significant increase in the number of people with diabetes worldwide: developed countries may face a 27% increase in diabetes from 6.0% to 7.6%. The incidence of diabetes also increases with age, particularly between 45 and 75 years, with those over 65 years facing the greatest increase (King et al 1998). In Australia in 1996 diabetes ranked eighth in the burden of disease of older men and ninth for women, as measured by DALYs (Brown 2001).

In New Zealand endocrine disorders figure relatively highly in the burden of disease, reflecting the impact of diabetes on both mortality and morbidity rates (Public Health Intelligence Group 2001b). An extensive report on the incidence and prevalence of diabetes and the likely future burden in New Zealand highlights ethnic differences in mortality rates, with the finding that while 4% of European New Zealanders' deaths are caused by diabetes, 20% of Māori and 17% of Pacific deaths are diabetes related (Public Health Intelligence Group 2002b, 2002c. See also Public Health Intelligence Group 2001a). Overall 7% of YLL can be attributed to diagnosed diabetes: 5% for Europeans, 21% for Māori and 19% for Pacific peoples (Public Health Intelligence Group 2002b, 2002c).

The diabetic population has a much older age structure than non-diabetics, resulting in highly age-related incidence rates. However, incidence peaks at different ages for Pacific, Māori and European people (around 55 years, 60 years and 65 years, respectively). Both Māori and Pacific females have higher incidences than their male counterparts, with the opposite pattern evident in the European group. As a result, Māori are over-represented in the diabetic population and Europeans under-represented.

The prevalence of diabetes in New Zealand, under the most likely scenario, is estimated to increase by 78% between 1996 and 2011, with greater increases for Māori and Pacific peoples (approximately 130–150%) than Europeans (around 58%). The Public Health Intelligence Report (2002c) concluded that diabetes will increase for all ages, but particularly the older ages, resulting in an older, more ethnically diverse diabetic population in 2011. It was also estimated that population ageing will account for substantially more of the increase in diabetes than changing ethnic composition, assuming stable rates in the prevalence of obesity between 1996 and 2011.

Projected deaths from diabetes calculated for this paper are presented in Table 19. They indicate substantial increases in deaths across all ethnic groups and age ranges, but with very large increases for Māori. These mortality estimates are similar to those calculated by the Public Health Intelligence Group (2002b, 2002c) for future prevalence rates of diabetes in the Māori population. While these large increases for Māori are based on low numbers of older Māori in the population currently, it is clear that demand for health services related to diabetes will increase markedly over the next two decades and diabetes is likely to be a significant health issue for Māori people. This is true also for the general population.

**Table 19: Base death rates and numbers of deaths for diabetes, 1998/00, with projected deaths to 2011 and 2021 (medium projection), by gender and ethnicity**

| Age ranges    | Other                      |                  |                       |                       | Māori                      |                  |                       |                       | Pacific                    |                  |                       |                       |
|---------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|               | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| <b>Female</b> |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 36                         | 44               | 53                    | 73                    | 382                        | 27               | 46                    | 77                    | 537                        | 14               | 27                    | 46                    |
| 75–84         | 125                        | 109              | 120                   | 152                   | 528                        | 12               | 26                    | 46                    | 342                        | 3                | 7                     | 12                    |
| 85 plus       | 256                        | 80               | 127                   | 159                   | 786                        | 4                | 7                     | 17                    | 1241                       | 2                | 7                     | 12                    |
| <b>Male</b>   |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 57                         | 64               | 78                    | 107                   | 505                        | 31               | 54                    | 90                    | 402                        | 9                | 18                    | 32                    |
| 75–84         | 171                        | 100              | 132                   | 174                   | 672                        | 11               | 24                    | 43                    | 534                        | 3                | 7                     | 12                    |
| 85 plus       | 415                        | 55               | 103                   | 151                   | 667                        | 2                | 3                     | 8                     | 1071                       | 1                | 2                     | 5                     |

## CANCERS

The prevalence and incidence of cancers increase with age. Among those cancers most commonly associated with ageing are colorectal cancer in men and women, lung cancer in men, cancer of the breast in women and cancer of the prostate in men (Public Health Intelligence Group 2002a). In Australia in 1996, lung cancer ranked third and seventh for men and women respectively, while breast cancer was fifth and colorectal cancer sixth for women (Brown 2001). For men, prostate and colorectal cancer ranked sixth and seventh respectively in the burden of disease (Vos and Begg 2000). In Victoria, Australia, cancer is projected to become an equal health issue for men and women and will be the leading cause of the burden of disease in 2016. This is due to improvements in cardiovascular health outpacing improvements in cancer treatment. Lung cancer in women is also predicted to rank higher in the burden of disease by 2016.

Cancer is the second leading cause of death in Europe, accounting for 20% of mortality (WHO 1996). Cancers of all kinds have increased in most of the EU countries. While Austria, Finland, France and Spain have experienced a decline in cancer rates, this masks a decline in death rates in under-65-year-olds and an increase in the over-65 group. Cancers of the respiratory system, such as lung and trachea and bronchus, have increased, except in Austria (Triantafillou et al 1999).

In New Zealand in 1996 the health loss to cancer was 20% of total DALYs, with similar rates for men and women (Public Health Intelligence Group 2001b). The results of a comprehensive analysis of cancer rates in 1996 (Public Health Intelligence Group 2002a) indicate that, in terms of age and gender, the leading types for those aged 65 and over were lung and colorectal cancer for both men and women, prostate cancer for men and breast cancer for women. Projections to 2011/12 indicate that while these will remain the top three cancers in men and women aged 65 and over, the relative ranking

of each is likely to alter.<sup>9</sup> Table 20 presents the top three cancers in New Zealand for people aged 65 and over for 1996, with projections to 2011.<sup>10</sup>

**Table 20: Male and female cancer registrations, 1996 and projections to 2011**

| Leading sites | Age 65–74 years |         | Age 75 years and above |          |
|---------------|-----------------|---------|------------------------|----------|
|               | Counts (rank)   |         | Counts (rank)          |          |
|               | 1996            | 2011    | 1996                   | 2011     |
| <b>Male</b>   |                 |         |                        |          |
| Colorectal    | 449 (1)         | 521 (2) | 341 (2)                | 701 (2)  |
| Prostate      | 430 (2)         | 651 (1) | 661 (1)                | 1459 (1) |
| Lung          | 397 (3)         | 272 (4) | 312 (3)                | 350 (3)  |
| <b>Female</b> |                 |         |                        |          |
| Colorectal    | 350 (2)         | 383 (2) | 460 (1)                | 705 (1)  |
| Breast        | 371 (1)         | 565 (1) | 395 (2)                | 655 (2)  |
| Lung          | 213 (3)         | 242 (3) | 169 (3)                | 288 (3)  |

Source: Public Health Intelligence Group 2002a

Projections of mortality for all cancers are presented in Table 21. These indicate significant rises in deaths from this disease for all ages and ethnic groups, and for both men and women. Increases for Māori are high, but again reflect the lower number of older Māori in the current population. For Pacific peoples, deaths from cancer in all age ranges are estimated to rise and are higher for men than for women. In total, the projections indicate that increases in cancer mortality will in turn result in significant increases in the demand for health services over the 20-year period between 1998/2001 and 2020.

**Table 21: Base death rates and numbers of deaths for all cancers, 1998/00, with projected deaths to 2011 and 2021 (medium projection), by gender and ethnicity**

| Age ranges    | Other                      |                  |                       |                       | Māori                      |                  |                       |                       | Pacific                    |                  |                       |                       |
|---------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|               | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| <b>Female</b> |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 625                        | 767              | 925                   | 1281                  | 1260                       | 88               | 152                   | 256                   | 949                        | 25               | 48                    | 82                    |
| 75–84         | 1071                       | 933              | 1028                  | 1303                  | 1799                       | 42               | 90                    | 156                   | 1301                       | 13               | 28                    | 45                    |
| 85 plus       | 1745                       | 547              | 867                   | 1083                  | 2430                       | 11               | 22                    | 54                    | 2128                       | 4                | 12                    | 21                    |
| <b>Male</b>   |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 1011                       | 1136             | 1382                  | 1907                  | 1433                       | 88               | 152                   | 256                   | 1700                       | 37               | 76                    | 134                   |
| 75–84         | 1940                       | 1135             | 1503                  | 1971                  | 3033                       | 50               | 110                   | 196                   | 4031                       | 23               | 51                    | 92                    |
| 85 plus       | 3240                       | 430              | 805                   | 1178                  | 3871                       | 10               | 16                    | 45                    | 6425                       | 4                | 13                    | 29                    |

<sup>9</sup> The projections used in this report reflect a ‘best estimate’ by using average projections from four types of models. Public Health Intelligence Group 2002a p. 63 details the four projection models used.

## MUSCULOSKELETAL DISEASES

While musculoskeletal diseases do not contribute hugely to mortality rates, they are associated with high rates of disability and primary health care use. In Australia, a survey in 1995 found that 49% of those over the age of 65 reported having a long-term arthritic condition (Australian Bureau of Statistics 1999). In the USA arthritis affects approximately 59% of people over the age of 65 and is the leading cause of disability as measured by activities of daily life (ADLs) (Goulding et al 2003). In Victoria, Australia, musculoskeletal disease is projected to increase as the population ages (Vos and Begg 2000, Brown 2001).

New Zealand data indicate that musculoskeletal diseases accounted for 3% of DALYs in 1996, reflecting the low mortality associated with these conditions, although people with these conditions experience significant levels of disability as a result of arthritic and rheumatoid disorders (Public Health Intelligence Group 2001b). Projected deaths from musculoskeletal diseases are presented in Table 22 but could only be estimated for the 'Other' ethnic category – data for Māori and Pacific peoples were either absent or insufficient.

