

## **Part II**

# **Adding Life to Years: Patterns and Trends in Morbidity**



Standardised indicators and instruments for measuring the quality of life dimension of health are less well developed than mortality measures. That makes the description, explanation and forecasting of this health dimension a more challenging task. Yet such analysis is becoming increasingly relevant as the population progressively ages (with concomitant expansion of chronic disease and associated disability) and mortality becomes increasingly senescent.

The past decade has seen the use in national population health surveys of health-related quality of life questionnaires. These assess levels of health across a range of domains, including the physical, mental and social. An example is the SF-36, which was included in the 1996–97 New Zealand Health Survey.

Subjective health assessment across multiple areas of functioning and feeling has major advantages through introducing a consumer perspective to population health monitoring, and through reporting domains of health inaccessible to more objective methods. Subjective measures do have some limitations: correlation with objective measures of health status is sometimes poor, cross cultural applicability of the instruments may be questionable, and mapping from subjective measures to underlying disease processes is problematic. These disadvantages may be partially overcome by focusing on disability as a key aspect of *health-related* quality of life. From a policy perspective, the relevant outcomes of morbid processes (such as diseases or injuries) are premature death and loss of independence (functional and/or role limitation, ie, disability). Monitoring disability provides a more objective, and perhaps more relevant, policy outcome measure than monitoring health-related quality of life. Standardised disability questionnaires are now available, as are simple observational tests of function. Population-based disability surveys form part of the population health monitoring toolkit in most OECD countries, including New Zealand. Yet the problem of mapping from disability to disease remains, especially for older people with co-morbidity and co-disability.

The monitoring of health-related quality of life and disability complements, but does not replace, the traditional morbidity measures: the incidence and prevalence of diseases and injuries, which are the proximal causes of these health outcomes. Data on symptoms, signs and diagnoses may be collected by survey, using self report, medical examination, or both. However, such surveys are limited in the range of data they can collect, as well as being intrusive and burdensome for respondents. Inevitably, health survey results need to be supplemented with data extracted from health service utilisation records.

Registers of diseases, injuries, birth defects and other morbid conditions can provide relatively accurate and comprehensive monitoring data. Routine health service utilisation data, which are collected for purposes other than population health monitoring, are less useful. As well as limitations in quality, typically coverage is incomplete because access to and utilisation of health services are influenced by supply-side factors independent of disease epidemiology. For many diseases and injuries, service utilisation is a poor proxy for direct measurement of incidence or prevalence: there is no substitute for epidemiological surveys or cohort studies to obtain accurate descriptions of the epidemiology of such conditions.

Part II of this report describes all three indicators of the quality dimension of health: subjective health-related quality of life measures, disability measures, and traditional measures of morbidity. Each indicator provides a different yet complementary perspective.

Chapter 4 focuses on subjective measures of health. Data from the global single item self rated health question and from the SF-36 health profile instrument, both fielded in the 1996–97 New Zealand Health Survey, are summarised and contrasted. Principal component factor analysis is used to extract two summary measures of health (physical and mental) from the SF-36 profile.

Key results from the first ever national disability survey to be carried out in New Zealand are summarised in Chapter 5. This was a post-census survey carried out in 1996–97, covering people living in the community and in residential institutions, so affording a rich and comprehensive dataset for analysis.

Chapter 6 collates morbidity data from multiple sources, including self reported data from the New Zealand Health Survey and other epidemiological studies, benefit claims, primary care consultation records, cancer registrations, and hospital separations. This provides a causal structure for morbidity that complements the quality of life and disability outcomes described in the earlier chapters.

# Chapter 4: Self reported health status

## Introduction

Health-related quality of life can be measured objectively through professional assessment of morbidity, or by self assessment of functional limitation (disability). It can also be measured subjectively by surveying an individual's perceptions of his or her own state of health. Subjective, or self reported, health status is not a substitute for more objective indicators but rather complements these measures: self reports of health introduce a consumer perspective into population health monitoring and reveal dimensions of health that may be inaccessible to the more traditional measures.

Until the 1980s subjective health assessment was confined to the single global self rated health question, in which survey participants were asked to rate their own health on a scale ranging from 'excellent' to 'poor'. This item has been used in numerous population health surveys and clinical studies, both in New Zealand and internationally (Idler and Benyamini 1997).

To provide a more comprehensive measure of subjective health status, however, it is necessary to use a longer questionnaire that can assess multiple dimensions of health rather than just the physical domain that the global self rated health question appears to tap. One such self reported health status or health-related quality of life (HRQOL) questionnaire is the Medical Outcomes Study Short Form 36, known as the SF-36 (Ware and Sherbourne 1992).

The SF-36 comprises 36 items grouped into eight scales, each of which measures a different dimension of health:

- physical functioning
- role physical (the impact of physical health on performance of everyday role)
- bodily pain
- general health (which includes the global self rated health question)
- vitality
- social functioning
- role emotional (the impact of emotional health on role performance)
- mental health.

The SF-36 has been used in many countries in both clinical studies (for example, McHorney et al 1993) and population health surveys (for example, Bullinger 1995; Sullivan et al 1995; Ware et al 1998). It was included in the 1996–97 New Zealand Health Survey (Ministry of Health 1999d), a nationally representative survey with an adult sample size of 7862, representing a response rate of 74 percent. Analysis of this dataset yields three different measures of subjective health status: the global self rated health measure, the full eight scale SF-36 profile, and two summary measures derived from the eight SF-36 scale scores, representing physical and mental health respectively. Each of these measures will be discussed in turn, analysing variations across age, gender, ethnicity and socioeconomic status.

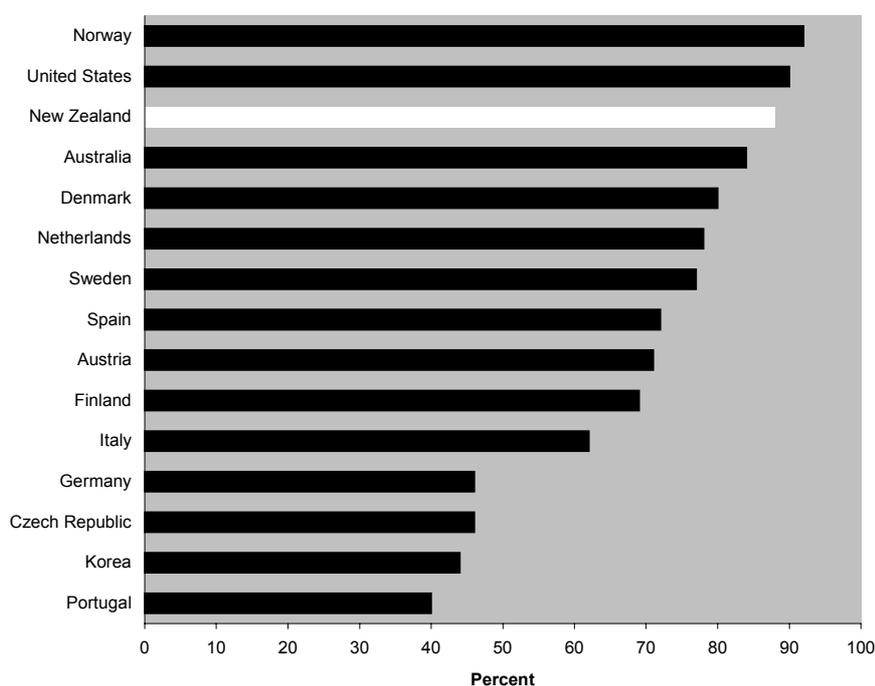
## Global self rated health status

This measure of subjective health status owes its widespread use to its ease of administration. A substantial body of research over the past 25 years has found it to be an important predictor of mortality risk (Idler and Angel 1990; Wannamethee and Shaper 1991; Kaplan et al 1996; Idler and Benyamini 1997; McGee et al 1999). This has led to the conclusion that the single global question integrates many facets of physical health, including co-morbidity (Idler and Benyamini 1997). The self rated health question in the 1996–97 New Zealand Health Survey (NZHS) was: *In general, how would you rate your health?: Excellent/Very Good/Good/Fair/Poor.*

### International comparisons

This question has been used in many population health surveys. Figure 70 shows the proportion of the population rating their health as good or better among selected OECD countries in the mid 1990s. New Zealand ranks highly on this measure, with approximately 88 percent of the population rating their health as good or better. Caution should be exercised in interpreting these international comparisons, however: the number of response categories varied across countries, affecting the proportions rating their health as good or better; there were variations in survey sampling and fielding; the percentages are not age standardised; and different cultural constructs of health, and different societal expectations of what constitutes ‘good’ health, may confound the data.

**Figure 70:** Proportion rating general health as good or better in selected OECD countries, 1991–97



Source: OECD

### Subgroup analysis

Variations in levels of self rated health among subgroups of the New Zealand population have been analysed from the 1996–97 New Zealand Health Survey dataset (Table 38).

**Table 38:** Global self rated health, by age, gender and ethnicity, 1996–97

	Percentage rating health as excellent or very good	Percentage rating health as good	Percentage rating health as fair or poor
<b>Gender</b>			
Male	57.6 (1.2)	29.5 (1.2)	12.9 (0.8)
Female	58.9 (1.0)	29.5 (1.0)	11.6 (0.6)
<b>Age</b>			
15–24 years	60.6 (2.1)	29.0 (2.1)	10.4 (1.4)
25–44 years	64.3 (1.1)	26.5 (1.0)	9.2 (0.7)
45–65 years	56.5 (1.6)	31.7 (1.5)	11.8 (0.9)
65–74 years	46.3 (2.3)	33.5 (2.0)	20.1 (1.7)
75+ years	32.3 (2.5)	36.3 (2.5)	31.3 (2.6)
<b>Ethnicity</b>			
European/Other	59.7 (0.9)	28.9 (0.9)	11.8 (0.6)
Māori	48.4 (1.9)	32.3 (1.7)	18.8 (1.5)
Pacific	54.0 (2.8)	31.7 (2.7)	14.4 (1.8)
Other	53.2 (4.5)	37.4 (4.5)	9.4 (2.8)
<b>Total</b>	<b>58.3 (0.8)</b>	<b>29.5 (0.8)</b>	<b>12.2 (0.5)</b>

Source of base data: NZHS 1996–97

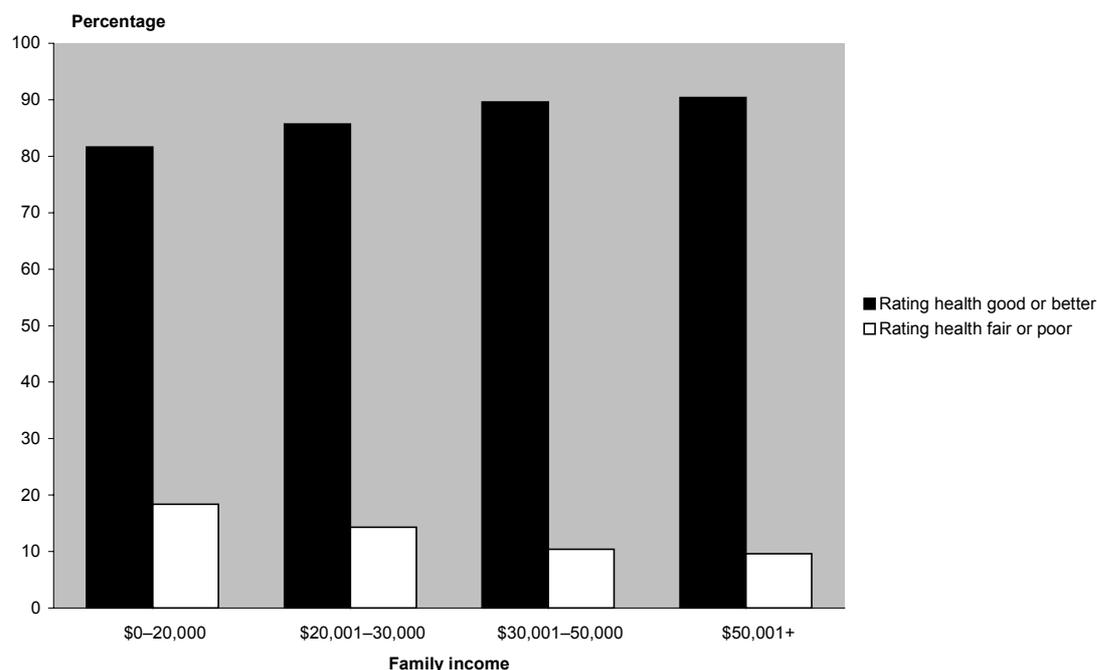
Note: percentages are standardised for age and gender, except where they are age specific, in which case they are standardised for gender; or when they are gender specific, in which case they are standardised for age; numbers in parentheses are standard errors.

Across all subgroups, the proportion rating their health as good, very good or excellent declines with increasing age from middle age (45 years) onwards; correspondingly, the proportion rating their health as fair or poor increases with increasing age. For example, the proportion rating their health as poor rises from approximately 10 percent among youth (15–24 years) and young adults (25–44 years), to over 20 percent among people aged 65 to 74 years, and over 30 percent among people aged 75 and over. Differences between males and females were not statistically significant. Standardising for age, the proportion rating their health as excellent or very good is significantly lower for Māori (48 percent) compared with European/Others (60 percent), and the proportion rating their health as fair or poor is correspondingly higher (19 percent for Māori and 12 percent for European/Others).