**Table 22: Medium projected deaths from musculoskeletal disease from base 1998/2000 to 2011 and 2021, by gender for the 'other' ethnic group**

| Age ranges | Female                     |                  |                       |                       | Male                       |                  |                       |                       |
|------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|            | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| 65–74      | 20                         | 24               | 29                    | 40                    | 12                         | 13               | 16                    | 22                    |
| 75–84      | 52                         | 45               | 50                    | 63                    | 32                         | 19               | 25                    | 32                    |
| 85 plus    | 163                        | 51               | 81                    | 101                   | 118                        | 16               | 29                    | 43                    |

The results indicate an increase in deaths related to musculoskeletal diseases between 2001 and 2021 for both men and women in all age ranges. Deaths for men in the 65–74 year age range are estimated to increase by 69% and for women by 67%. In the 75–84 age group, deaths will increase for men by 68% and for women by 40% over the next two decades. However, the greatest percentage increases are in the 85 and over age group, with projected increases of 169% for men and 98% for women, possibly reflecting an increase in male life expectancy.

## OSTEOPOROTIC FRACTURES

Hip fractures are a common injury from falls in older people. Hip fractures always result in hospitalisation and carry a significant burden for both mortality and morbidity because they mainly occur in older people. Short-term morbidity and mortality can occur due to complications such as pneumonia and pulmonary embolism. Older people have difficulty regaining their previous level of

<sup>10</sup> The data presented in Table 20 only show cancer registrations. Deaths from these three cancers in the 65 and over age group both at 1996 and projected to 2012 show similar rankings (Refer to Public Health Intelligence Group, 2002a).

functioning due to poorer mobility, and some become totally dependent. As a result there is a high risk of institutionalisation to provide ongoing care and support. Women experience higher rates of osteoporotic hip fractures than men due to their lower bone mass after menopause (as a result of reduced oestrogen production), with the risk for women over 50 years estimated at 17.5% (Jacobzone et al 1999). In a study of several OECD countries, approximately 30% of women aged 70–79 years in the USA were found to be osteoporotic and in Sweden 84% of women in this age group were detected as having osteopenia or reduced bone mass, based on the WHO definition (Jacobzone et al 1999).

The incidence of hip fractures varies significantly across countries, with the highest rates in northern Europe and lowest in southern Europe (Jacobzone et al 1999). Some cross-country comparisons reveal a rising incidence of hip fractures in several countries, and some researchers predict that the annual incidence of hip fractures could increase by more than 30% by 2020 (Johnell et al 1992, cited in Jacobzone et al 1999). In the UK almost 40% of home accidents were due to falls in the group aged 65 and over. One in three women and one in twelve men over 50 years of age will suffer from osteoporotic fractures. Ninety percent of the hip fractures in the UK are in the over-50-years age group (Health Promotion England 2001). A Finnish study found that the increase in the rate of hip fractures is occurring faster than can be accounted for by demographic changes alone (Kannus et al 1999). This increase has been attributed to changes in life style such as increased smoking and alcohol consumption and decreased physical activity. Similarly, in the Netherlands hip fractures in the 85 and over age group represent the third-highest health care cost for that group (Meerding et al 1998). In the USA falls and fall-related injuries are the leading cause of injury-related deaths among those aged 85 years and over. Hip fractures as a result of falls are one of the most serious outcomes. Since 1990 hip fracture hospitalisation rates of adults aged 65 and over have increased in the USA. Half of all older people who are hospitalised for hip fractures are unable to return home or live independently after their injuries (Merck Institute of Ageing and Health 2002).

In Australia osteoarthritis ranked 10th in the burden of disease of Australian women in 1996, as measured by DALYs (Brown 2001). Moller (2002) examined the cost of injury-related falls in South Australians over the age of 65 and projected future expenditure on fall-related injury until 2051. Assuming that present patterns of incidence and service delivery response are maintained, it was estimated that costs associated with fall injury in older people would increase by about 30% by 2011. The number of bed days associated with these injuries was also projected to more than double by 2051, with a moderate cost increase initially of approximately 25% between 2000 and 2010, followed by more substantial increases when the baby boom generation reaches the high risk age for falls – 75 years and over. A nine-fold increase in hospitalisation rates was projected for those aged 85 and over compared to all people aged 65 and over.

In New Zealand, falls among people aged 65 and over are acknowledged to be an important health issue (Ministry of Health 1999a). They are the second most common cause of unintentional injury deaths, after road traffic accidents, and there is a strong relationship between age and deaths from falls. In 1996 the death rate from falls for the 65–74 year age group was 12 per 100,000. It was 55 for the 75–84 age group and 311 for people aged 85 and over. While death rates from falls decreased

between 1980 and 1996 by about 60%, hospitalisation rates have increased approximately 37% for both males and females in the same time period (Ministry of Health 1999a). Also of concern for future health demand is the disability resulting from non-fatal falls in older people. As seen in the international literature, a hip fracture resulting from falls involves hospitalisation and treatment at high cost to acute care services, and also impacts on disability support services due to the long-term disability that often arises from the injury.

Projected increases in mortality from falls that result in fractures are presented in Table 24 and summarised for the 'Other' ethnic category in Table 23. Deaths from falls could only be estimated for two age ranges. The results of the projections 2001 to 2021 indicate comparable increases in deaths from falls for both men and women in the 65–74 year age range. In the group aged 75 and over, which includes those most at risk, deaths from falls will increase significantly for both men and women, but with higher increases for men, possibly reflecting increasing life expectancy for men.

**Table 23: Projected percentage change in mortality from falls resulting in fractures, by age and gender, for 'Other' ethnicity, 2001(base) to 2021**

| Age group | Male                 |                      |                      |                      | Female               |                      |
|-----------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|           | % increase 1998–2011 | % increase 2011–2021 | % increase 1998–2021 | % increase 1998–2011 | % increase 2011–2021 | % increase 1998–2021 |
| 65–74     | 30                   | 31                   | 70                   | 22                   | 36                   | 67                   |
| 74 plus   | 43                   | 35                   | 93                   | 22                   | 26                   | 54                   |

Increases for both Māori and Pacific peoples can be expected for both genders and across both age groups. Table 24 suggests percentage increases in deaths from falls resulting in fractures of 100% to 300%, but these large increases for Māori and Pacific peoples are again due to very low numbers in the base data. Overall, the estimates indicate that acute care hospital services are likely to face increased demand associated with fractures sustained in falls, as the population continues to age.

**Table 24: Base death rates and numbers of deaths from fractures, 1998/2000, with projected deaths to 2011 and 2021 (medium projection), by gender and ethnicity**

| Age ranges    | Other                      |                  |                       |                       | Māori                      |                  |                       |                       | Pacific                    |                  |                       |                       |
|---------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|----------------------------|------------------|-----------------------|-----------------------|
|               | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 | Rate per 100,000 1998/2000 | Deaths 1998/2000 | Projected deaths 2011 | Projected deaths 2021 |
| <b>Female</b> |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 7                          | 9                | 11                    | 15                    | 19                         | 1                | 2                     | 4                     | 12                         | 0                | 1                     | 1                     |
| 75 plus       | 94                         | 112              | 137                   | 173                   | 71                         | 2                | 4                     | 8                     | 29                         | 0                | 1                     | 1                     |
| <b>Male</b>   |                            |                  |                       |                       |                            |                  |                       |                       |                            |                  |                       |                       |
| 65–74         | 9                          | 10               | 13                    | 17                    | 11                         | 1                | 1                     | 2                     | 31                         | 1                | 1                     | 2                     |
| 75 plus       | 81                         | 58               | 83                    | 112                   | 35                         | 1                | 1                     | 3                     | 107                        | 1                | 2                     | 3                     |

## **SENSORY IMPAIRMENT (VISION/HEARING)**

As with musculoskeletal disorders, sensory impairment does not affect mortality rates, but often results in disability that increases DSS utilisation. In a 1995 study of older Australians, 96% of people over 65 reported eye problems and 32% reported hearing and ear problems (Australian Bureau of Statistics 1999, Brown 2001). In 1996 adult onset hearing loss in men aged over 65 and age-related vision impairment in women ranked ninth and eighth, respectively, in the burden of disease of Australian adults. Hearing loss for men is also projected to increase as a burden of disease in Victoria, Australia, by 2016 (Vos and Begg 2000).

Most studies find that cataracts are the leading cause of blindness in older populations and their incidence increases with age (Tielsch et al 1990, Klein et al 1996, Klaver et al 1998). Women are more at risk than men (Javitt et al 1996). Diabetes is a major risk factor for cataracts in older people (NHS Working Group 1997). The rate of cataract surgery is reported to have increased in recent years in many countries; for example, Australia, where the number of cataract operations has increased by 2.6 times between 1985 and 1994 (Jacobzone et al 1999). This increase has been attributed to the growing numbers of older people, advances in medical knowledge (both in detection and in treatment), greater patient demand and higher financial incentives. Thus, delay in receiving treatment for cataracts may increase the severity of the disease, levels of functional impairment and the risk of injury due to inadequate sight (Jacobzone et al 1999). These authors argue that as OECD populations age it is important to plan adequate eye treatment given the demand that visually impaired elders will have on disability services. No detailed figures could be located on the incidence and prevalence of hearing and visual disorders in New Zealand's older population.

## **SUMMARY**

In summary, many factors affect disease and disability in the older age groups. Many of the diseases outlined in this review are amenable to intervention at the preventive, therapeutic or rehabilitation levels throughout the life span. Failure in prevention or treatment can lead to limitations or impaired functioning in older people, driving demand for disability support and health services. Much is known about the causes of ill health in old age and effective treatments for some age-related illnesses. Functional impairments can often be reduced and managed by appropriate rehabilitation strategies.

The projections presented here indicate that over the next 20 years population ageing in New Zealand will place health and disability services under considerable pressure through substantial increases in mortality from many diseases associated with older age. Moreover, the data indicate that Māori and Pacific health demands will increase significantly. Disparity between the health status of different ethnic groups in New Zealand is an issue that needs to be addressed as more Māori and Pacific peoples reach older age groups. The challenge for the New Zealand government is to assess the relative contribution of each disease or condition to population ill health and prioritise resources accordingly, as our population ages over the coming decades.