The global self rated health question was also used in the 1992–93 Household Health Survey (SNZ and Ministry of Health 1993). Comparison of these results with the 1996–97 New Zealand Health Survey shows higher proportions of both European/Others and Māori rating their health as fair or poor in the more recent survey. In the four years between the two surveys, the proportion of European/Others rating their health as fair or poor increased from 8 percent to 12 percent while Māori increased from 15 percent to 19 percent. There are several possible explanations for this apparent trend towards worsening self reported health: differences in the design and analysis of the two surveys, a change in perception of what constitutes ‘good’ health (the so-called ‘problem of the falling norm’ resulting from rising social expectations), or a genuine deterioration in population health.

Differences across socioeconomic groups in the 1996–97 health survey were analysed using annual family income as the measure of socioeconomic status. People with lower annual family incomes are significantly less likely to rate their health positively (Figure 71). A similar – but not as steep – income gradient was observed in the 1992–93 survey. Again, this may reflect methodological artefact, changes in perception, or a real increase in the gradient.

**Figure 71:** Proportion rating their health as (at least) good versus less than good, by annual family income, 1996–97



Source of base data: NZHS 1996–97

## SF-36 profiles

The SF-36 questionnaire consists of 36 questions (items) measuring physical and mental health status in relation to eight health scales (see Table 39). Responses to each of the SF-36 items are scored and summed according to a standardised scoring protocol (Ware et al 1993) and expressed as a score from 0 to 100 for each of the scales. Higher scores represent better self reported health.

Five of the scales are unipolar (physical functioning, role physical, bodily pain, social functioning, and role emotional); in other words, they define health status in terms of the absence of disability. The maximum score of 100 is therefore achieved when no disability is reported. The other scales (general health, vitality and mental health) are bipolar scales, covering both positive and negative health states. The maximum of 100 on these bipolar scales therefore indicates not merely the absence of disability but the presence of a positive state of health.

Interpretation of the SF-36 is based on the mean (average) scores of the people in each population or subgroup. The scales are independent of each other, so mean scores cannot be compared across scales. However, subgroup means can be compared for any one scale. In this report, the SF-36 scale means are presented as a profile, with the scales most closely associated with physical health (physical functioning, role physical, bodily pain, general health) on the left, and those most closely associated with mental health (mental health, role emotional, social functioning, vitality) on the right.

A comprehensive psychometric analysis of the acceptability (in terms of the level of missing data), reliability and construct validity of the SF-36 in the New Zealand population was undertaken as part of this analysis. The results indicated that for the population as a whole, the

SF-36 performed as well or better than in other countries (Scott and Tobias et al 1999). However, the construct validity – the extent to which the questionnaire measures the health constructs it is designed to measure – may be questionable among Pacific people and older Māori (Scott and Sarfati et al 1999); this is discussed in more detail later.

The questionnaire has some psychometric deficiencies, in particular the fact that significant numbers of the population score the maximum of 100 (the ‘ceiling effect’) on several of the scales. This creates problems for statistical analysis, and also suggests that the questionnaire is better at discriminating patient subgroups than population subgroups. Additionally, although the SF-36 nominally measures the social dimension of health in addition to physical and mental health, in fact social functioning does not emerge as an independent component in factor analysis but is subsumed under mental health.

**Table 39:** SF-36 scales and abbreviated item content

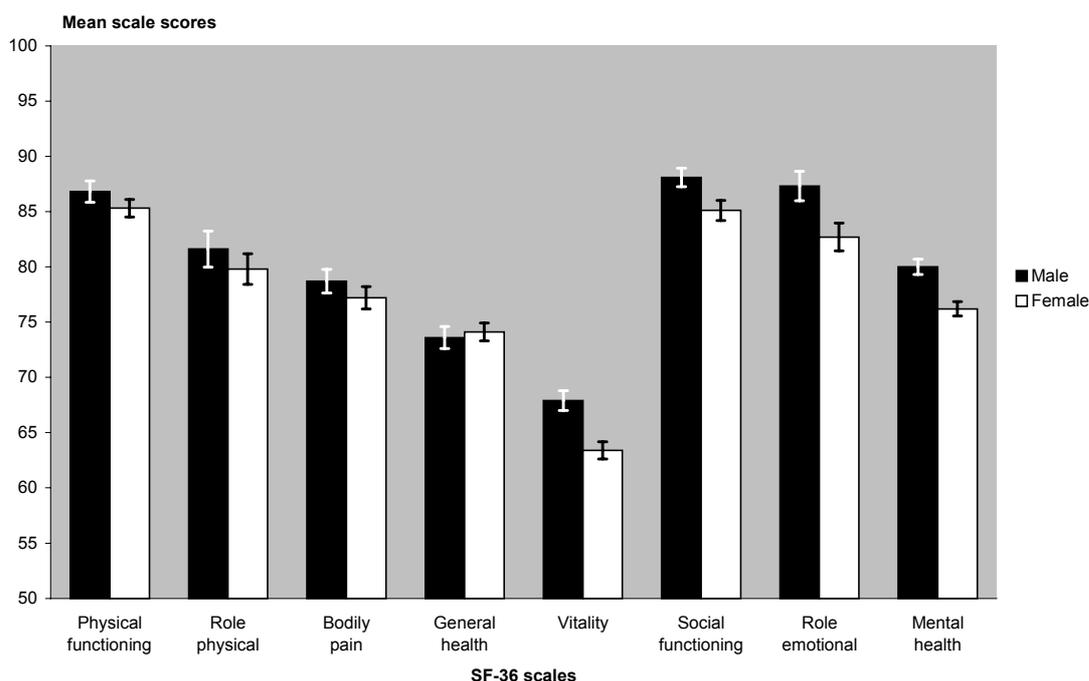
Health scale	Item	Abbreviated item content
Physical functioning (PF)	PF1	Vigorous activities, such as running, lifting heavy objects, strenuous sports
	PF2	Moderate activities, such as moving a table, vacuuming, bowling
	PF3	Lifting or carrying groceries
	PF4	Climbing several flights of stairs
	PF5	Climbing one flight of stairs
	PF6	Bending, kneeling, or stopping
	PF7	Walking more than a kilometre
	PF8	Walking half a kilometre
	PF9	Walking 100 metres
	PF10	Bathing or dressing yourself
Role physical (RP)	RP1	Cut down the amount of time spent on work or other activities
	RP2	Accomplished less than would like
	RP3	Limited in the kind of work or other activities
	RP4	Difficulty performing the work or other activities
Bodily pain (BP)	BP1	Intensity of bodily pain
	BP2	Extent pain interfered with normal work
General health (GH)	GH1	Is your health: excellent, very good, good, fair, poor
	GH2	I seem to get sick a little easier than other people
	GH3	I am as healthy as anybody I know
	GH4	I expect my health to get worse
	GH5	My health is excellent
Vitality (VT)	VT1	Feel full of life
	VT2	Have a lot of energy
	VT3	Feel worn out
	VT4	Feel tired
Social functioning (SF)	SF1	Extent health problems interfered with normal social activities
	SF2	Frequency health problems interfered with social activities
Role emotional (RE)	RE1	Cut down the amount of time spent on work or other activities
	RE2	Accomplished less than would like
	RE3	Didn't do work or other activities as carefully as usual
Mental health (MH)	MH1	Been a very nervous person
	MH2	Felt so down in the dumps that nothing could cheer you up
	MH3	Felt calm and peaceful
	MH4	Felt down
	MH5	Been a happy person

## Gender variations

Males scored slightly, but significantly, higher than females on all scales except for the general health scale (Figure 72). The differences were more pronounced for the scales associated with mental health (vitality, social functioning, role emotional and mental health) than for the physical health scales (such as physical functioning and bodily pain).

These results contrast with the lack of gender differences revealed by the single global self rated health question. Interestingly, the global question is one of the items in the general health scale, the only scale in the SF-36 profile to show no gender differences, highlighting the increased sensitivity of a longer health status questionnaire.

**Figure 72:** SF-36 profiles, by gender, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

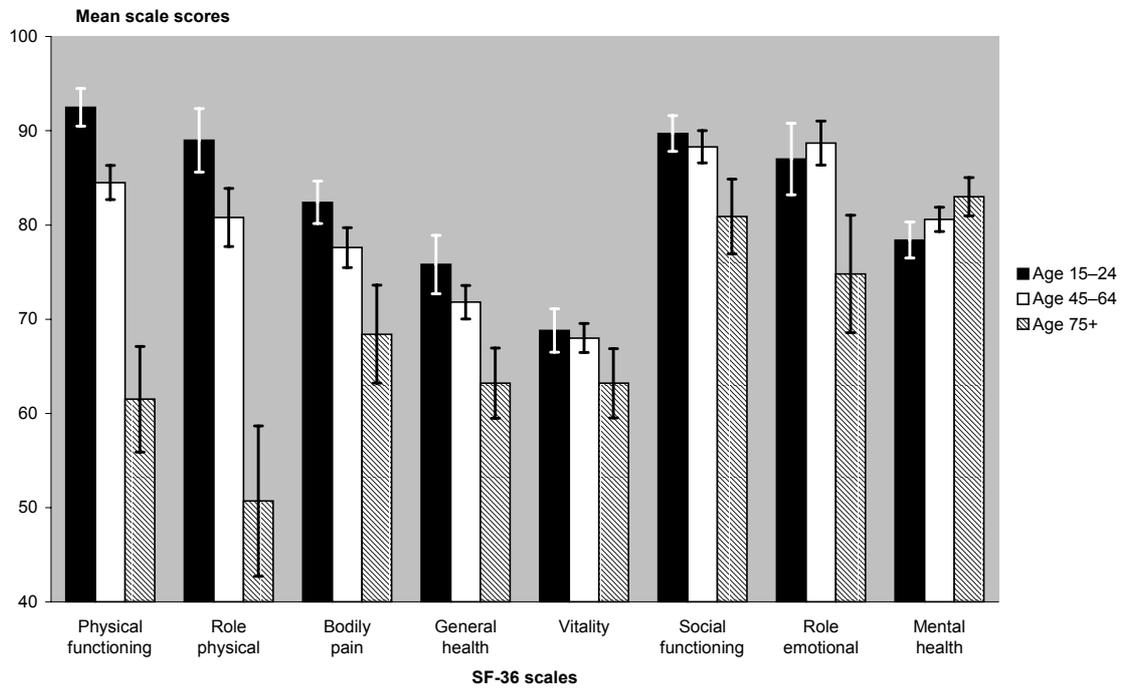
The lack of gender difference on the general health scale was also found in the 1995 Australian National Health Survey (ABS 1997). However, New Zealanders showed more pronounced gender differences on the scales related to mental health, whereas in Australia there were fairly similar gender differences across the scales associated with both mental and physical health. In the United States, the gender differences were more pronounced on the scales associated with physical health (Ware et al 1993).

## Age variations

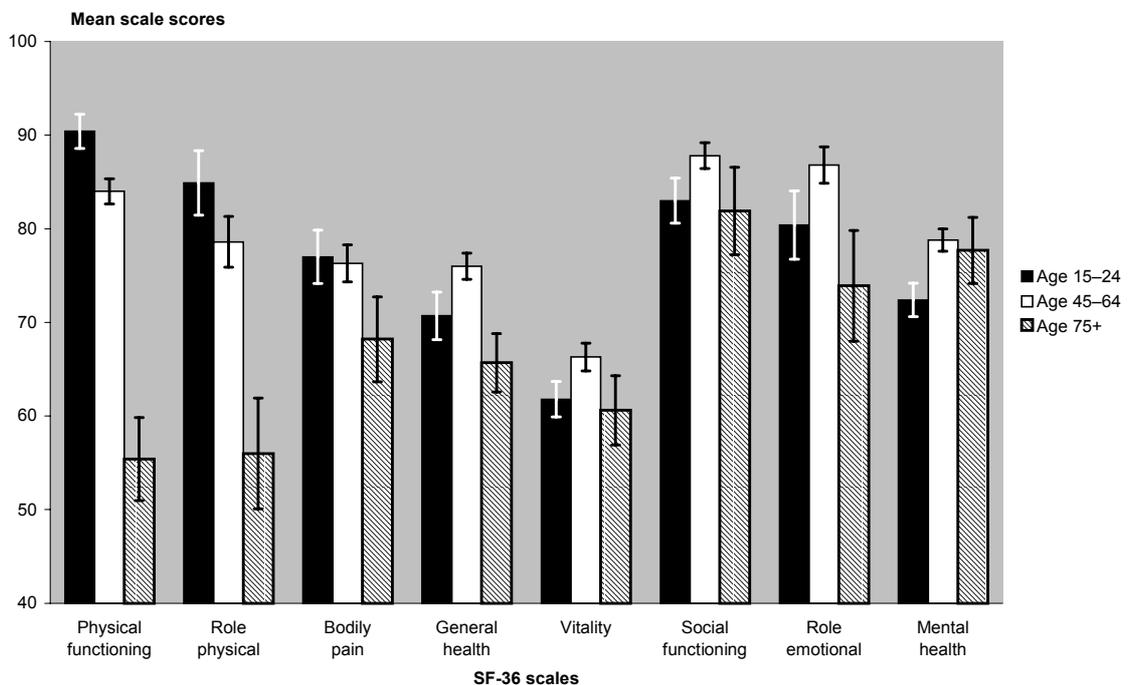
The SF-36 profiles for three selected age groups are shown in Figures 73a and 73b. The data generally show decreasing health with increasing age, with the most pronounced differences occurring in the physical health scales. The exception was the mental health scale, which showed a gradient of higher scores with increasing age for males. For females, mental health scores also increased with age until the 45–64 age group, then levelled off (the mean scores for the 45–64, 65–74 and 75 and over age groups did not differ significantly from each other). For both males

and females, the lowest mental health scores were in the 15–24 age group, with young women having particularly low scores.