## 6 LONG-TERM CARE ISSUES

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Disability trends and life expectancy rates are key indicators of the impact of the ageing population and consequent demand for long-term care services (Jacobzone et al 1998). The functional status of older people is primarily linked to underlying disease status, and chronic disabling conditions are associated with increased likelihood of requiring long-term care, either in an institutional setting or in the community (Fried and Guralnik 1997). Generally the vast majority of older people in residential care have either a severe or profound disability (Byles and Flicker 2002). Arguably, the demands associated with long-term care pose the greatest challenge for personal/family and public resources as the population continues to age (Woolaway 2001, Goulding et al 2003). A recent report from the United Nations Economic and Social Commission for Asia and the Pacific states that improving the delivery of community-based long-term care for disabled and frail older persons requires attention and needs to be strengthened in the region (UNESCAP 1998).

Anderson and Hussey (2000) examined ageing trends in Japan, Australia, France, Germany, Canada, New Zealand, the UK and the USA and found similar rates of institutionalisation across the eight countries, ranging from 1 in 15 older people in Australia and Germany to 1 in 20 in the UK. The use of long-term care services is heavily weighted towards the very old, typically those aged over 80. This sector of the population is expected to show the greatest levels of growth and by 2010 will constitute up to a quarter of the population in some countries (Jacobzone et al 1998). The early baby boomers will not significantly increase the demand for health services until they approach their 80s, with the peak of the cohort reaching their 80th year in 2039 (Evans et al 2001). However, it is also acknowledged that the ageing population will result in a shift from acute hospital care towards social care, leading to a greater demand for long-term care in the UK (Wanless 2001), in Australia (Carey 1999), the USA (Stone 2000) and the EU (Triantafillou et al 1999).

Long-term care encompasses a broad range of assistance with daily activities needed by disabled individuals over a prolonged period of time. The need for long-term care is due largely to underlying chronic medical conditions such as arthritis, dementia or diabetes. As we have seen, need for assistance may be related to ADLs (activities of daily living), such as bathing, dressing, eating and personal care, and/or IADLs (instrumental activities of daily living), including household tasks such as cleaning, and meal preparation, and life management skills such as shopping, money and medication management (Stone 2000). Long-term care is not an extension of acute care because it is invariably sustained over a long period of time and involves low-tech supportive services, but this care is essential to wellbeing and the ability of older people to function with disabilities (Stone 2000). Acute care services are episodic and temporary and relate to periods of sickness where the focus is on curing the illness.

A British study by the Medical Research Council (Melzer et al 1999) looked at the prevalence of physical and cognitive impairment in 10,377 people aged over 65 and attempted to relate disability to care and support systems. Eleven percent of men and 19% of women over 65 had a disability, and 38% of the over-80-year-olds were found to be cognitively impaired. Of those with a disability, 62% needed daily assistance and 21% needed continuous care and supervision. Sixty-three percent of older people with disabilities had used acute hospital services in a period of two years, of whom 43% were treated as inpatients. Over half of those with cognitive impairments and ADL limitations were living in institutions. A large proportion of disabled and dependent older people lived in the community, supported by informal and formal care-giving services. The authors argued the need to look at co-operation between acute and long-term care services, given that 63% of their sample used both.

In Australia a significant section of health care demand and expenditure is attributable to long-term care of older people. Long-term residential care is available for older people who are unable to remain in the community. Nursing homes provide care for the most disabled people, with hostels providing care for those with a lower level of impairment (Gibson et al 1993, Carey 1999). Gibson and Liu (1994) examined the consequences of a reduction of nursing home beds in relation to both the numbers of highly dependent older people in the Australian population and the likely impact of population ageing between 1993 and 2021. They based their projections on the assumption that age- and sex-specific levels of severe disability will not change significantly up to 2021 and that current utilisation patterns are a useful indicator of future trends. They also assumed that the 1994 policy of funding 40 beds per 1000 persons 70 years and over in residential homes and 52 in hostels would remain unchanged.

Their projections showed a likely shortfall in the capacity of the nursing home system to accommodate very dependent residents, based on current utilisation and bed ratios. The projected patterns showed an oversupply of nursing home beds between 1993 and 2001, but that this would fail to meet demand by 2006. Between 2006 and 2021 the projections indicated that a substantial shortfall in residential nursing beds was likely. The projections indicated that the planned level of hostel bed places would also not be sufficient to accommodate both the existing demand and the needs of those unable to be accommodated in residential nursing home beds. Overall, the results indicated that the supply of both hostel and residential nursing home beds would substantially fail to meet projected demand from 2001, but with a particular shortfall between 2006 and 2016 (a shortfall of 5300 in 2006, peaking in 2011 at 21,800 and falling back to 17,100 by 2016). They concluded that there would be a shortage of nursing-home-level care for highly dependent older people in Australia by 2006.

A comprehensive study conducted in the UK projected the demand for long-term care between 1996 and 2031 (PSSRU 1999, Wittenberg et al 2001). The projections assumed that patterns of care remained unchanged, with an unchanged relationship between use of informal care, dependency levels and household composition. The results of their projections indicated that, if no account was taken of other factors such as dependency rates, then population ageing alone would require the long-term care sector to expand by 61% between 1995 and 2031. If the population aged 85 and over expanded by 1% over that time then the sector would have to grow by 92%.

The report also detailed the likely increases in demand for domiciliary services such as home care and meals, and health services such as day hospital visits and community nursing. Again assuming stable rates of utilisation, age, family composition and gender, the projections indicated that the number of people receiving formal home care would rise by about 62%, and those receiving community nursing by 61%, between 1995 and 2031. A similar increase of 65% was projected for the number of older people in residential places such as nursing homes and long-stay hospital care during this period. The study also found that the projections were very sensitive to assumptions about future rates of dependency among older people. Assuming compression of morbidity, with a 1% decrease in dependency rates per year, then the projections estimated that long-term care expenditure would only need to expand by 18%. However, if age-specific dependency rates rose by 1% per year then the projections estimated that long-term care would need to expand by 121% to keep pace with demand.

Another UK government report on the residential care sector found that the number of residential homes fell by 3% between 2000 and 2001 and places in the remaining facilities dropped by 1%, while home care hours rose over the same period (Department of Health [London] 2002b). The report also projected demand for residential care to 2010 and 2020 based on the assumption that there would be no change in either patterns of care or in dependency rates. This suggested that the number of older people in residential homes would rise by about 23% between 2000 and 2020 as a result of demographic pressures alone. The implications were that a return to 1998 bed levels (a 3% increase on 2001 levels) would be necessary to meet demand in the first 10 years, but in the following decade a more substantial increase in supply would be required.

The analysis found that if the balance of care shifted from institutions to home care then this would approximately halve the projected demand for beds, emphasising the interaction between residential and community-based care options. A Canadian study that examined the relative costs of residential and home-based care for older people found that overall health costs for home care were one-half to three-quarters of the costs associated with residential care (Hollander 2001). This again shows that the extent of home-based care plays an important part in determining the cost of health services as the population ages.

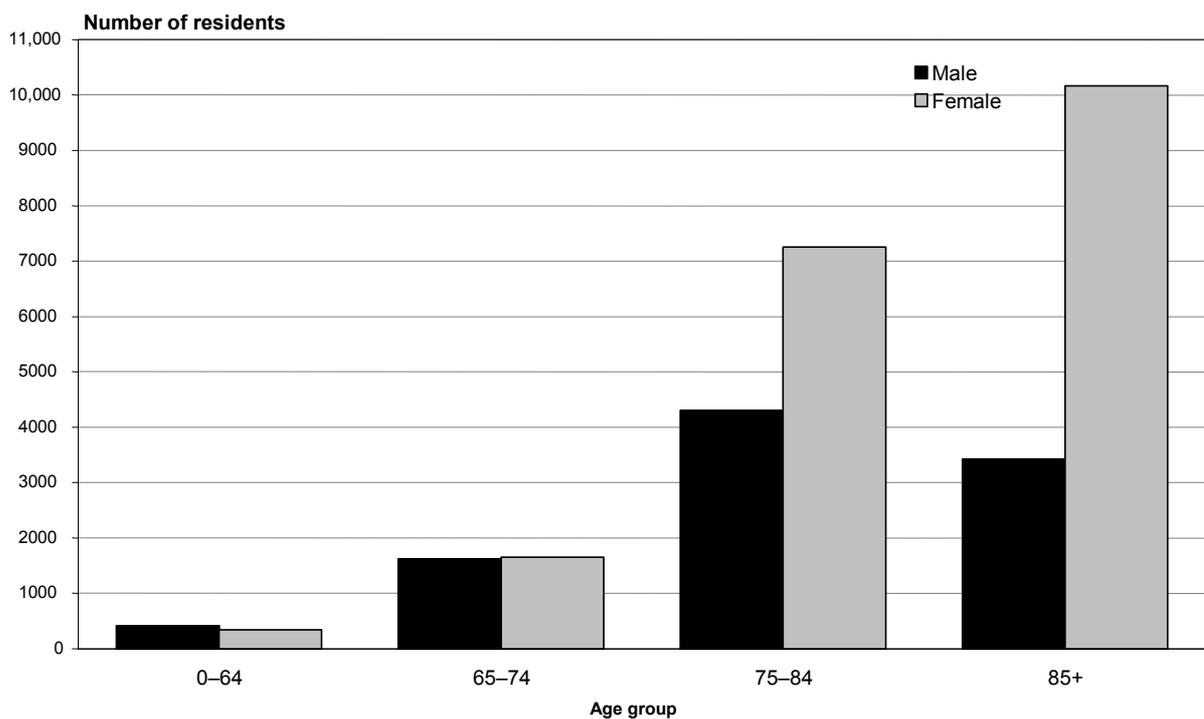
The extent to which older people use long-term residential care depends on the availability and accessibility of such services. OECD data indicate that the proportion of the population in long-term care institutions varies between 2.9% for Spain to 7% for Finland, and is influenced by policy, availability and funding (Jacobzone et al 1998). Melzer et al (1999) claimed that even among the most dependent sub-groups of older people the majority live in the community, supported by formal and informal caregivers. Policy settings and implementation are influential in the choices made by dependent older people and their carers about whether they should go into long-term care, stay at home alone, shift in with others or move into sheltered accommodation.