**Figure 73a:** SF-36 profiles, by selected age group, males, 1996–97



**Figure 73b:** SF-36 profiles, by selected age group, females, 1996–97



Source of base data: NZHS 1996–97

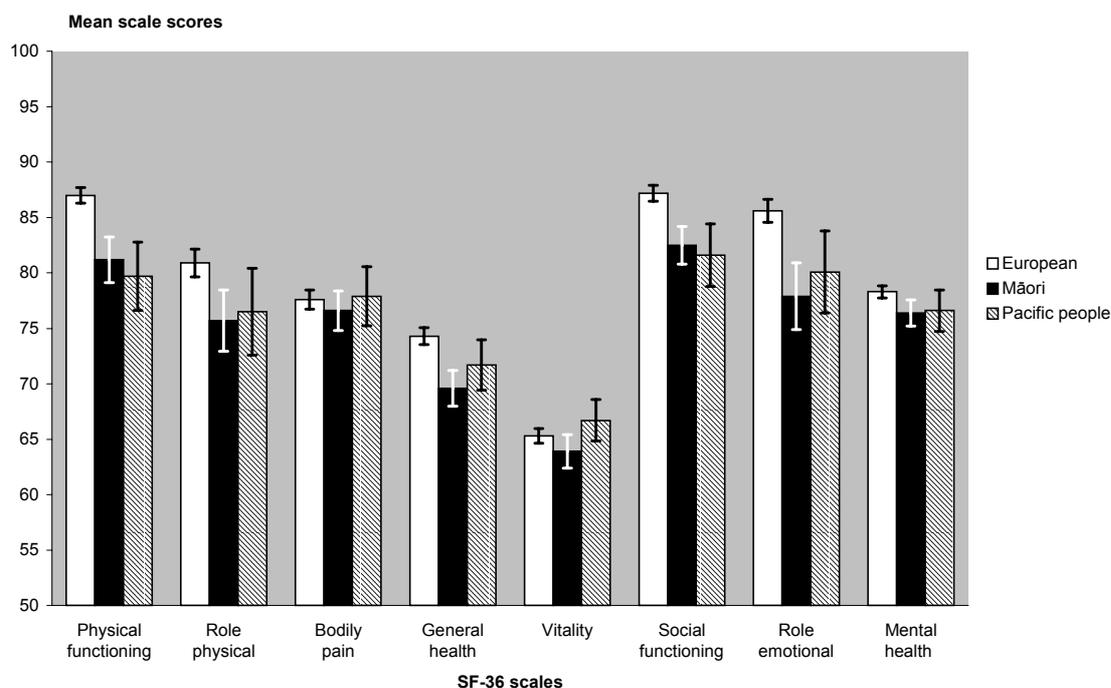
Note: error bars indicate 95 percent confidence intervals; broken axes.

Longitudinal SF-36 data are limited, but a British study (Hemingway et al 1997) confirms the age related decline in physical health found here. However, the study also found decreasing scores on the mental health scale as age increased up to age 55 years, then either a small increase (males) or a stabilisation (females) in scores after this age. This suggests that the results found in the cross sectional New Zealand Health Survey – showing an apparent stability or improvement in mental health with age in both genders – could represent a cohort effect, at least in part. That is, younger cohorts may have higher expectations, and so appear to have lower mental health status than older cohorts, quite independent of ageing. However, the Hemingway study only followed up participants for three years so further longitudinal research is needed to clarify the contribution of age and birth cohort to the pattern seen in cross sectional age structured data.

## Ethnic variations

European/Others rated their health significantly higher than Māori across all scales except for bodily pain and vitality, and significantly higher than Pacific people on all scales except bodily pain, vitality and mental health (Figure 74). Māori and Pacific groups differed significantly from each other only on the vitality scale, where Māori had a slightly lower score.

**Figure 74:** SF-36 profiles, by ethnicity, adjusted for age and gender, 1996–97



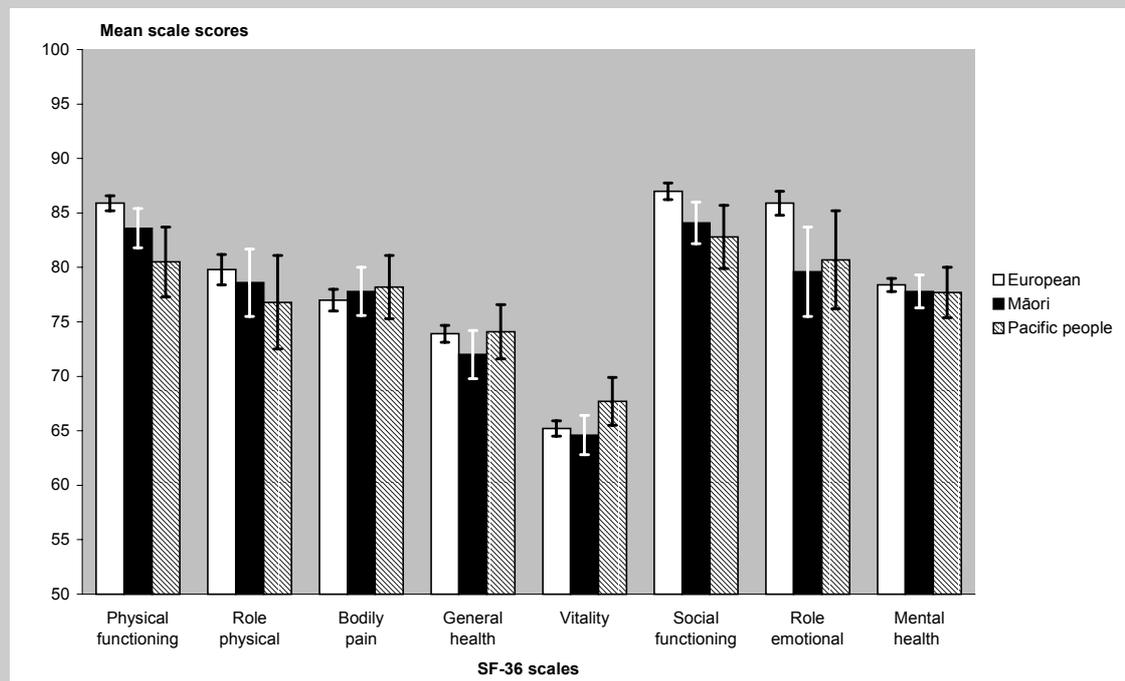
Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

## Box 12: Socioeconomic factors affecting ethnic variations in SF-36 scores

In comparing the self reported health status of ethnic groups, adjustments need to be made for a number of potentially confounding variables – variables that are unequally distributed across ethnic groups and that are also known to affect health status. Socioeconomic status (analysed by income, education or deprivation) is one such variable: lower self reported health status among Māori and Pacific people may be a function of their lower socioeconomic status rather than, or in addition to, their ethnic status. Figure 75 shows the results of a multivariable analysis that explores the association between ethnicity and SF-36 scores, after adjustment for a number of potentially confounding variables.

**Figure 75:** SF-36 profiles, by ethnicity, adjusted for socioeconomic factors in addition to age and gender, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

Comparison of Figures 74 and 75 shows that differences among ethnic groups were indeed reduced by adjustment for socioeconomic status, although the differences remain significant on some scales: European/Others still have significantly higher scores than either Māori or Pacific people on the physical functioning, social functioning and role emotional scales.

The fact that the differences across the groups were reduced or eliminated on some scales suggests that socioeconomic differences explain some of the ethnic inequalities in self reported health status, but remaining significant differences indicate that inequalities in self reported health status may be partially influenced by cultural differences, independent of material or socioeconomic factors. This interpretation needs to be treated with caution, however, since it is unlikely that socioeconomic status was perfectly measured in this analysis; some residual confounding may remain. Also, treating socioeconomic status as a confounder rather than an effect modifier could be considered overly simplistic: cultural differences may themselves be influenced by social structural factors.

The ethnic differences in SF-36 profiles reported here, although statistically significant for most scales, are surprisingly small in magnitude. Although it is difficult to compare subjective and objective indicators of health because of the different units of measurement involved, objective measures do seem to indicate larger ethnic differences: for example, the life expectancy of Māori females at birth in 1996 was nine years less than that of European/Other females (see Chapter 2).

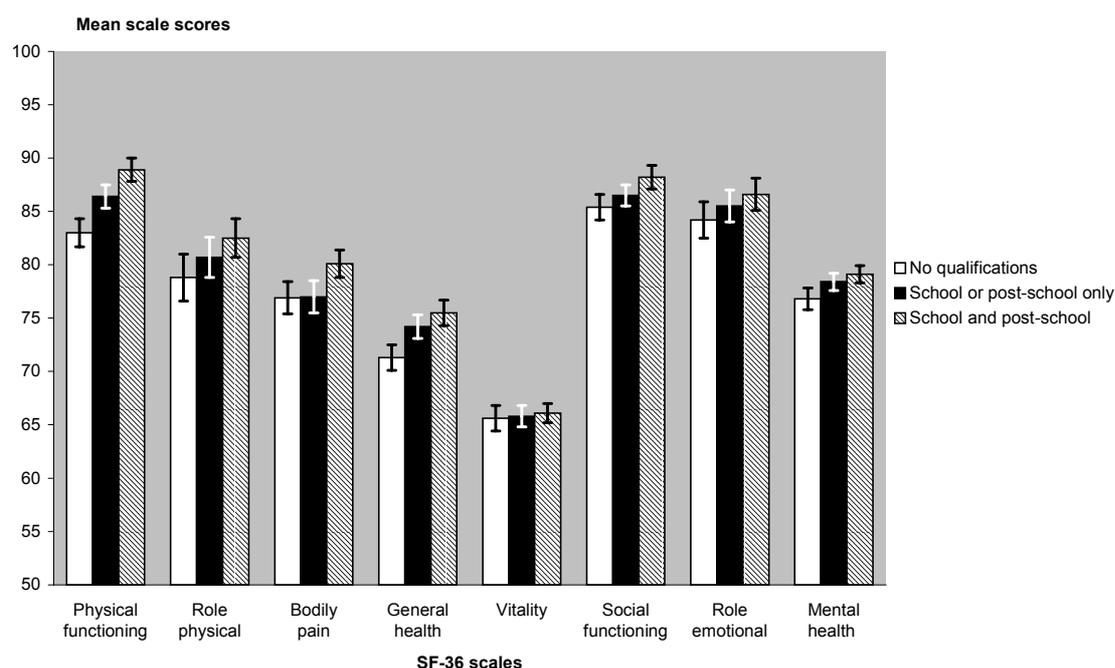
The smaller than expected ethnic differentials in self reported health status may reflect the fact that self assessments are made, at least in part, relative to what is expected or considered ‘normal’ for the respondent’s own ethnic group (Idler and Angel 1990). It may also be that cultural differences in concepts of health make inter ethnic comparisons of self reported health problematic (see Box 13).

## Socioeconomic variations

### Education

Figure 76 shows statistically significant differences in self reported health status by educational status, particularly on the four scales associated with physical health. The differences are small, except for physical functioning and general health. This may partly reflect imprecision in the measurement of education as a marker of socioeconomic status.