The international literature suggests that the proportion of older people needing care is likely to increase, but debate continues over the extent to which increases in life expectancy will result in years

free from chronic disabling conditions. It seems likely that a significant proportion of these extra years will be characterised by disability or chronic illness. In New Zealand increasing age is associated with higher levels of disability and a greater likelihood that either support at home or residential care will be required. In the 2001 Disability Surveys 74% of people aged 65–74 were living at home without assistance, but this applied to only 54% of those between 75 and 84 and 15% of those aged 85 and over.

While 57% of people aged 85 and over lived at home and received help and assistance, the proportion in residential care was much higher among this age group than in younger age groups (Ministry of Health 2002c). Very few people under the age of 75 were in residential care in New Zealand in 2000/01 (Figure 4). For people aged 85 and over, 31% of women were in residential care compared with 24% of men. This reflects women’s higher life expectancy, disability rates and widowed status (Ministry of Health 2002c).

**Figure 4: Estimated average number of residential care residents, by age group and gender, 2000/01**



Source: Ministry of Health 2002 (presented in Ministry of Health 2002c)

The future level of demand for long-term care among the older population is therefore related to trends in disability and life expectancy and how these two factors will interact – that is, the extent to which morbidity and disability are compressed towards the end of life. International trends clearly show that people aged 80 and over, particularly those with significant disabilities are the highest users of long-term care. However, many people in this category still remain living in the community with the help of formal and informal support services. It is important to recognise the continuum of care –

involving acute services, residential care and community support – when thinking about future demand, rather than seeing residential care as a separate sector. Nevertheless, the cost of residential care for older people is likely to loom large in funding projections. It is also an area in which policy settings will have a significant influence.

## 7 IMPLICATIONS FOR THE HEALTH AND DISABILITY WORKFORCE

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The issues reviewed in this paper have serious implications for the adequacy and availability of an appropriately trained workforce to deliver care to older people. Many of the health professionals currently working are themselves part of the baby boom generation, and in some countries it is estimated that 30% of health professionals will disengage from the health service to retire at the same time that the ageing population will be placing increased pressures on the health system (Hogan and Hogan 2002).

Wanless (2001) reports that the UK does not have sufficient health professionals, and workforce planning carried out by Dargie (1999) indicates both a current and projected workforce shortage of doctors and nurses. The health workforce in the UK is also ageing and is not being adequately replenished by younger workers (Dargie 1999). Moreover, with improved health technology the health workforce will have to upgrade its skill level, particularly in the area of information technology and genetic counselling.

In the USA, according to commentators, the professional and paraprofessional health workforce is unprepared to address the long-term care needs of an ageing society, and this situation is predicted to worsen as the baby boomers age. For example, physicians often have no training in long-term care, and do not understand the interrelationship between health, social and psychological needs, with few medical students studying geriatric medicine (Stone 2000, Merck Institute of Ageing and Health 2002). In their review on ageing and health, the Merck institute report that older patients who receive care from professionals with appropriate geriatric training show better health improvements. Stone argues that inadequate geriatric training is exacerbated by a lack of cultural or financial incentives for medical professionals to pursue careers or training in geriatrics and in how to care for long-term illness and disability.

Angus et al (2000) calculated the projected supply of intensive care specialists (intensivists) and pulmonologists in the USA in order to assess how supply will keep up with demand as the population ages. Estimates of current demand for professional pulmonary and intensive care unit services found that 56% and 67% of care days, respectively, were incurred by patients over 65 years, indicating the importance of these services for older people. The projections used a base model from USA Census estimates of population change, by current age and disease-specific use rates, with the assumption that there would be changes in annual hours due to the changing age structure of the population. The analyses were conducted for both intensive care unit specialists and pulmonary specialists, and subjected to sensitivity analysis that estimated:

- the effect of age-independent changes on the incidence, prevalence and management of pulmonary diseases and common intensive care unit diseases
- the spread of managed care systems

- retirement patterns
- the distribution of clinical hours
- changes in the number of specialist trainees.

The results indicated that as a result of population ageing, the supply of intensivists would meet demand until approximately 2007, but thereafter demand would outstrip supply yielding a shortfall of intensivist hours of 22% by 2020. The variables in the sensitivity analysis had only a small impact on the ratio between supply and demand and did not lead to a large reduction in the shortfall. Similar results were reported for projections of the ratio of demand to supply of pulmonary specialists, but with the shortfall occurring earlier. A deficit of 35% in these specialists was forecast by 2020. As with intensivists, sensitivity analysis did not markedly alter the projections, with population ageing being the primary driver of increased demand.

The International Council of Nurses (2000) assert that increases in life expectancy will result in greater numbers of older people needing care, and that given nursing is the largest component of care for frail older people, then the ageing population will have a significant impact on these health professionals.

All of these issues are leading overseas governments to commence planning health workforce requirements over the next two decades (see Wheeler 2002 for an example). Hogan and Hogan (2002) argue that it would be prudent for the Canadian government to address chronic shortages of health-care professionals. Canada, like New Zealand, has had difficulty in both retaining and recruiting human resources in the health sector in recent years (Health Workforce Advisory Committee 2002a). Hogan and Hogan argue that these difficulties may increase as the population ages unless preparations are made early to address the needs of the health workforce, such as increasing funding for training programmes and improving wage rates. Indeed, workforce issues may prove to be the greatest challenge facing health systems in the future. Labour supply reacts fairly slowly to market conditions, because of the time needed for training and recruitment, so conditions need to change now to ensure sufficient resources in the health sector as the population ages.

In New Zealand the future direction of the health workforce has been examined by the Health Workforce Advisory Committee (2002b). The ageing of the population, changing ethnic composition, technological advances and changing disease patterns were all identified as important factors driving future demand for health services and health workers. In common with other countries, New Zealand is experiencing difficulties in recruiting and retraining specialists in geriatric care, and concern has been expressed that the training programmes in place do not develop the correct skills needed to care for older people (Associate Minister of Health 2001). Reflecting trends overseas, the nursing population is also ageing. The average age of nurses was 42.6 years in 1998 (Associate Minister of Health 2001), and the percentage of the nursing workforce aged between 25 and 29 years has decreased from 14.9% to 9% between 1990 and 2000. During the same period the percentage of nurses between 50 and 54 has risen from 9.1% to 12.3%. The rate of retirement among nurses can therefore be expected to increase in the near future (Ministry of Health 2002d).

The demand for GPs will also increase (Health Workforce Advisory Committee 2002a). The growing complexity of health needs is expected to increase the length of consultations, and GPs may reduce the numbers of clients on their books. GPs are also taking on responsibilities devolved from secondary care services, with the result that future demand is likely to outstrip supply. More generally, there are issues in the recruitment, retention and supply of medical practitioners. The supply of junior doctors is decreasing, with student debt forcing many medical graduates to seek employment overseas. This situation is further exacerbated by doctor shortages internationally. Many other countries are able to offer more competitive salaries to New Zealand medical graduates.

Shortages are also apparent in other specialist health fields. Currently New Zealand has a shortage of specialist radiation therapists, and given that the rate of cancer in New Zealand is increasing and is associated with advancing age, this is also likely to be an area in which demand will outstrip supply (Ministry of Health 2002d). Similar shortages are also evident in the numbers of cytotechnologists in cancer screening organisations. Skill shortages have been reported in the public health workforce, and given the role that public health plays in the overall health status of the population this is another matter of concern.

There are difficulties in recruiting and retraining speech therapists, needed by people with conditions such as stroke. The same issues are reflected in a shortage of rehabilitation specialists, physiotherapists and disability support needs assessors, who provide important health services to disabled people. Altogether the New Zealand health workforce faces significant challenges, both currently and over the next two decades as our population ages.

In summary, many countries are coming to the realisation that workforce issues in the health sector are likely to become a critical issue in meeting the challenges of population ageing. This is related to the ageing of the health workforce itself, especially in nursing, but is exacerbated by the fact that geriatric medicine and long-term care of older people with major disabilities are not popular specialties for medical professionals and are not prominent in medical training. Countries like New Zealand face the additional challenge of retaining health care workers in the face of active recruitment from overseas. Planning to meet shortfalls in the health service workforce is essential, given the long lead time required for recruitment, training and certification.

## 8 INTERNATIONAL DIRECTIONS IN HEALTH REFORM AND POLICY

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Many international analysts and researchers have concluded that while population ageing will impact on health systems in many countries, if governments plan appropriately for increasing numbers of older people then the changes should be manageable (Robson 2001). A British Columbia study examined the impact of ageing on the health system and found that demography alone explains only a small part of the trends in health care use (Evans et al 2001). The authors argue that change in the age structure of the population has not been a major contributor to trends in the per capita utilisation of health care services in Canada, indicating that ageing effects are relatively small and will not result in an uncontrollable 'crisis' in the health system. Similarly, Australian findings indicate that much of the increase in health expenditure as a result of ageing reflects high spending in the last two years of life. Thus any increase in health spending as a result of population ageing is likely to be considerably smaller than growth in ageing as a trend (Carey 1999). A report on long-term issues affecting the UK health system argued that while the population in the UK over the next two decades is going to increase overall and that the proportion of those over the age of 85 will rise by between 37 and 94%, it is age and proximity to death that are the main drivers of health service use, suggesting that the impact of ageing on health costs and demand for services will not be unmanageable (Wanless 2001).

Researchers and analysts argue that governments should focus on making improvements in the efficiency of the health sector. For example, in a review of the Canadian health care system's ability to cope with population ageing, Hogan and Hogan (2002) argue that ageing represents a one-time pressure on the health system (although sustained over a number of years) and not an ongoing issue, so there is no need for reform, but rather an emphasis on maximising the efficiency of service delivery and diverting resources from other areas to alleviate potential tensions.

Reforms have been under way in Europe to reorganise the health system and improve efficiency in service delivery in order to contain health expenditure caused by the larger numbers of older people with chronic health problems and disabilities (WHO 1996, Triantafillou et al 1999). A primary focus has been on strengthening primary care services for older people. Countries where the primary health care sector has control of health resources are seeking to give the sector a steer in shifting from a curative focus to a more preventive approach. This reflects the belief that the combination of knowledge and skills provided by primary health care professionals is essential to changing health behaviour, and that older people will benefit from such services.

During the 1990s Australia instituted the Aged Care Reform Strategy. This aims to target long-term care resources to those most in need, as defined by dependency levels and financial status (Gibson et al 1993, Gibson and Liu 1994). Services are also available under the Home and Community Care Program (HACC), which provides assistance for people who wish to remain, and are able to be supported, in the community (Carey 1999). Similarly, discussions about the financing and delivery of care in the USA have focused on how to support informal care-giving, recognising the pivotal role of family and friends in providing long-term care assistance to disabled older people and the objective of reducing the need for formal care (Stone 2000). The UK government has also released a policy brief that emphasises the need to provide support for informal caregivers (Department of Health [London] 2002a).

## **SYSTEMS OF INTEGRATED CARE FOR FRAIL OLDER PEOPLE**

Countries in the EU have developed a wide variety of strategies for policy intervention at different levels in the health system, and there has been an increasing emphasis on both process and outcomes in health care. A recent trend has been the introduction of ‘continuous quality of care development’ (QCD) programmes. These take a comprehensive and integrated approach to health care, operating at different levels in health care systems and involving a variety of health care professionals (WHO 1996). Central to health policy reform overseas is a focus on providing a comprehensive health service that incorporates primary care, acute care and long-term care at both the institutional and the community levels. The health needs of older people are often multi-dimensional and a system of co-ordinated care is required if these needs are to be effectively evaluated and attended to (UNESCAP 1999). The New Zealand *Health of Older People Strategy* outlines a policy framework for meeting the health needs of older people as the population ages (Associate Minister of Health 2002). The aim is to develop an integrated approach to health and disability support services that are equipped to respond to the complex and changing needs of older people. Termed ‘the integrated continuum of care’, the strategy seeks to ensure that older people can access care and required services in line with their evolving needs. This strategy is currently being implemented, and a workshop was held in Wellington in 2002 to assess how the implementation of the continuum of care concept is progressing (Ministry of Health 2002a).

Several integrated service provision models have been proposed and trialed in OECD countries, such as PACE in the USA (Stone 2000), SIPA in Canada (Bergman et al 1997), and co-ordinated care trials in Australia (Australian Department of Health and Aged Care 2001). All aim to ensure the co-ordination of efficient and appropriate service delivery for older people. These programmes are summarised below as examples of how an integrated approach may work in delivering care to older people.

## **AUSTRALIA – CO-ORDINATED CARE TRIALS**

Co-ordinated care trials in Australia examine how health and community service professionals can co-ordinate services for people with long-term care needs, chronic illness or multiple needs, with the aim of achieving better health and wellbeing outcomes within current funding levels. The trials investigate whether improved outcomes can be achieved and whether pooling funding at the state and commonwealth levels would bring better co-ordination of care (Australian Department of Health and Aged Care 2001). A central premise for the trials was that efficient co-ordination of care for people with chronic or complex needs would reduce hospitalisation. The savings generated could then be used to cover the costs of co-ordinated care (Esterman and Ben-Tovim 2002). In an OECD report, Carey (1999) argued that such a system could yield significant benefits to older people given the higher incidence of chronic illness and disability necessitating long-term care among this group.

The first set of Australian trials ran for two years and were evaluated both locally and nationally. Esterman and Ben-Tovim (2002) concluded that the results were disappointing: basically, the trials did not demonstrate that co-ordinated care resulted in improved health and wellbeing for participants. Reductions in hospitalisation rates were observed in only three of the nine trials. They argued that the trials did not achieve their stated objectives because of their length, difficulties with recruitment, and lack of tailoring of the interventions for different participants. However, while noting these shortcomings the authors did conclude that the trials provided a number of benefits, such as the funding of intervention programmes, and technological upgrading of systems required to run the trials. They also found that co-ordinated care was perceived positively by the participants, who appreciated the integration of their care services. Further trials are under way, and these are being run for a longer period, with better targeted interventions and outcome measures (Esterman and Ben-Tovim 2002).

## **CANADA – SIPA**

SIPA (Système de services intégrés pour personnes âgées en perte d'autonomie) was devised by McGill University as a model for integrated care for frail older people, in response to the increasing number of older people in the Canadian population (Bergman et al 1997). In the late 1990s care of frail older people (aged 75 and over) in Canada was fragmented, with a lack of overall control, responsibility, accountability and funding. The organisation of care at both the community and institutional level was not providing comprehensive coverage. The responsibility for delivering services to frail older people lay with a variety of agencies, both formal and informal. No single mechanism oversaw the services that were offered by caregiving agencies. SIPA established a single entry point, within a specific geographical region for each older person requiring care or support for ongoing disability needs.

The model was designed to ensure comprehensive care coverage, integration of available services and continuity of care by all of the professionals and organisations involved. Each SIPA agency was responsible for primary and secondary medical and social services, prevention, rehabilitation, medication, technical aids and long-term care. Older people were eligible if they had either one severe disability or two mild to moderate disabilities, as measured by DALYs. The focus was on older people requiring nursing home care, but also those with disabilities needing assistance to remain in the community. The goal of SIPA was to deliver care through a multidisciplinary team that would use services and resources in the most appropriate and efficient way and minimise the inappropriate use of acute and long-term institutional care. SIPA was trialed in two centres in Montreal for 22 months. It was concluded that SIPA had the potential to use resources effectively and to reduce inappropriate acute hospital admissions, while maintaining or improving the quality of service and client satisfaction in a cost-effective manner (Bergman 2001a, 2001b).

### **USA – PACE**

PACE, the Program of All-inclusive Care for the Elderly, was developed in response to population ageing and inefficiency in the delivery of care to frail older people via the Medicare and Medicaid programmes (Chu and Pan 2001). PACE is a fully integrated managed care system that provides a comprehensive medical and long-term care service. Started as a demonstration project in 1986, it has since expanded to 25 different sites in the USA, and a further eight sites were in a pre-operational phase in 2001. The programme is funded by pooling Medicare and Medicaid funds to provide a broad range of both acute and long-term care services for older people, delivered by multidisciplinary health professional teams (Lee et al 1998). In-home services, day care, laboratory and ambulance services, skilled nursing care, specialist medical services and supportive/rehabilitation services all come within the scope of the PACE model.

Integration of funding enables a flexible array of services to be offered, which are not usually included in the Medicaid or Medicare plans. Access to PACE is restricted to older people who are certified for nursing home care and who are at least 55 years old. All participants are frail, with multiple medical problems, and generally have limited social and psychological support networks. The typical client is aged about 80 years, has on average 7.8 medical conditions and is dependent or restricted in 2.7 ADLs (activities of daily living) (Lee et al 1998). Generally the clients represent a sector of the population who are at high risk of hospitalisation and admission to residential care (Chu and Pan 2001). The specific goal of the PACE programme is to stabilise chronic medical conditions and maximise functional capabilities and status. Another goal is to facilitate early detection and treatment of illnesses so that morbidity and mortality are reduced and long hospital stays are avoided. PACE is intended to take over the total responsibility for providing health services for frail older people (Lee et al 1998).

An evaluation of established PACE sites examined changes in disability and functional status among enrolees living in both community and residential care settings. It found that they experienced significant changes in their ADL status within a short time of admission to the programme and that their functional status stabilised fairly rapidly. After the first six months in the programme the likelihood of either improvement or deterioration of functional status was small (Mukamel et al 1998).

Improvements in functional status were influenced by both type of ADL restriction and the living arrangements of enrolees. For example, the study found bathing dependency showed the highest improvement of all restrictions, all other things being equal, at six and eighteen months. However, there was less improvement in dementia and incontinence. The study also found that frail older people who remained in their homes living alone had better outcomes than individuals living with others. Those living alone were more likely to have improved at both six and 18 months and were less likely to have died at 18 months. Assessment of the financial efficacy of the PACE model demonstrated that the programme has the ability to provide cost-effective, quality care to frail older people who need residential care, to reduce the use of institutional care and to control the use of medical services (Eng et al 1997, Lee et al 1998).

In summary, several countries have attempted to adopt a co-ordinated approach to health care delivery – with mixed results. The delivery of care was found to be cost effective in each of these programmes, and many of the frail older participants expressed improved satisfaction with their care. However, while inappropriate hospitalisations were reduced in some of the programmes, the impact on the health status and wellbeing of participants was more ambiguous. Some reviews found no clear improvements in the health of older people in the programmes, although most conceded that benefits were apparent and that many of the trials had not been running long enough for a definitive decision on efficacy to be made. The success of the New Zealand *Health of Older People Strategy* in delivering a continuum of care to older New Zealanders would be enhanced by an in-depth evaluation of the benefits and limitations of these overseas programmes.

## 9 OTHER FACTORS INFLUENCING PROJECTIONS IN THE HEALTH SERVICES SECTOR

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In their report for the OECD, Jacobzone et al (1998) suggest that the interplay between demographic changes, changes in rates of serious disability, existing service provision, spending levels and trends in de-institutionalisation make it very difficult to provide a clear-cut picture of long-term care costs and the demand for services that will be incurred by OECD countries in the next three decades.

Hogan and Hogan (2002) also argue that forecasts of future demand in health services are plagued by uncertainty. They advise that health policy should adopt a risk management approach, taking account of this uncertainty when planning future demand and service delivery. The greatest concern for future health planning in the context of ageing is the need to focus on human resources, since health worker shortages pose major risks. Other unpredictable factors include changes in public and social policy (such as flexible working, retirement patterns) or breakthroughs in medical technology (eg, that alleviate age-related illnesses such as dementia and arthritis) which could alter any projections for health and disability service demand (Triantafillou et al 1999).

In this chapter the international literature on the impact of informal care issues, consumer expectations and technology will be examined to consider how these issues could impact on future demand for health and disability services.

### INFORMAL SUPPORT ISSUES

The ageing of the baby boom generation is expected to drive up demand for a broad array of long-term care services (Stone 2000). One common suggestion for counteracting this is to encourage home care as an option rather than hospitalisation and residential care. However, as pointed out by Hogan and Hogan (2002), such a shift would increase the need for home care and informal workers. There are also questions about the ability of older people to afford such services. Living arrangements among older people also affect the demand for health and disability services. A continuing desire for independent living arrangements, particularly by economically well-off older people, may translate into an increased demand for community-based services (Jacobzone et al 1998).