**Figure 76:** SF-36 profiles, by education, adjusted for age and gender, 1996–97



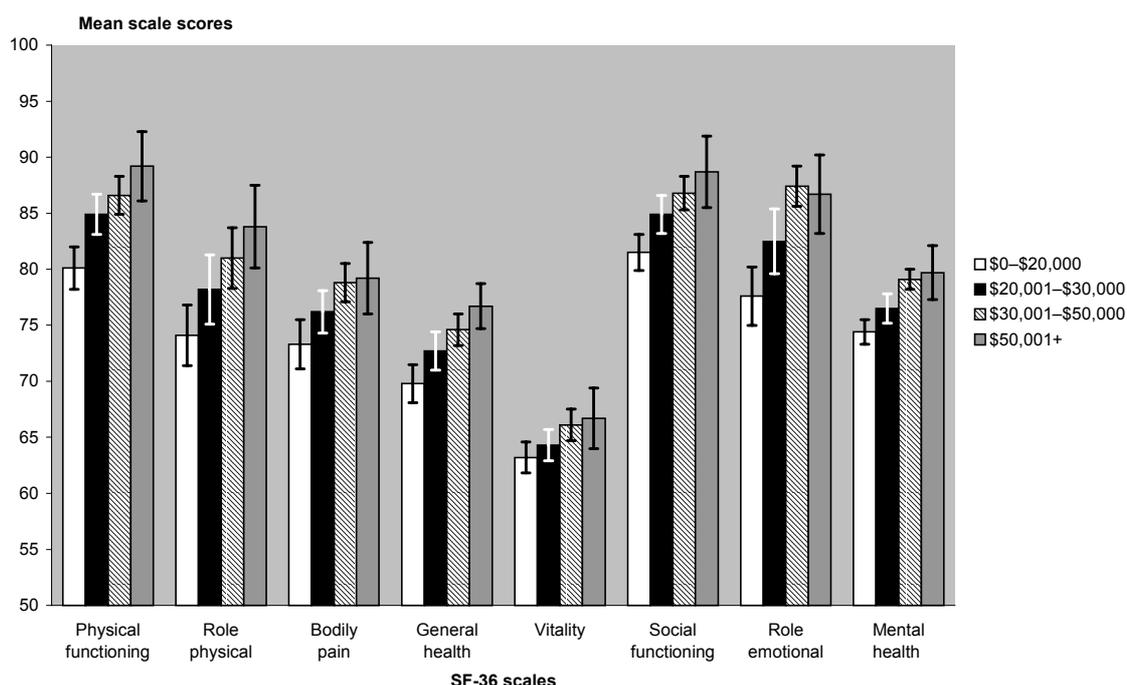
Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

### Income

Figure 77 demonstrates a clear income gradient in self reported health status, with significantly higher scores in the highest income group relative to the lowest income group on all scales, although the differences between the top two income groups are not always significant.

**Figure 77:** SF-36 profiles, by family income, adjusted for age and gender, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

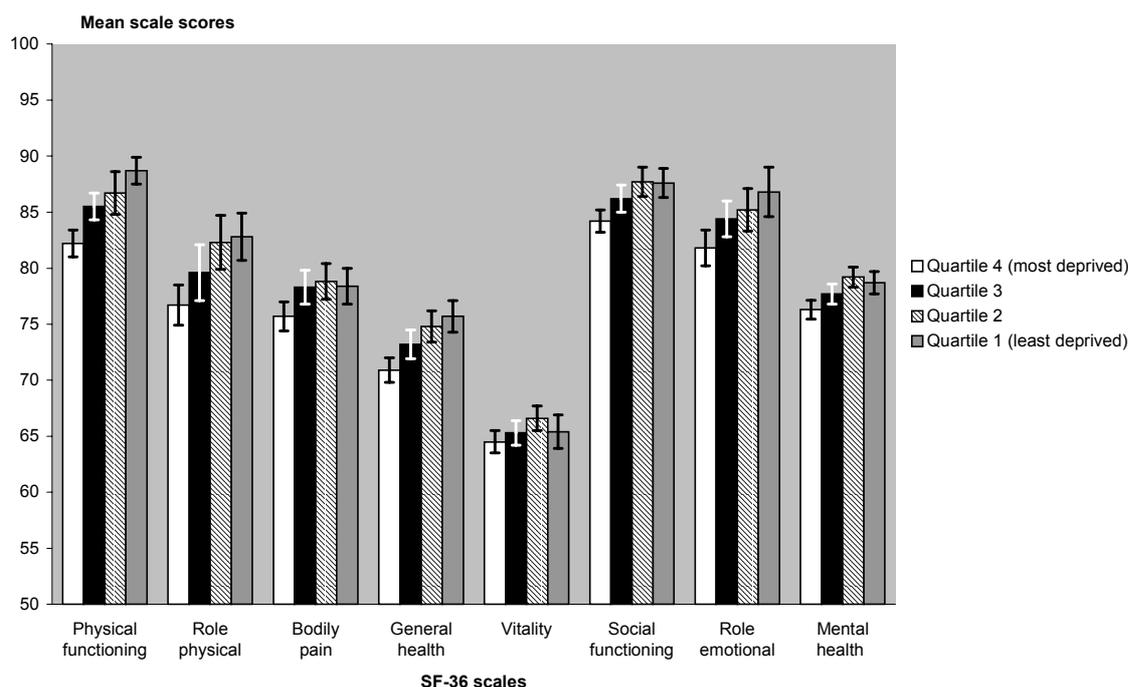
Non-Māori males showed the clearest income gradient in SF-36 profile scores across all scales. For non-Māori females and Māori males, the gradient was steepest for the scales related to physical rather than mental health. Among Māori females, only those in the lowest income category showed significantly lower health status, with no observable gradient across other income levels (Ministry of Health 1999d). Australian SF-36 data for equivalised family income groups showed a similar income gradient across all scales (ABS 1997).

The greater magnitude of the gradient for income compared with that for education in SF-36 profile scores does not necessarily imply that self reported health status is more sensitive to the former dimension of socioeconomic status. Rather, the measurement of income may simply be more precise than that of educational status.

### SF-36 by NZDep96 quartiles

The NZDep96 score (Salmond et al 1998) measures the level of deprivation in the meshblock in which a person lives. The scores have been divided into quartiles from 1 (least deprived) to 4 (most deprived) for the purposes of this analysis (Figure 78).

**Figure 78:** SF-36 profiles, by NZDep96 quartile, adjusted for age and gender, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

As with family income, there is a relationship between the level of self reported health status and the NZDep96 deprivation index, with better health being reported among individuals in less deprived areas. However, when these data are analysed separately for Māori and non-Māori groups, no such gradient exists for Māori (Ministry of Health 1999d).

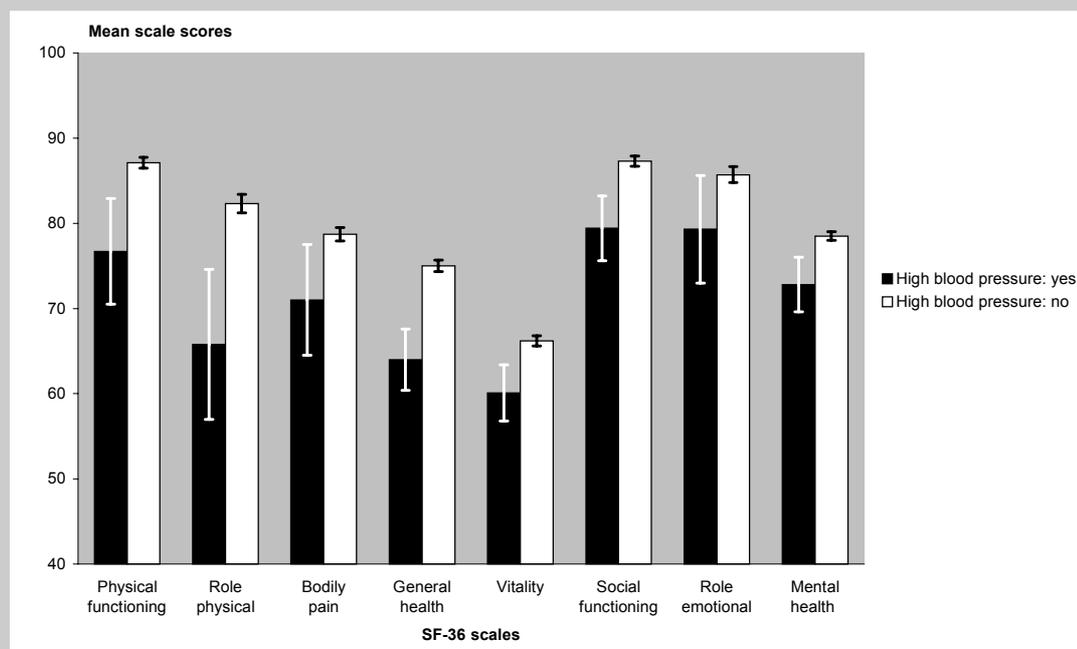
The apparent lack of association between the NZDep96 score and self reported health for Māori is surprising. It may simply be a statistical artefact (the survey included relatively small numbers of Māori in the less deprived categories). Or it may be that the NZDep96 index is less successful in capturing relevant dimensions of socioeconomic status among Māori than non-Māori. Life course influences may also provide a partial explanation: Māori adults living in more affluent areas may have been more deprived as children, which may have affected their current health status. It is also possible that Māori living in less deprived areas are living in predominantly non-Māori neighbourhoods and may be more alienated from their cultural roots and associated social support systems, with adverse consequences for their health. Selective (internal) migration and the gentrification of (previously deprived) inner city areas are other possible explanations.

### **Box 13: The relationship between subjective and objective measures of health**

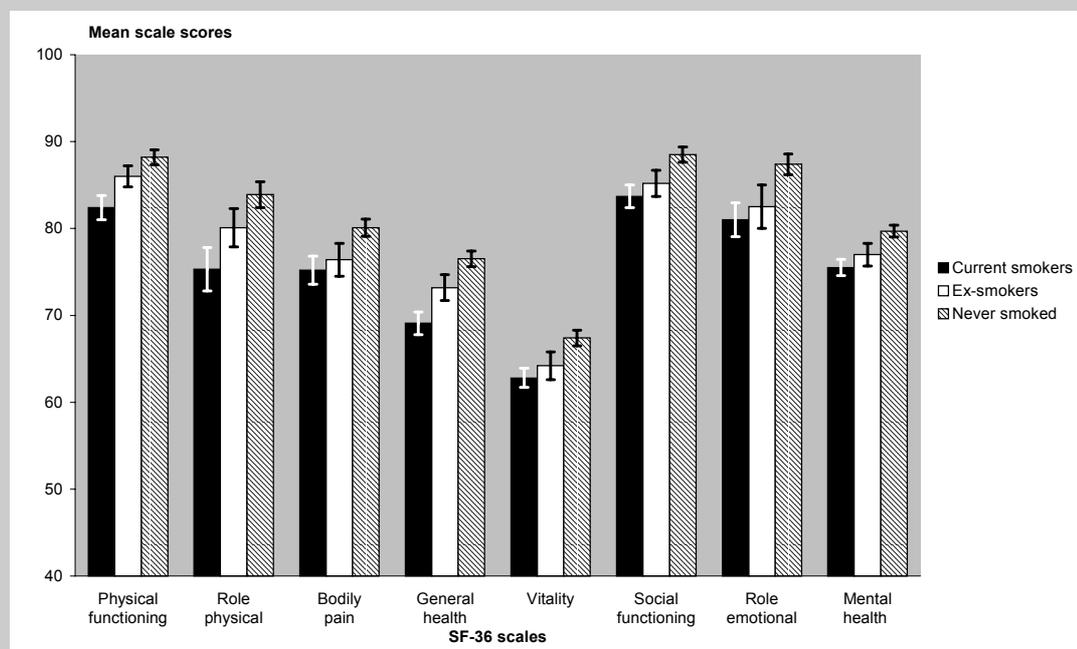
Subjective measures of health status have been advocated as a useful proxy for objective measures (Kaplan et al 1996). As mentioned above, in some studies the single global self rated health question has been found to be a powerful predictor of mortality within a population group (Idler and Benyamini 1997), and this is the case for a range of ethnic groups (McGee et al 1999). Yet the data presented in Figure 74, which shows smaller SF-36 differences between ethnic groups than indicated by objective measures, raises questions about the reliability of subjective measures.

Additionally, the self reported health of risk factor groups seems to be unrelated to their objective health status. For example, people with high blood pressure, which is generally asymptomatic, show pronounced differences in SF-36 scores (Figure 79a); and smoking, which profoundly affects objective health, is associated with less marked SF-36 differences (Figure 79b).