It is difficult to assess the demand for formal long-term health and disability support services since informal care plays a significant role in supporting older people who need assistance. Organised in-home help services represent only one-fifth of the total care resources available to and used by frail non-institutionalised older people (Jacobzone et al 1998). In the USA the major long-term provider of informal care is the family, and to a lesser extent other unpaid informal caregivers such as friends and neighbours. In the UK the majority of long-term care is provided informally by families, with one in eight adults providing care. Over half of the total carers are looking after people aged 75 years and over (Health Promotion England 2001).

In the UK, Wittenberg et al (2001) found that if an unchanged relationship between levels of informal help, dependency levels and household type is assumed then the number of older people who are living at home, need support and are receiving informal care is projected to rise by 56% between 1995 and 2031. However, they make the point that it is extremely difficult to reach a conclusion about the likely supply of informal care, because it is dependent on the attitudes, values and expectations of the older people and their families. Their analysis indicates that if informal care supply does fail to keep up with demand then there could be both a significant amount of unmet care needs in the older population and an increased demand for formal and institutional care.

Thus a decline in the availability of informal unpaid caregivers may result in an increase in unmet care needs (Stone 2000). In Australia the proportion of people who are very old and very disabled persons was increasing in 1994, but the majority of those with severe disabilities were cared for in the community (Gibson and Liu 1994). Carey (1999) argues that in Australia there will be a greater demand on the government for subsidised long-term care, because of social trends that are reducing the supply of informal care givers in the home. Demographic analysis in Australia suggests that until 2021 there is likely to be a reduction in the number of available caregivers. This arises from a reduced ability or willingness to care for aged relatives, due to either increased labour force participation by women or ageing within the workforce of carers (Gibson and Liu 1994). Generally women, especially daughters, take on the bulk of informal caring roles (Tennstedt 1999). However, as women delay childbearing they will be more likely to be juggling the multiple demands of child rearing, paid work and elder-care responsibilities.

Several factors influence the demand for informal caregiving. The most important predictor is marital status. At present, older women are significantly less likely to be married than men are, but the percentage with spouses is on the rise in the USA, due to increasing male life expectancy (Stone 2000). Another important factor is family structure. With declining birth rates, future cohorts of older people will not have as many family members who could assist with their care. Thus, one significant sub-population likely to use formal care services are older people who live alone and have no living children or siblings (PSSRU 1999, Pickard et al 2000, Stone 2000).

On a positive note, international research points to a rebalancing of ratios between older men and women resulting from gains in male life expectancy. This trend may reduce the overall demand for formal care in the future as increasing numbers of older women remain partnered (Jacobzone et al 1998). Lakdawalla and Philipson (1998, 1999) specifically examined the interaction between economic forces and levels of healthy and frail persons in the population and estimated how these influence the supply and demand for long-term care. Their empirical work suggests that the increase in healthy old people, especially older men, may assist in reducing the demand for long-term care in nursing homes, which is disproportionately used by older widows. The increase in life expectancy of older men, the possible decline in disabilities among older women and increasing income levels could therefore influence the demand for care and the supply of carers (Triantafillou et al 1999).

In the USA gender has been found to influence the type and amount of informal care elders receive (Tennstedt 1999). Women are more likely than men to receive informal caregiving assistance, but after controlling for functional status, men receive greater quantities of informal caregiving time. This may be due to the gender-specific tasks that men require, such as cooking, housework and personal care. In contrast, older women tend to require assistance with transport, shopping and household repairs, which take less time. Another factor is that older men tend to receive help from one source, often their spouse, whereas women have typically between two and four caregivers to assist them with different tasks.

Liu et al (2000) recently identified some changes in the pattern of home care assistance received by disabled older people in the USA. They found that the proportion of people accessing and relying solely on either paid or informal care declined over the 1989 to 1994 period, while the proportion accessing both sources increased, particularly for those with severe levels of disability (five or more ADLs – activities of daily living). The authors surmised that this change may be related to changes in family demographics, increasing complexity in the needs of disabled older people, or the increasing participation of female caregivers in the workforce, which might necessitate the use of supplementary care avenues. However, the study did not find that the role of informal carers diminished. The authors conclude that the findings indicate a fluid arrangement between the demand for and supply of services, and changes in policy in one area could result in decreases or increases in other areas.

The availability of choices in the provision of care, as well as cultural and economic factors, affects the patterns and willingness of family members to provide informal care (Salvage 1995). Demographic data in Europe indicate that there are fewer children and siblings available in successive generations to provide informal care. Women's greater participation in the paid labour force means that caring for older dependent relatives will carry a higher opportunity cost. The age of the person requiring care is growing and the age of the carers is also increasing. These all affect the substitutability between family care and public and private care services (Salvage 1995). Jani Le Bris (1993) found that higher incomes or a better supply of public services can permit some families to opt not to provide informal care for their older relatives and to rely on public services. A longitudinal study of disabled older people in the USA investigated the substitution of formal services with informal care over a seven-year period. This found that substitution was related to the limited availability of informal carers or temporary substitutes. However, the net effect of the programme was to allow older people to remain in the community for longer (Tennstedt et al 1993).

In their examination of population ageing in Australia, Canada, France, Germany, Japan, New Zealand, the UK and the USA, Anderson and Hussey (2000) found that in all the countries except Japan, 10–20% of older people lived with adult children. However, Anderson and Hussey claim that informal care support has been weakened over time. Between 1970 and 1990 there was a decrease in the percentage of older people living with their children and an increase in the percentage living alone in all eight countries, although the growth in older people living alone stabilised in the 1990s.

Gibson and Liu (1994) predicted a decline in the proportion of informal carers on the basis of demographic trends alone, even leaving aside other influential factors such as the higher labour market participation of women. In support of this, Rowland (1991) calculated the future caretaker ratio for Australia (the caretaker ratio is the ratio of women aged 50–64 years to the number of over-80-year-olds). On the basis of projected demographic changes, Rowland estimated a reduction in the caretaker ratio from 3.5 potential carers in 1986 to only 1.8 in 2031. While the caretaker ratio is a limited measure that does not take account of demand and supply factors, it reflects the potential availability of informal carers.

## **INFORMAL CARE IN NEW ZEALAND**

In New Zealand at least 50% of people with mild dementia are cared for in the community, usually by a family member (Butler et al 1998). The ability of people with dementia to stay in their homes is dependent on the availability of family or carer support; the availability or accessibility of community services, the extent of functional impairment, and the existence of behavioural complications and psychotic symptoms (Ministry of Health 2002b). Planning services for people with dementia needs to take into account all groups, such as those with early onset, mild, moderate or severe levels of impairment, people living in rural settings, and those who are socially isolated. Given the complex care needs of people with dementia who remain in the community or in their own homes, informal carers play an exceedingly vital role. Where they are absent, or where stress levels make caring unsustainable, this may precipitate admission into residential care (Ministry of Health 2002b).

Some information is available on informal care from the ‘activities’ question in the population census. This asked people if, in the four-week period before the census, they had cared for someone who was ill or disabled within the same household and also outside their household (there was a separate category for childcare). The age of the person cared for was not indicated, so this cannot provide a definitive picture of elder-care activities. It is suggestive only. The ‘From Birth to Death’ database provides a breakdown of caring activity data by age, gender and ethnicity (Davey 2003).<sup>11</sup>

Comparisons of the information from census to census are unreliable, because of different wording of the question, different instructions to respondents and varying placement of the questions within the individual census questionnaire.

The following table gives the percentage of people in various age group who provided informal care for ill or disabled people in the same household and in another household. The data is from the 2001 census. Women were more likely than men to be involved in both types of caring, except for people

<sup>11</sup> The From Birth to Death databases include the population in private dwellings on census night who usually live in these dwellings. This differs from total usually resident census population in two respects: it excludes people living in non-private dwellings and it excludes people who were away from their usual residence on census night. The database also does not cover people who were temporary visitors in private dwellings on census night. This approach was required because the census does not collect information on the ethnic group of absentees, and ethnicity is one of the key variables in the analysis. The total New Zealand usually resident population at the 2001 census was 3,737,277. The From Birth to Death database covers 93% of this population. (The 1996 From Birth to Death database covered 94% of the usually resident population at that date.)

aged 75 and over. In this age group men may be caring for their disabled wives. The highest rates for caring in the same household were in the 20–59 age groups, and the highest rates for caring in another household were in the 40–74 age group.

**Table 25: Percentage of people caring for an ill or disabled person, by age and gender, 2001**

| Age group | Caring for ill/disabled person in same household |          | Caring for ill/disabled person in another household |          |
|-----------|--|----------|---|----------|
|           | Male %   | Female % | Male %  | Female % |
| 15–19     | 4  | 5        | 3   | 4        |
| 20–39     | 7  | 9        | 5   | 8        |
| 40–59     | 6  | 10       | 7   | 14       |
| 60–74     | 5  | 7        | 7   | 11       |
| 75 plus   | 5  | 4        | 5   | 5        |

Source: From Birth to Death database

In the young adult age group (20–39) women were more likely to provide informal care to ill or disabled people than men, in all ethnic groups (Table 26). Within the same household the figures were highest for Māori and Pacific peoples, both men and women. In other households the figures were highest for Māori.

**Table 26: Age group 20–39, percentage who looked after someone ill or disabled, by gender and ethnicity, 2001**

|                 |        | Same household | Another household |
|-----------------|--------|----------------|-------------------|
| Māori           | Male   | 10             | 8                 |
|                 | Female | 15             | 13                |
| Pacific peoples | Male   | 11             | 6                 |
|                 | Female | 14             | 8                 |
| Asian           | Male   | 4              | 3                 |
|                 | Female | 5              | 3                 |
| Pākehā          | Male   | 5              | 5                 |
|                 | Female | 8              | 8                 |
| Total           | Male   | 6              | 5                 |
|                 | Female | 9              | 8                 |

Source: From Birth to Death database

The figures are fairly similar for the 40–59 year age group (Table 27). However, around 14% of women in the age group cared for people in other households, with higher figures for Pākehā and Māori women. These could be caring for older parents, but this is only an assumption.