**Figure 79a:** SF-36 profiles, by high blood pressure status, adjusted for age and gender, 1996–97



**Figure 79b:** SF-36 profiles, by smoking status, adjusted for age and gender, 1996–97

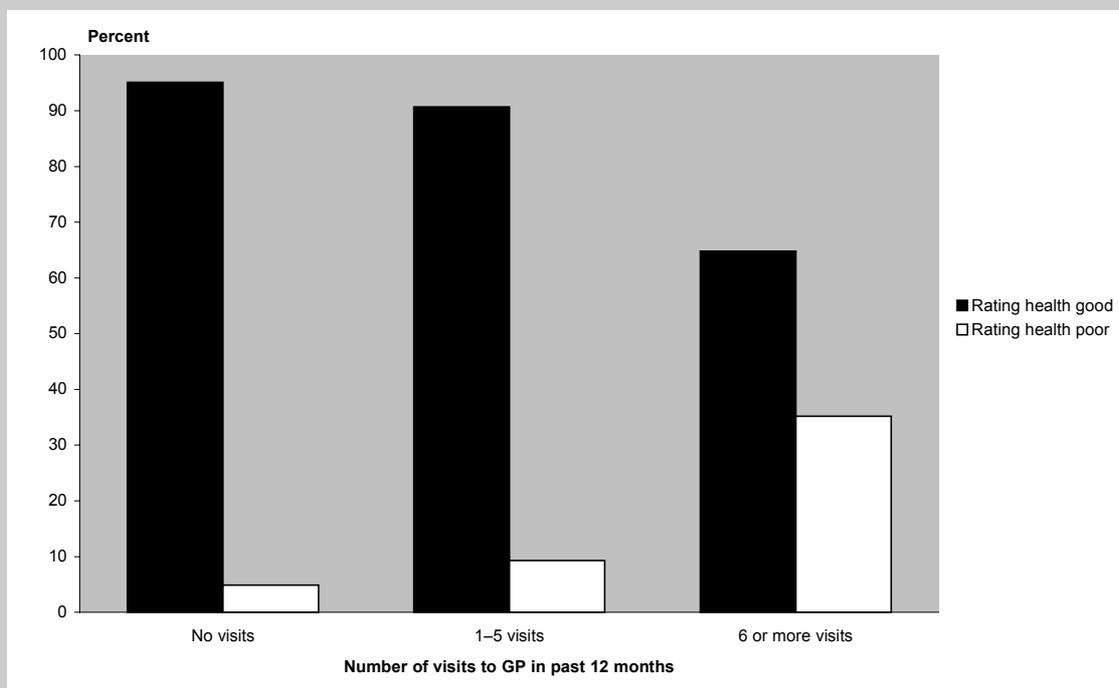


Source of base data: NZHS 1996–97

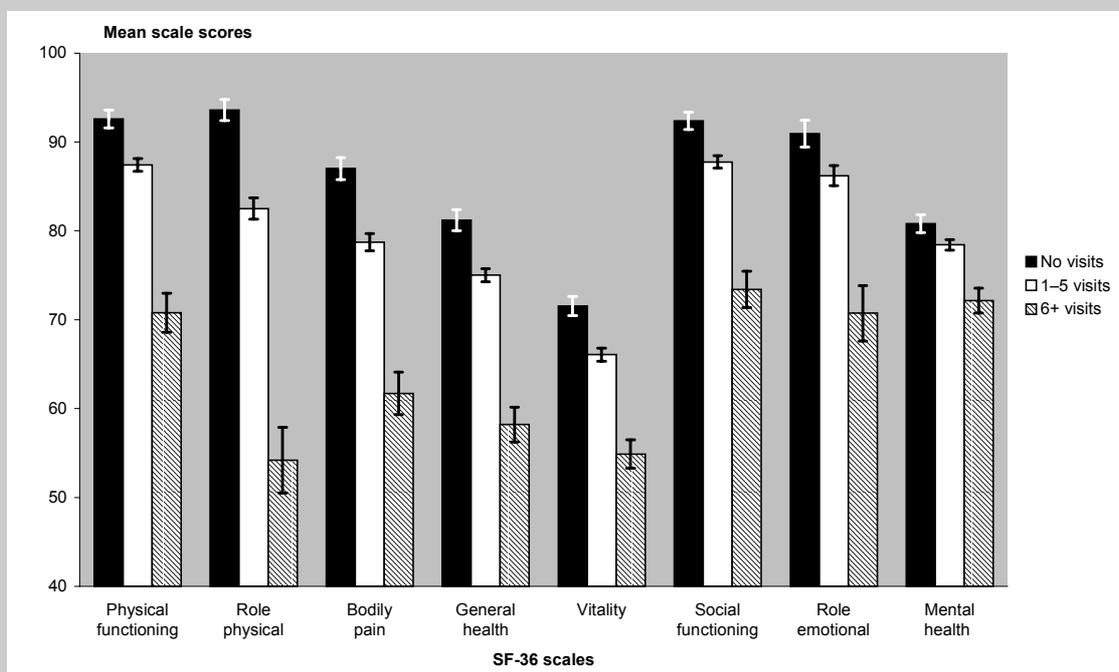
Note: error bars indicate 95 percent confidence intervals; broken axes.

On the other hand, Figures 80a and 80b suggest a closer relationship between subjective and objective health measures (to the extent that GP visits can be taken as an indicator of objective health status).

**Figure 80a:** Self rated health, by GP visits, adjusted for age and gender, 1996–97



**Figure 80b:** SF-36 profiles, by GP visits, adjusted for age and gender, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axis.

A possible explanation for these apparently contradictory findings relates to ‘within group’ versus ‘between group’ differences (Gould 1996). Self reported health status may correlate highly with objectively measured health status within a group (for example, those who share similar cultural beliefs) but correlate poorly between groups (for example, if the groups differ in cultural perceptions of health, and the subjective health measure is sensitive to such cultural influences). Another possible explanation relates to homeostatic control of subjective (perceived) health status. Above a threshold, subjective health status may correlate poorly with observed indicators because of adaptation (R Cummins, personal communication, 1999).

## SF-36 summary scores

The SF-36 was constructed to measure two major dimensions of health: physical and mental (Ware et al 1993). One test of the construct validity of the SF-36 (whether the questionnaire actually measures what it is supposed to measure) is to carry out a principal component factor analysis on the scale scores. This analyses the correlations among scale means to determine the number of underlying factors, or components, in the data. For example, if the scale means are all closely inter correlated then only one factor is emerging – probably a general health factor. However, if the pattern of correlations among the scale means forms two clusters, indicating two factors, then there is some evidence to support the existence of two dimensions underlying the SF-36.

A principal component analysis using standardised statistical methods has been carried out on the SF-36 in a number of different cultures. In general, OECD countries show a two factor structure (Ware et al 1994; 1998):

- the physical functioning, role physical, bodily pain and general health scales correlate most strongly (in that order) with the first (‘physical health’) component and weakest with the second (‘mental health’) component
- the mental health, role emotional, social functioning and vitality scales correlate most strongly (in that order) with the second (‘mental health’) component and weakest with the first (‘physical health’) component.

The data from the 1996–97 New Zealand Health Survey showed a very similar two factor structure for the total population. However, analysis of the questionnaire’s factor structure among European/Other, Māori and Pacific ethnic groups showed considerable departure from that structure among middle aged and older Māori, and among Pacific people of all ages. Among older Māori only one factor emerged, consistent with more traditional Māori holistic constructs of health. Among Pacific people there was some suggestion of a two factor structure but interpretation of the factors as representing ‘physical’ and ‘mental’ clusters is problematic as the scales did not cluster in the predicted pattern. This suggests that older Māori and Pacific people have interpreted some of the SF-36 questions differently from the younger Māori and the European/Other groups (Scott and Sarfati et al 1999).

The distinct physical and mental health clusters found in most factor analytic studies provide the basis for the creation of two summary scores: the *physical component summary* (PCS) score and the *mental component summary* (MCS) score, derived from the factor score coefficients (Ware et al 1994). The summary scores are scaled to have a mean of 50 and a standard deviation of 10.

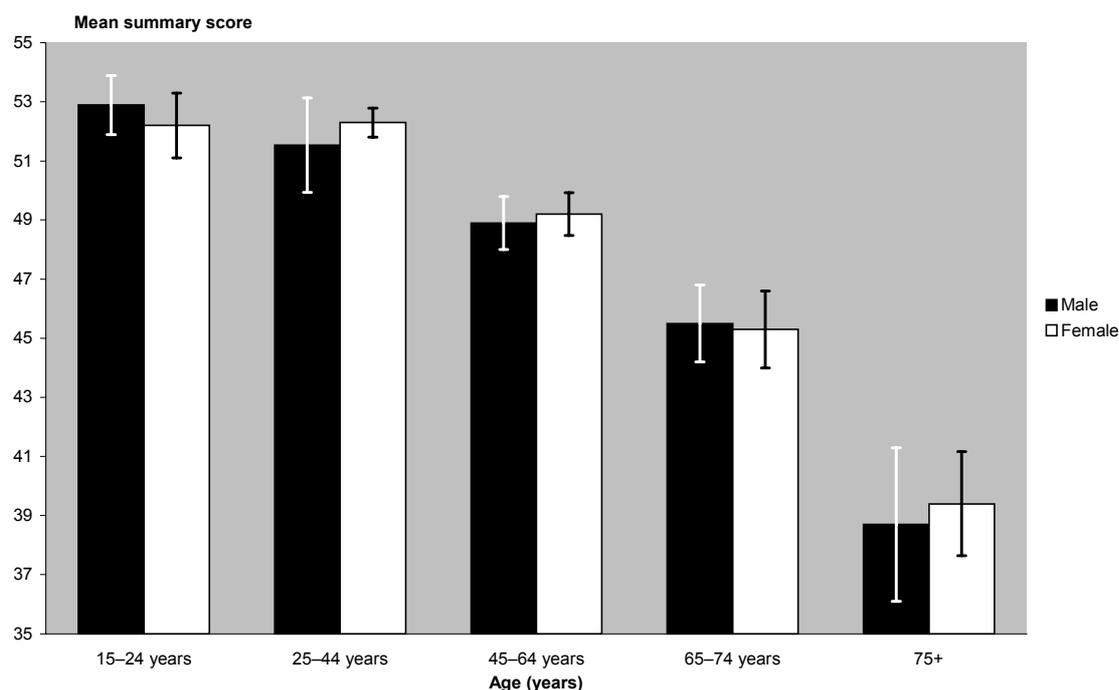
These indicators have the advantage of summarising the information from eight scales into two measures of population health status, which can make the information more useful for policy purposes – for example, in comparing the progress of two subgroups over time. However, these summary measures are less sensitive than the eight individual SF-36 scales, and so can sometimes fail to show a difference between groups. Inevitably, the summary scores also lose some of the richness inherent in the detail available from examination of the full profile of the eight separate scales.

The results of the factor analysis show that summary scores can be validly calculated for the New Zealand population as a whole but not for Māori and Pacific ethnic groups separately. Therefore, the summary scores that follow are not analysed by ethnicity.

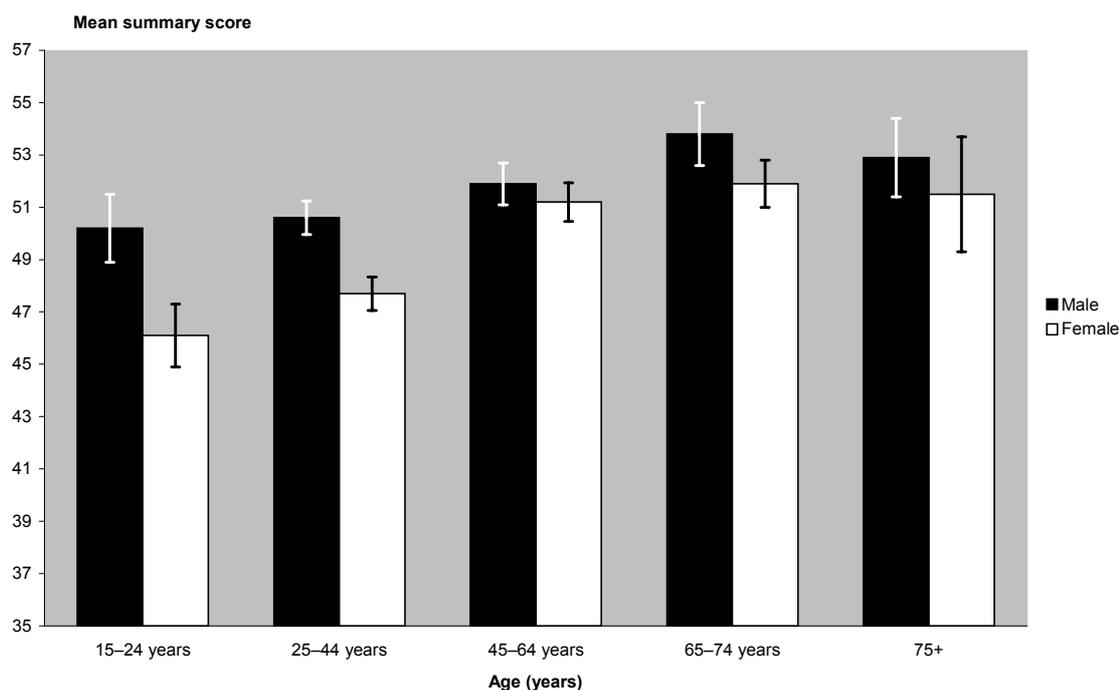
### Physical component summary (PCS) and mental component summary (MCS), by age and gender

Comparison of PCS and MCS scores illustrates the differential effect of age on physical and mental health (Figures 81a and 81b). PCS scores decline steadily with age, while MCS scores increase up to the 65–74 age group. The summary scores illustrate the same patterns evident in the profiles of the eight scales, but the compression of information into two scores allows a clearer depiction of the impact of age and gender on the respective dimensions of physical and mental health.

**Figure 81a:** Physical component summary score, by age and gender, 1996–97



**Figure 81b:** Mental component summary score, by age and gender, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axes.

The New Zealand patterns for PCS (with both genders declining with age) are almost identical to those found in the 1995 Australian National Health Survey (ABS 1997). For MCS, the Australian data for males show no change with age, whereas in New Zealand there is a steady increase from 25–44 to 65–74 years. For Australian females there is an increase with age for MCS, as occurs for New Zealand females, but in Australia the MCS continues to increase through the 75 years and over range.

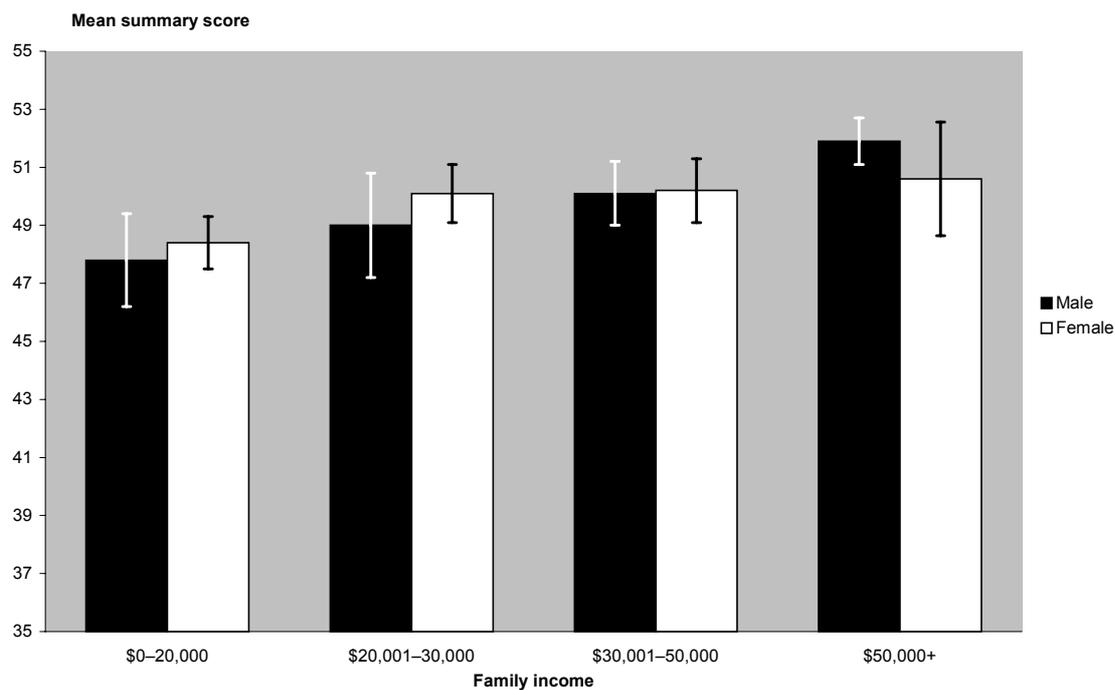
The gender difference in the New Zealand results is most pronounced for the mental health dimension, as was also seen in the SF-36 profile analysis. The summary scores show no significant gender difference for the physical health dimension, but a quite pronounced difference in the mental health component, with young females having significantly lower self reported mental health status compared with young males. This finding is consistent with the hypothesis that females have higher rates of anxiety and mood disorders (for example, depression) (Sullivan and Bulik 1997; Bushnell, 1997), the disorders to which the SF-36 mental health-related scales are most sensitive.

### **Physical component summary (PCS) and mental component summary (MCS), by socioeconomic status**

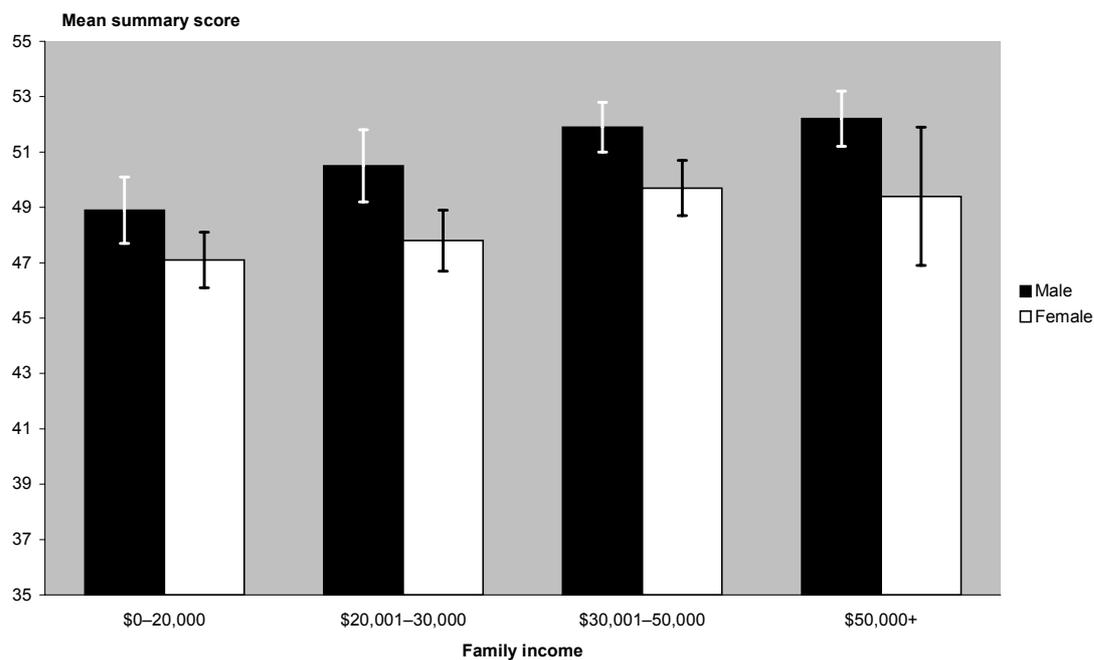
#### **Income**

Increasing income (up to the third income category) is associated with better self reported health status in both physical and mental dimensions (Figures 82a and 82b). Again, the gender difference is evident in self reported mental health status.

**Figure 82a:** Physical component summary score, by family income, adjusted for age, 1996–97



**Figure 82b:** Mental component summary score, by family income, adjusted for age, 1996–97



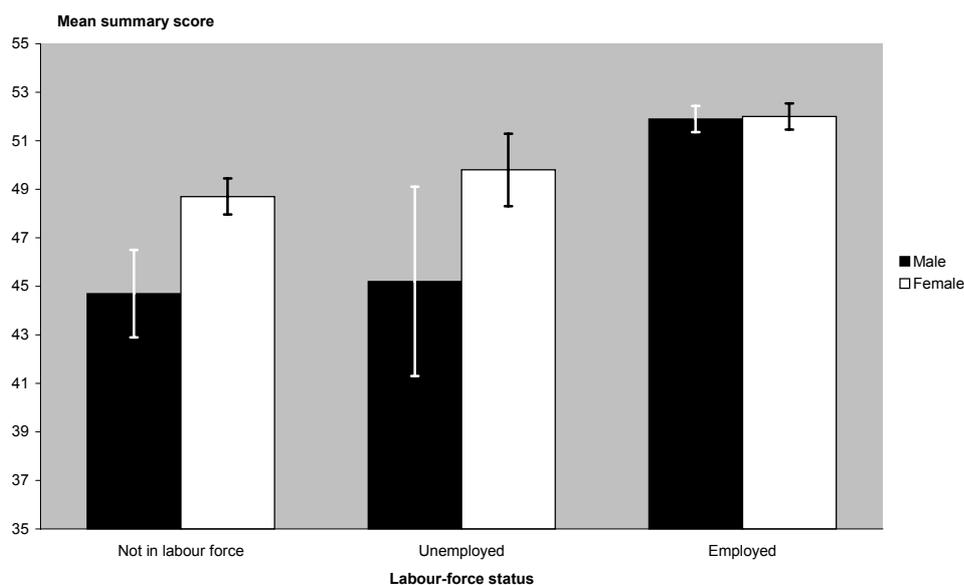
Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axes.

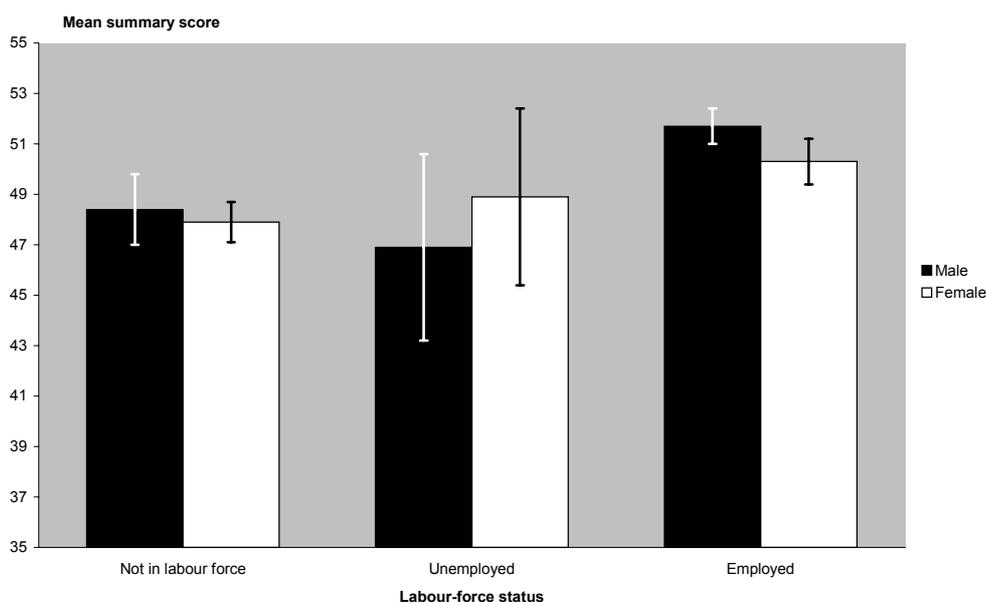
## Labour force status

Both males and females have significantly better self reported physical health status if they are employed, an effect that is more pronounced in males (Figures 83a and 83b). For males, being employed is also associated with better self reported mental health status compared with being unemployed. For females, there is a significant mental health difference between ‘employed’ and ‘not in the labour force’ groups only, although employed females also tend to rate their mental health better than unemployed females.

**Figure 83a:** Physical component summary score, by labour force status, adjusted for age, 1996–97



**Figure 83b:** Mental component summary score, by labour force status, adjusted for age, 1996–97



Source of base data: NZHS 1996–97

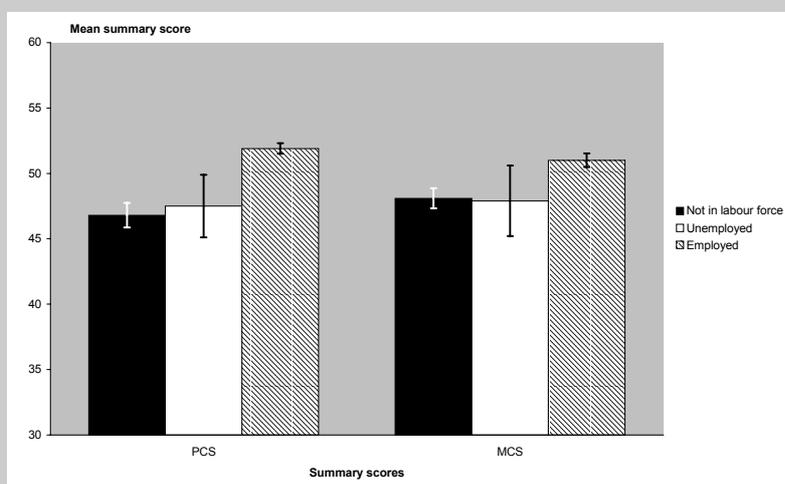
Note: error bars indicate 95 percent confidence intervals; broken axes.

## Box 14: Socioeconomic factors affecting labour force status and health

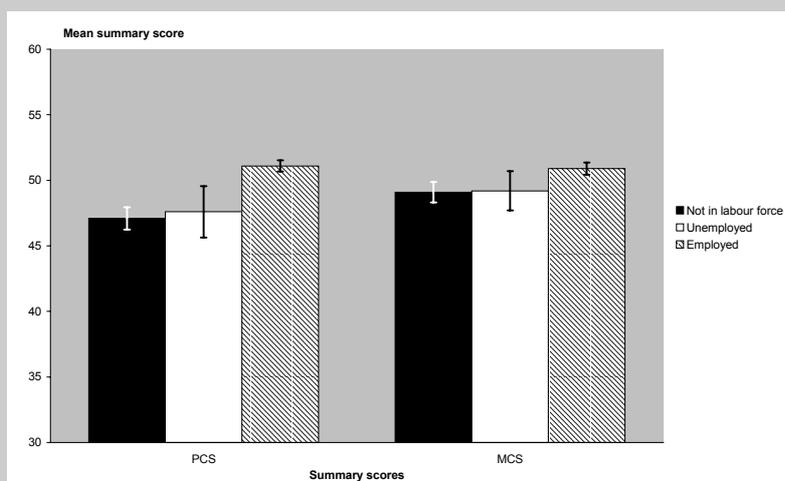
Differences in self reported physical and mental health status are associated with labour force status. An important question is: how much of this association is a function of differences in income rather than of the psychological effects of unemployment?