**Table 27: Age group 40–59, percentage who looked after someone ill or disabled, by gender and ethnicity, 2001**

|                 |        | Same household | Another household |
|-----------------|--------|----------------|-------------------|
| Māori           | Male   | 9              | 9                 |
|                 | Female | 14             | 16                |
| Pacific peoples | Male   | 10             | 7                 |
|                 | Female | 14             | 10                |
| Asian           | Male   | 5              | 3                 |
|                 | Female | 6              | 4                 |
| Pākehā          | Male   | 6              | 7                 |
|                 | Female | 9              | 15                |
| Total           | Male   | 6              | 7                 |
|                 | Female | 10             | 14                |

Source: From Birth to Death database

In the age groups between 60 and 80 years, women were more likely to be caring for someone who was ill or disabled than men (Table 28). This applied in all ethnic groups, but there was very little difference between the rates for Asian men and women (Table 27). From age 80 onwards, however, a higher percentage of men than women were performing this type of caring work, in all ethnic groups.

**Table 28: Age group 60 and over, percentage who looked after someone ill or disabled, by age and gender, 2001**

| Age group | Same household |        | Another household |        |
|-----------|----------------|--------|-------------------|--------|
|           | Male           | Female | Male              | Female |
| 60–64     | 4.9            | 7.3    | 6.9               | 13.1   |
| 65–69     | 4.7            | 6.2    | 6.7               | 10.2   |
| 70–74     | 4.9            | 5.5    | 6.0               | 8.1    |
| 75–79     | 5.4            | 4.9    | 5.2               | 6.1    |
| 80–84     | 6.3            | 3.7    | 4.0               | 3.8    |
| 85 plus   | 6.0            | 2.1    | 2.8               | 2.0    |

Source: From Birth to Death database

Amongst the population aged 60 and over, Māori and Pākehā women aged between 60 and 70 had the highest rates of caring for someone in another household. At 70 to 74 the rates were highest for Pākehā women. From age 75 onwards the rates of caring were much lower.

Table 29 only includes people who, in the 2001 census (From Birth to Death database<sup>12</sup>), said they had cared for someone ill or disabled in their own household during the previous four weeks. Of this group, 25% were women aged 20–39 and 23% were women 40–59. The highest male percentages were in the same age groups. The population aged 20–59 accounted for 78% of people who did this type of caring work.

**Table 29: Distribution of people who looked after ill or disabled members of own household, by age and gender, 2001**

| Age group | Male | Female | Total |
|-----------|------|--------|-------|
| 15–19     | 2.8  | 3.2    | 6.0   |
| 20–39     | 15.7 | 25.0   | 40.7  |
| 40–59     | 14.4 | 23.3   | 37.7  |
| 60–74     | 4.8  | 6.6    | 11.4  |
| 75 plus   | 2.0  | 2.2    | 4.2   |
| Total     | 39.7 | 60.3   | 100.0 |

Source: From Birth to Death database

There is a similar pattern for people who cared for someone ill or disabled in another household (Table 30). The 40–59 years age group covered 46% of people who did this type of caring, and the 20–59 years age group covered 76%. Women aged 40–59 accounted for 31% of those caring for people outside their own households and 23% of those caring for ill or disabled members of their own households.

**Table 30: Distribution of people who looked after ill or disabled members living in other households, by age and gender, 2001**

| Age group | Male | Female | Total |
|-----------|------|--------|-------|
| 15–19     | 1.9  | 2.3    | 4.2   |
| 20–39     | 10.9 | 19.9   | 30.8  |
| 40–59     | 14.4 | 31.2   | 45.6  |
| 60–74     | 5.8  | 10.0   | 15.8  |
| 75 plus   | 1.4  | 2.2    | 3.6   |
| Total     | 34.4 | 65.6   | 100.0 |

Source: From Birth to Death database

In summary, given that a significant proportion of older people with disabilities are cared for by informal caregivers, any decline in the level of family care will impact on the demand for disability support services (Triantafillou et al 1999). If there is an increased demand on professional long-term

<sup>12</sup> The database does not cover the total usually resident population and so these figures underestimate the totals.

health care, then health costs and demands on resources will rise considerably (O'Shea and O'Reilly 1999).

## **RISING CLIENT/ CONSUMER EXPECTATIONS**

In many European countries health care users are becoming more vocal in terms of their choice of service providers and clinical regimes, and in policy debates. The increasing number of older people may bring them a greater say and representation in the decision-making process. Moreover, the information society is likely to have a big impact on the level of knowledge that will be held and can be accessed by individuals, which may result in increased participation of patients in decisions pertaining to their care (Triantafillou et al 1999, Jackson 2002). These patterns are reflected in the UK. After examining trends in wider society, Wanless (2001) concluded that the future health service user is likely to be better educated, more informed, more affluent, time pressured, less deferential to authority and professionals, have more comparisons to apply to the health system, will want to have more control and exhibit greater choice, and will expect a more tailored health service (see also NHS R&D Strategic Review 1999 for a similar analysis of consumer expectations). Use of the internet is projected to increase in the UK, giving many more seniors access to health resources and information about technology, pharmaceuticals and advances in treatments, which may drive up demand for those services (Triantafillou et al 1999, Dargie 2000). This suggests that future older populations will demand and receive higher levels of care for any given health need. Moreover, if consumers rely less on the state to pay for long-term care, they are also likely to demand greater flexibility in how and where they access services (Stone 2000).

Morgan and Hurley (2002) argue that the availability of medical technology, particularly pharmaceuticals, and the increasingly 'consumer oriented' marketing of drugs will interact with consumer knowledge and expectations. These contentions are supported by work that found direct-to-consumer drug advertising, allowed in both New Zealand and the USA, leads to increased demand for these products and has also resulted in increased contact with prescribing physicians (Mintzes et al 2002a, 2002b).

## **TECHNOLOGICAL ADVANCES**

The contribution of new technologies in improving health, and their costs and benefits, are issues of major importance in the European Community (Triantafillou et al 1999), Canada (Hogan and Hogan 2002), Australia (Naughtin 2002), the USA (Mohr et al 2001) and in the UK (Wanless 2001). Both existing technologies and those in development are likely to have a direct impact on the health of older people over the coming decades, but these elements cannot be factored into projections of future health demands (Triantafillou et al 1999).

Technological advances may help the health care system to ensure the sustainability of health services in the future (Jackson 2002). The OECD have suggested that medical research and technology should be focused on reducing dependency resulting from conditions more commonly associated with older age, such as dementia and stroke (OECD 1998b). It has also been suggested that the most important policy goal for governments should be to provide incentives or reimbursement mechanisms to facilitate the development of technology and services that will help older people to maintain functional independence and avoid institutionalisation or hospital care (OECD 1998a). Lowering dependency will result in less demand for health and disability services.

However, the notion that medical innovation will result in reduced levels of dependency may be too simplistic. Even now, lack of access to existing assistive technologies for frail older people is an issue in some countries (eg, Naughtin 2002 in Australia), and technological change could either reduce demand for health services and lower costs, or, just as easily, generate increased demand on the health sector and raise costs (Mohr et al. 2001, Hogan and Hogan 2002, Sheehan 2002). Evans et al (2001) argue that the introduction of new drugs may improve the effectiveness of treatment for some illnesses, but may also increase needs in two ways. Firstly, they have the capacity to benefit more people and might also increase the average length of illness (expand morbidity rates) in that they keep alive those that may have died without the new treatment. Secondly, it is likely that the amount of treatment for each patient may rise in terms of visits to the prescribing doctor (Metz 2001). In this context, Wanless (2001) found that medical technology has driven up the cost of health services by increasing the availability and accessibility of treatments to a larger number of people. Dargie (2000) argues that health technologies must be assessed and evaluated in terms of both their cost and their effectiveness given likely growth in the demands for health care. An OECD report makes the point that modern health care has often over-invested in expensive technology that has limited benefit, and under-invested in preventive technologies, such as screening for diabetic retinopathy or hypertension or providing mammograms for women over the age of 50 years (OECD 1998a).

An innovation which may assist older people to remain in their home is telemedicine and telehealth strategies (Naughtin 2002). These could provide the opportunity for specialists and health professionals to monitor an older person's health status remotely, thus allowing them to remain in their own homes or other community settings and still receive treatment.

Hogan and Hogan (2002) argue that technological advance is likely to be the 'wild card' in projections of future health demand. While technological development has been a significant driver of health expenditure and health outcomes, there is no standardised measure of technological change by which it can be factored into health service projections. Technological innovation is also, by its very nature, hard to predict because it involves the discovery of the previously unknown. Thus, while advances in medical technology may reduce the burden of illness, they may be accompanied by increasing use of inappropriate or unnecessary services. It is a distinct possibility that technological advances, increasing access to information, higher educational levels among older people, and the influence of consumer-focused advertising might result in fuelling demand and increasing costs, rather than managing illnesses so that the demand on the health system is reduced (Evans et al 2001).



## **10 CONCLUSION**

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With the projected ageing of the New Zealand population, we can expect growing demands on both acute health services and disability services, particularly long-term care. Significant increases in the age group 65 and over are predicted for the coming decades, but the population aged 85 and over is growing even faster. Considerable growth is also expected in the Māori, Pacific and Asian populations 65 and over, although they will continue to represent only a minority of the age group.

Analysis of the future demand for health and disability services is usually based on projections of current utilisation trends, taking into account likely demographic change. However, this approach must recognise the uncertainties about whether current trends will continue into the future, and also requires making assumptions on a range of other factors, many of which cannot be included in the projections themselves. The international literature raises numerous issues that will impact on future demand for health and disability services as a result of population ageing, and a summary of the major issues is provided below.

### **LIFE EXPECTANCY**

Will increasing life expectancy equate with improving or deteriorating age-specific health status? A decline in disability rates will moderate increases in the costs of health services and long-term care, even if people are living longer. There is a great deal of debate about rates of morbidity among older people as life expectancy continues to rise. Increases in life expectancy may also be variable by gender and ethnicity.