Figure 84a shows the association between labour force status and health status after adjusting for age and gender only. Figure 84b shows the same relationship after also adjusting for education and family income (markers of socioeconomic status). After adjustment for socioeconomic status, the self reported physical and, to a lesser extent, mental health status of the 'employed' group remains significantly better than that of the 'unemployed' and 'not in the labour force' groups. This suggests that the worse health status of non-employed people may not be solely the result of material deprivation, but may reflect psychosocial impacts of unemployment as well. Selection effects may also explain part of the difference, especially for those not in the labour force.

**Figure 84a:** Physical component summary and mental component summary scores, by labour force status, adjusted for age and gender, 1996–97



**Figure 84b:** Physical component summary and mental component summary scores, by labour force status, adjusted for age, gender, education and income, 1996–97



Source of base data: NZHS 1996–97

Note: error bars indicate 95 percent confidence intervals; broken axes.

## Summary and conclusions

A comprehensive account of population health status requires both subjective and objective measures. Subjective measures are not a substitute for objective measures, nor do they provide condition-specific information (map to specific disease processes). But subjective measures of health status, such as the global self rated health question and the SF-36, do reveal information about the impact on health of chronic diseases and disability that are not reflected in statistics on hospital discharges, primary health care or disability support services.

The 1996–97 New Zealand Health Survey reveals a number of findings relevant to health policy. Increasing socioeconomic status was associated with better self reported health status, in both physical and mental health dimensions; the association was strongest for income. Analyses that controlled for the different socioeconomic status of labour force groups removed some of the differences among those groups, but the employed still reported significantly better physical and mental health than the unemployed or people not in the labour force. Differences in health status across socioeconomic groups are seen also with objective measures of health (see Chapters 2, 3 and 5) and offer opportunities for health and intersectoral policies to improve equity of outcomes (National Health Committee 1998b).

The conclusion that ethnic differences in health status cannot be completely explained by socioeconomic status deserves further research to identify the other – presumably cultural – factors involved, or to determine whether the residual ethnic difference is an artefact of the way socioeconomic status is being measured. Also deserving of attention are the gender differences in self reported health status: males generally reported better health status, particularly in mental health, than females, a gender difference most pronounced in younger people. Is this inequality largely the result of a higher prevalence of clinical depression and anxiety disorders among females, or does it reflect more fundamental differences in gender roles?

The inclusion of the SF-36 in the 1996–97 New Zealand Health Survey provided an opportunity to compare three subjective health status measures as monitoring tools: the single item global self rated health status question, the full eight scale SF-36 profile, and the two SF-36 summary scores (PCS and MCS).

The global self rated health question is easy to administer and analyse, allowing for extensive comparisons and trend analyses. But it cannot provide information about different domains or aspects of health status, particularly mental health, or the gender differences that were apparent in the SF-36 scales. It is also susceptible to rising societal expectations, and is influenced by culturally specific concepts and beliefs regarding health.

The full SF-36 profile with its eight scales provides broad coverage of health dimensions (although it does not directly measure sexual or cognitive functioning), and it is reasonably well accepted and understood in population surveys (although less well among older people and those less well educated) (Scott and Tobias et al 1999).

The SF-36 principal component summary scores are scaled to avoid the ceiling effect of the eight scale instrument, which may make them better suited for population health surveys. They also have the advantage of being able to describe differences among groups in terms of only two generic measures: physical and mental health. Yet some loss of information is inevitable in going from eight measures to only two. Most importantly, factor analysis of the New Zealand Health Survey data shows that the ethnic-specific summary scores for (older) Māori and for Pacific people may lack validity (Scott and Sarfati et al 1999a), so limiting the application of these

measures to policy issues concerning the whole population and age and gender subgroups only. Despite its limitations, the SF-36 survey instrument has advantages over other approaches to monitoring the health-related quality of life of the population: it is more comprehensive than a disability survey, yet more specific than the single global health question.

Although health profile instruments such as the SF-36 *describe* individuals' satisfaction with the different dimensions of their own health, they do not provide information on how people *value* those dimensions relative to each other. Econometric approaches to health status measurement incorporate such valuations (preferences for different health states), and so can assign a single index to specified states of health. Such instruments (for example, the EQ-5D, see de Chairo 1998) may have a place in population health monitoring but have not as yet been widely applied for this purpose.

Separate measurement of the 'quality of life' and 'quantity of life' dimensions of health, while valuable, is inadequate for population health monitoring. Integrated measures, incorporating both dimensions into a single index, are needed to enable the interactions between the two dimensions of health to be taken into account. To date, such measures have relied on disability-based descriptors to capture the quality of life dimension of health. Yet broader constructs of health-related quality of life may be preferable, and integrated measures based on instruments such as the SF-36 and the EQ-5D are under development (Brazier et al 1998). Until such measures are fully developed and validated, however, integrated health status measures based on narrower concepts of disability, rather than broader concepts of health-related quality of life, can still provide most of the information needed for evidence-based policy.

# Chapter 5: Disability

## Introduction

From a population health perspective, disability represents a key dimension of health-related quality of life. Disability may be defined as functional and/or role limitation that results from a health condition, and is expected to last for six months or more (WHO 1980). However, this definition requires some elaboration (Guralnik et al 1996; Verbrugge and Jette 1994).

‘Functional’ limitations refer to limitations in the performance of basic actions or routine tasks required for everyday living. ‘Role’ limitations are the more complex, often social, activities involved in the fulfilment of socially expected roles, such as worker, parent or partner. This construct of disability – in effect a health perspective on the social model of disability – locates disability not within the individual but rather in the relationship between the individual and his or her environment. In other words, disability is the gap between personal capacity and environmental (task or role) demand.\*

A qualification to this definition is that the limitation must result from a pathological (disease, injury, birth defect) or physiological (ageing, disuse) process; for example, limitation in role performance resulting from gender discrimination in the workplace is not considered a disability. In addition, the resulting limitation must last six months or more: short term disablement associated with acute disease or injury is considered part of the morbid process itself, rather than being a consequence of it.

The functional and role behaviours included within this construct of disability cover the full spectrum of human life. However, for measurement purposes, a number of domains or clusters of behaviour can be recognised. These range from basic *self care* or *activities of daily living* (ADL) tasks (such as eating, dressing, grooming, bathing and toileting), through *mobility* (walking, stair climbing, driving, using public transport) and *independent living* or home management activities (housekeeping, gardening, shopping, budgeting), to the more complex *social activities* involved in communicating (for example, by telephone), socialising, parenting, caring for others and working.

## Measuring disability

Disability can be measured by the level of difficulty experienced in carrying out specified tasks (such as self care tasks), or by the need for assistance in carrying out these tasks. The former criterion obviously yields a higher prevalence of disability than the latter. This report mainly uses the ‘need for assistance’ criterion, as this accords better with policy objectives (which are aimed at the maintenance or restoration of independence) and eligibility for subsidised disability support services; it is also more compatible with the (implicit) definition of disability used in the burden of disease analysis (see Chapter 8). Need for assistance includes both personal assistance (from an informal or paid carer) and use of an assistive device (although simple devices such as eyeglasses are excluded).

---

\* Environmental barriers contributing to disability – such as barriers to access to education and training, employment, accommodation, transport, and social services, and the impacts of stigmatisation and discrimination – are of critical importance but are beyond the scope of this report.

## Characteristics and causes of disability

The key characteristic of disability as a (non-fatal) population health outcome is its severity – that is, its impact on quality of life. This can be measured in several ways: by the number of activities for which help is required (for example, 5+ ADL disability is more severe than 1–2 ADL disability); by the domain of disability in which help is needed (for example, limitation in self care is more severe than difficulty with home management); or by the frequency with which assistance is needed. The latter convention is adopted here, with the need for intermittent or non-daily assistance being distinguished from the need for continuous or daily assistance.

Various typologies of disability have been developed, none of them entirely satisfactory. This report distinguishes:

- physical disability (subdivided into mobility and agility limitations)
- sensory disability (mainly hearing and vision limitations)
- mental disability (psychological or psychiatric disability)
- intellectual disability
- cognitive disability (including attention, learning and memory limitations but excluding intellectual disability)
- speech disability (including speaking, swallowing and communicating difficulties).

In reality, people often experience more than one type of disability simultaneously. Co-disability increases progressively with age: older disabled people often have multiple disabilities rather than a single disability. Differentiating the primary disability may be difficult in such circumstances; for example, mental disability may be secondary to physical disability rather than being the result of a primary mental illness.

Disability also has different meanings for the individual and his or her family, depending on the age of onset and the duration of the disability. Early onset (lifelong) disability has very different implications from late onset (late life) disability. Early onset disability is usually the result of a birth process (birth defect, premature birth or complicated birth) or, less commonly, the consequence of a disease or injury in childhood or youth. Typically, late life disability is the outcome of chronic disease and senescent processes occurring simultaneously in old age. In the latter situation, the existence of co-morbidities and co-disabilities may make it difficult to identify the contribution of specific chronic diseases (or their risk factors or determinants) to specific disabilities. Nevertheless, an understanding of the specific morbidities contributing to the burden of disability is essential to the design and evaluation of policies intended to reduce this impact.

This chapter describes the prevalence of disability in New Zealand in 1996–97, categorised by severity, type, age of onset, duration and multiplicity. Inequalities in the experience of disability among population subgroups, categorised by age, gender, ethnicity and socioeconomic status, are analysed. To the extent permitted by the available data, the causal pattern of disability is also examined.

## Data sources and methods

This chapter draws heavily on the first New Zealand Disability Surveys (NZDS), fielded by Statistics New Zealand in 1996 and 1997 (SNZ 1998a, HFA and Ministry of Health 1998). These surveys covered both non-institutionalised and residential populations and comprised:

- a post census household survey covering the usually resident civilian population of all ages residing in private dwellings
- a survey of the adult population living in health-related institutions – that is, hospitals, long stay residential facilities for people with intellectual, psychiatric and physical disabilities, and rest homes (but excluding non-health-related institutions such as prisons and boarding houses).

The former survey achieved a sample size of 17,548, including 4100 people with disabilities (2669 adults and 1431 children) and 13,448 controls (people without disabilities), an overall participation rate of 86 percent. The institutional survey achieved a sample size of 1016 adults (a 92 percent response rate). For the household survey, the 1996 Census provided the sampling frame (based on the filter questions included in the census); the institutional survey was a stratified random sample of registered residential facilities. Participants were first administered a screening questionnaire to confirm the presence or absence of disability. Respondents with a disability were then administered a detailed content questionnaire relating to their experience of disability and need for (and use of) disability support services.

The definition of disability for adults was self (or proxy) reported functional and/or role limitation, in response to a set of questions covering various domains of behaviour. For children under 15 years (reported via proxy), a slightly different definition was used which included specific chronic conditions and education or other support needs. This definitional difference means that results from the two age groups are not strictly comparable, and the prevalence of disability in children may be overstated relative to that in adults.

Responses were analysed by means of an algorithm that assigned each participant to one of three severity levels of disability:

- Level 1 – participants who had a functional and/or role limitation, but did not need any assistance
- Level 2 – participants who needed help intermittently, but not on a daily basis
- Level 3 – participants who needed continuous or daily help, generally with self care or independent living.

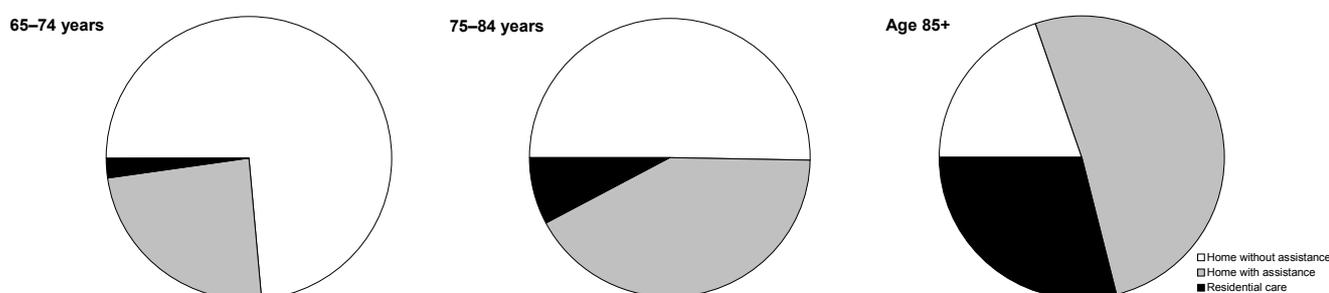
The analyses reported here focus on *dependent* disability – that is, disability associated with a need for personal assistance, whether from another person or a complex assistive device. This corresponds to severity Levels 2 and 3 combined.

## Disability in the whole population

By combining data from the New Zealand Disability Surveys with data from the 1996 Census, it can be estimated that approximately 28,700 people aged 65 or more years lived (for at least part of the year) in a health-related residential facility in 1996–97. Older people in residential care accounted for approximately 2 percent of those aged 65 to 74 years, about 8 percent of those aged 75 to 84 years, and 29 percent of those aged 85 and over.

In total, approximately 702,000 people were living with disability in 1996–97, a rate of 197 per 1000 (or almost 20 percent of the population). Of these people, approximately 405,000 needed assistance, either intermittently or continuously – a rate of 114 per 1000 (just over 11 percent of the population). Approximately 161,000 of these people were aged 65 or more years, comprising over 38 percent of the older population. Almost 15 percent of disabled older people needing assistance, or just over 5 percent of the total older population (Figure 85), are estimated to be living in residential care.