### **MORTALITY RATES AND PROXIMITY TO DEATH**

Age-specific mortality rates have decreased in New Zealand and similar countries, but the costs of and demand for health services are heavily concentrated in the period just before death. The most common cause of death over 65 years in New Zealand, regardless of ethnicity and gender, is ischaemic heart disease, with the rate increasing significantly with age. Deaths from strokes, chronic obstructive pulmonary disease and cancer also increase with age.

## **COHORT-BASED HEALTH STATUS**

While severe incapacitating disabilities may be declining, the number of more moderate health problems may increase as the population ages and lives longer. The results from international studies indicate that improvements in the general health status of the baby boom generation may moderate the demand and need for health services as this cohort ages. Notably, changes in health status can be achieved by reducing unhealthy life-style factors such as smoking and obesity. However, current rates of unhealthy life-style practices in New Zealand, particularly smoking in the 45–64 year age group, may impact negatively on future disability rates and the demand for disability support services, given that this cohort will be moving into older age in the coming two decades. Moreover, there are strong ethnic differences in the extent of obesity, smoking, high blood pressure and other risk factors in the New Zealand population.

## **HEALTH SERVICE USE**

Clearly health service use increases with advancing age, as reflected in both the New Zealand data and the international literature. Taken overall, the projections suggest population ageing will bring significant increases in the demand for both primary and hospital health services.

## **DISABILITY RATES AND SERVICE USE**

The international literature on disability trends reflects mixed results regarding both the rates and severity of disability in older people. On balance, the evidence indicates that lower rates of severe disability for older people can be expected in the future. However, while severe disability may be declining, the extra years gained from increases in life expectancy at age 65 may be affected by light to moderate disability. While the literature is equivocal on the ‘compression of morbidity hypothesis’, the data do suggest a movement in that direction. The New Zealand projections conducted for this paper indicate that a 77% increase in expenditure on disability support services by 2021 is possible. Disability support service costs are also projected to increase to a greater extent for men than for women, which may reflect greater increases in male life expectancy.

## **AGE-RELATED DISEASE TRENDS**

Specific analysis of age-related diseases indicates that the New Zealand health sector can expect increased health expenditure and demand in the coming two decades from cardiovascular diseases, cancers, strokes, diabetes mellitus, chronic obstructive pulmonary diseases, osteoporotic fractures and musculoskeletal diseases. Detailed data on sensory impairments among older people in New Zealand were not available, but international material indicates that visual and auditory limitations, while not fatal, are likely to increase and drive the demand for disability support services as the population ages.

A review of both international literature and New Zealand data also indicates that rates of dementia are likely to increase significantly over the coming two decades. Given that the needs of older people with dementia often necessitate long-term care, greater demand for these services can be expected. Overall, the projections presented and literature reviewed indicate that over the next 20 years population ageing in New Zealand will place health and disability services under considerable pressure through substantial increases in morbidity rates from many diseases associated with older age. The data also indicate that Māori and Pacific health demands will increase significantly. Disparity between the health status of different ethnic groups in New Zealand is an issue that will need to be addressed as larger numbers of Māori and Pacific peoples are represented in the older age ranges.

## **USE OF LONG-TERM CARE**

The future level of demand for long-term care among older people is related to trends in disability and life expectancy and how these factors interact. International trends clearly show that people aged 80 and over have the highest use of long-term residential care, especially those with significant disabilities. However, many people aged 80 and over with disabilities still continue to live in the community with the help of formal and informal support. Given that overall disability levels of older New Zealanders may not reduce substantially in the foreseeable future, and that the proportion of people aged 85 and over is expected to increase dramatically, the anticipated increases in life expectancy at age 65 will result in considerable demand for long-term care up until 2021. Residential care is best considered in the context of a continuum of care, involving acute services and community support, rather than being seen as a separate sector. Nevertheless, the cost of residential care for older people is likely to loom large in funding projections. It is also an area in which policy settings will have a significant influence.

## **IMPLICATIONS FOR THE HEALTH WORKFORCE**

Workforce issues may prove to be the greatest challenge facing health systems in the future. Many countries have identified that managing the health workforce is critical for meeting the challenge posed by population ageing. Forward planning to meet shortfalls in the health service workforce is essential, given the long lead time required for recruitment, training and certification. A major issue is that the health workforce itself is ageing, especially nurses. Geriatric medicine and long-term care of older people with major disabilities are not popular specialties for medical professionals and are not prominent in medical training. Countries like New Zealand face the additional challenge of retaining health care workers in the face of active recruitment from overseas. New Zealand is already experiencing difficulties in recruiting medical practitioners and training specialists in geriatric care, and if training programmes do not develop the skills needed to care for older people, then the health workforce is likely to face increased strain in delivering care as our population ages.

## **INFORMAL CARE**

Closely allied to health workforce issues is the availability of informal carers to look after dependent older people in the community. The supply of informal care is dependent on the attitudes, values and expectations of dependent older people and their families. International demographic data indicate that there may be fewer children and siblings available in successive generations to provide informal care. Moreover, women provide the majority of informal care support to older people and women's greater participation in the paid labour force means that caring for older dependent relatives will carry a higher opportunity cost. Given that a significant proportion of older people with disabilities are cared for by informal caregivers, a decline in the level of family care is likely to impact on the demand for formal long-term care services, resulting in a considerable increase in health costs and greater demands on resources.

## **POLICY RESPONSES**

In response to the complex care needs of older people and the issue of population ageing, several countries have attempted to adopt a co-ordinated approach to health care delivery. The results from trials in Australia, America and Canada are mixed. While the delivery of care was generally found to be cost effective, the impact on the health status and wellbeing of participants was more ambiguous, with some reviews finding no clear improvements in the health of older people. However, the older people themselves in these trials usually expressed satisfaction with this approach to their health care needs. A more comprehensive review of these programmes is needed so that lessons learnt from overseas can be applied to the continuum of care strategy proposed for older New Zealanders.

## **RISING CLIENT AND CONSUMER DEMANDS**

The international literature suggests that the attitudes and expectations of future cohorts of older people may result in higher expectations about health care services. The baby boom generation is more highly educated than their predecessors and has access to a wider variety of information and technology that provides them with a greater awareness of available treatments. This increased knowledge, coupled with the consumer-oriented approach common in developed countries, is likely to drive the desire for a greater say in decision-making processes relating to health provision, and increase expectations about the procedures available to consumers.

## **TECHNOLOGICAL CHANGE**

The previous issue is closely related to technological advances in medicines and treatments. Patients tend to expect that advanced technology will be available to them and this may drive up future health care costs. Technological advances, increasing access to information, higher educational levels among older people, and the influence of consumer-focused advertising might fuel demand and increase costs rather than manage illnesses so that the demand on the health system is reduced. Trust in a 'technological fix' should not be over-played.

Old age is generally associated with increasing chronic and acute ill health and the onset of disability. However, there is considerable discussion in the international literature over whether increased life expectancy will necessarily lead to greater levels of ill health and demands on health services. This is the crux of the 'compression of morbidity' debate, and both the crisis and manageability perspectives need to be considered. On balance, the international literature on projecting future trends in the demand for health and disability services suggests that ageing will have a considerable, but manageable, effect on projected health expenditure.

# GLOSSARY AND ABBREVIATIONS

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## ABBREVIATIONS

|      |   |
|------|---|
| ADL  | Activities of daily living (such as washing, eating, dressing and walking)  |
| COPD | Chronic obstructive pulmonary disease (including chronic bronchitis and emphysema)  |
| CORD | Chronic obstructive respiratory disease   |
| CSDA | Commonwealth/State Disability Agreement (Australia)   |
| DSS  | Disability support services   |
| EU   | European Union  |
| IADL | Instrumental activities of daily living (includes household tasks such as cleaning and meal preparation and life management skills such as shopping, money and medication management) |
| IHD  | Ischaemic heart disease   |
| LSOA | Longitudinal study on ageing (USA)  |
| NHIS | National Health Interview Survey  |
| OECD | Organisation for Economic Co-operation and Development  |
| PACE | Programme of all-inclusive care for the elderly (USA)   |
| SIPA | Système de services intégrés pour personnes âgées en perte d'autonomie. A model for integrated care for frail older people  |

## GLOSSARY

|  |  |
|--|--|
| Burden of disease                          | A measure of the social impact of a disease (or injury) on a population, including both fatal and non-fatal outcomes of the disease (or injury).   |
| Co-morbidity                               | Coexistence of more than one disease in the same individual at a given time.   |
| Disability                                 | Functional or role limitation resulting from a health condition and lasting (or expected to last) six months or more. A disability may or may not be associated with the need for assistance.  |
| Disability adjusted life expectancy (DALE) | The average number of years an individual of a given age is expected to live, with the years weighted on a scale of 0–1 according to the social preferences for the different states of disability into which the population is distributed, if current mortality and disability rates and current disability state valuations, continue to apply. |
| Disability adjusted life year (DALY)       | A health gap measure derived by adding YLD to YLL. One DALY thus represents the loss of one year of <i>healthy</i> life.   |

|                                     |  |
|-------------------------------------|--|
| Disability free life expectancy     | A health expectancy indicator measuring the expectation of life (at any age) free of any functional or role limitation, whether needing assistance or not.   |
| Healthy life expectancy (HLE)       | Also referred to as health adjusted life expectancy. The equivalent number of years in full health that a person can expect to live, if current mortality and disability or morbidity rates continue to apply at all ages. |
| Incidence of disability or disease  | The number of new cases in a year, divided by the population at risk.  |
| Life expectancy                     | A summary statistic derived from a life table, estimating the average number of years an individual of a given age is expected to live if current mortality rates continue to apply.                                       |
| Morbidity                           | Any departure (subjective or objective) from a state of physiological or psychological wellbeing.  |
| Mortality                           | Death  |
| Prevalence of disability or disease | The number of instances of disability or disease present in the population at a given time, divided by the population at risk.   |
| Years of life lost (YLL)            | An indicator of the social burden of fatal health outcomes, calculated by subtracting the age at death from the life expectancy remaining at that age (as determined from a suitable standard or reference table).         |
| Years of life with disability (YLD) | A measure of the burden of non-fatal health outcomes, used in the construction of the DALY. YLD represents the equivalent of years of life with severity-adjusted disability.  |

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