**Figure 85:** Residential distribution of people aged 65 and over, by age and disability status, 1996–97



Source of base data: NZDS and Census 1996

Of the 405,000 people with dependent disability, 110,000 (27 percent) required assistance on a continuous or daily basis, typically in the self care (as well as other) domain. This is a rate of severe disability of 31 per 1000 (just over 3 percent) in the whole population (Table 40).

**Table 40:** Distribution of disability, by severity level, 1996–97

Level of disability	Number	Rate per 1000	Percentage of disabled population
Level 1	297,000	83	43
Level 2	295,000	83	42
Level 3	110,000	31	16
Levels 2 and 3	405,000	114	58
Total	702,000	197	100

Source of base data: NZDS 1996–97  
Note: rate per 1000 is not age standardised.

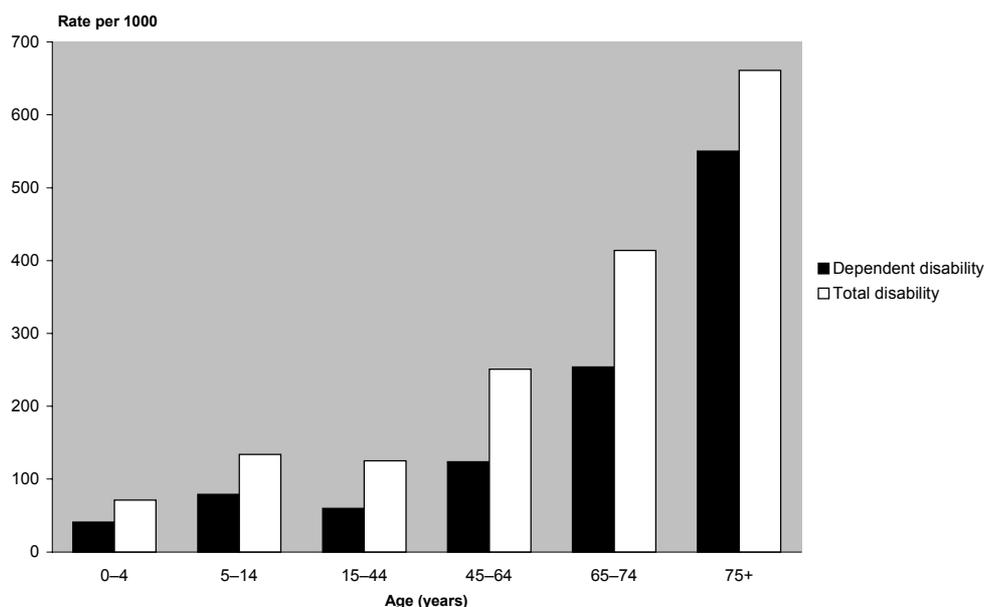
These prevalence rates are higher than those reported in recent surveys in several other countries, including Australia, Canada and the United States (AIHW 1998; Statistics Canada 1991; US Department of Health and Human Services 1998; Manton et al 1997). This finding is not due to differences in population age structures (since it persists after age standardisation), but may reflect a greater willingness to acknowledge and self report disability, variation in survey methods (Picavet and van den Bos 1996), or real differences in the prevalence of disability in the different countries.

## Variations in disability

### By age

Throughout adult life, but especially from middle age, the prevalence of dependent disability increases exponentially, reaching very high levels in advanced old age. This relationship with age does not apply to non-dependent (Level 1) disability, however (Figure 86).

**Figure 86:** Disability, by age and severity level, 1996–97



Source of base data: NZDS 1996–97

The prevalence of dependent disability rises from approximately 4 percent (41 per 1000) in young children to almost 8 percent (79 per 1000) in school aged children. The overall prevalence in childhood of 66 per 1000 is very similar to that (70 per 1000) found in the 1993 Australian National Disability Survey (ABS 1993). The prevalence then appears to decrease slightly, to approximately 6 percent (59 per 1000) of those in the 15–24 and 25–44 age groups. (However, this apparent decrease should be interpreted with caution due to definitional differences between child and adult data in the New Zealand Disability Surveys.)

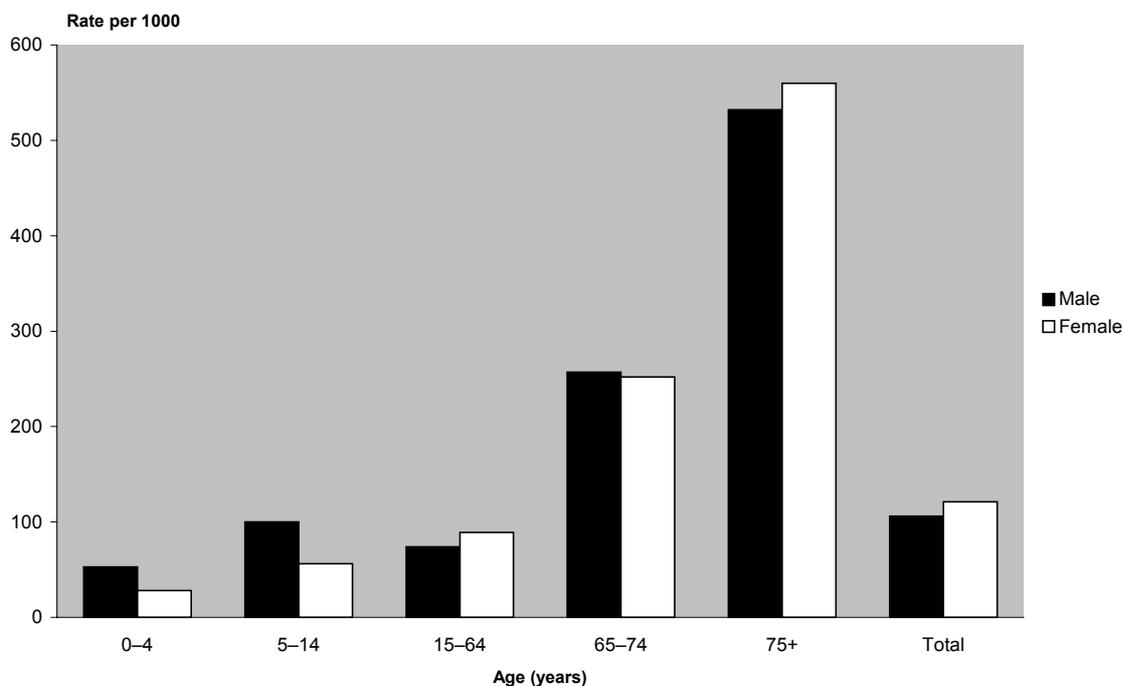
The rate then doubles to approximately 12 percent of middle aged adults (122 per 1000). In keeping with the exponential trend, the prevalence doubles again among older people aged 65–74 years, about one quarter (254 per 1000) of whom are dependently disabled. The rate of dependent disability among people of advanced age (75 years and over) is once again double that in the preceding age group, at just over half (550 per 1000).

### By gender

The gender differential in disability varies with age (Figure 87). Among children, boys have higher rates of disability (in all severity categories) than girls. Multivariable analysis of the 1996–97 New Zealand Disability Surveys data (Kokaua et al 1998) reveals an approximately 46 percent higher risk of dependent disability among boys than girls in the 0–14 age group. This reflects both biological and behavioural differences, including the higher risk of injury for boys.

The survey found no significant difference for disability of any severity between adult males and females, despite males' higher risk of injury in young adulthood and their earlier onset of cardiovascular and other chronic diseases; these risks may be counterbalanced by higher rates of such disabling but non-fatal diseases as musculoskeletal conditions and mental illness among females.

**Figure 87:** Dependent disability, by age and gender, 1996–97



Source of base data: NZDS 1996–97

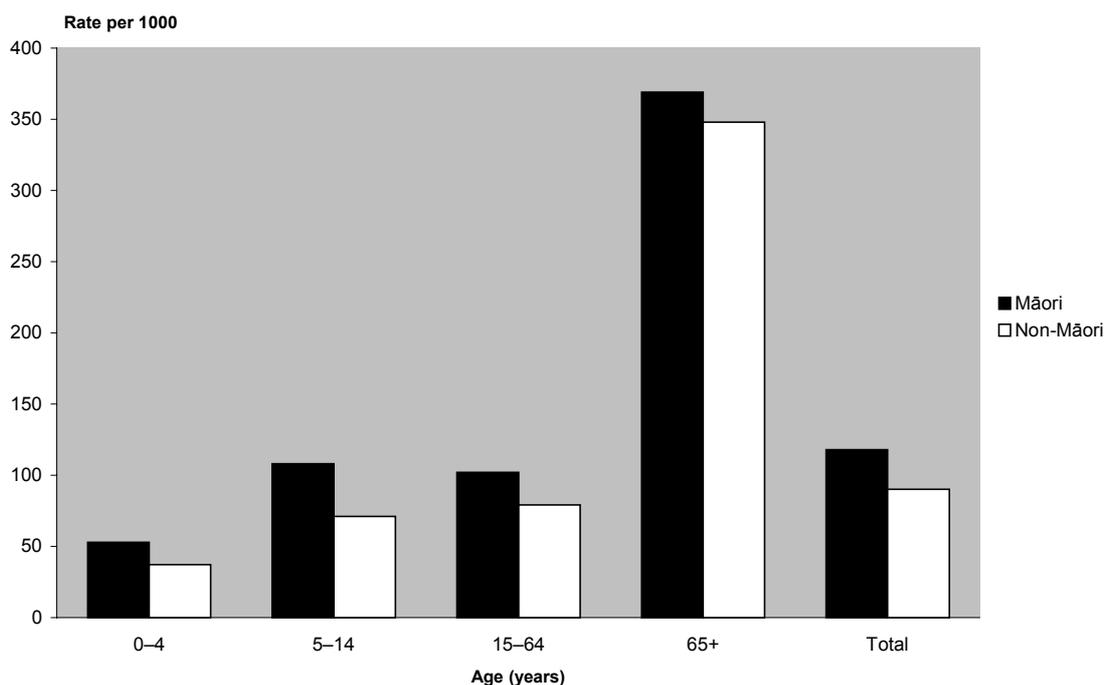
Only in advanced old age (75 years and over) do significantly higher female disability rates emerge, especially for dependent disability. This female excess is not thought to result from a higher incidence of disability, but rather from better survival after onset of disability. This may reflect different causal structures: males are more likely to experience chronic diseases that are both disabling and fatal (for example, ischaemic heart disease); females are more likely to become disabled as a result of non-fatal chronic diseases such as arthritis (Guralnik et al 1997).

The higher female age specific disability prevalence rates in old age, together with differences in the size and age structure of the female and male populations, account for a significant female excess in the disabled population overall. Thus, the majority (54 percent) of people with dependent disability are females.

### By ethnicity

Māori and Pacific people have much younger age structures than the European/Other ethnic group (for example, in 1996 3.0 percent of Māori were aged 65 and over compared with 13.3 percent of European/Others). Not surprisingly, overall rates of disability are therefore lower (108 per 1000 and 115 per 1000 for dependent disability among Māori and non-Māori respectively), but these rates disguise significant ethnic inequalities in age specific rates (Figure 88).

**Figure 88:** Dependent disability prevalence by age and ethnicity, 1996–97



Source of base data: NZDS 1996–97

Note: 'total' rate is age standardised to Segi's world population.

Māori children are about one third more likely to be disabled than non-Māori children (odds ratio of 1.35 after adjustment for a wide range of other sociodemographic variables in a multivariable analysis). Māori adults are also more likely to be disabled than non-Māori adults, but the difference is no longer statistically significant once socioeconomic status is taken into account (at least in this analysis).\*

Summarising across all ages by age standardising (to Segi's world population), it can be seen that Māori are more at risk of disability than non-Māori: in 1996–97 the age and gender standardised dependent disability prevalence rate was 118 per 1000 for Māori compared with 90 per 1000 for non-Māori (a ratio of 1.31). This is in keeping with the higher risk of both disabling chronic disease and injury experienced by Māori at most ages.

## By socioeconomic group

Data from the 1996–97 New Zealand Disability Surveys\*\* show a socioeconomic gradient in disability across all severity levels, using a variety of indicators, including household income, educational qualifications and labour force participation. Results for dependent disability for adults of working age (15–64 years) are summarised in Table 41. The restricted age range is used as some of the indicators do not apply to children or older people.

\* The confidence interval around the rate for Māori in the 65+ age group is very wide, despite oversampling.

\*\* This analysis could be carried out only on the Household Survey as data on income, education and (former) occupation were not collected from institutionalised respondents.

**Table 41:** Dependent disability, ages 15–64 years, by socioeconomic status, 1996–97

SES measure	SES level	Rate per 1000	Rate ratio
Household income	< \$30,000	131	2.6
	\$30,000 – \$50,000	86	1.7
	> \$50,000	50	1.0
Education	No qualifications	119	1.8
	School or post school qualifications	67	1.0
Labour force participation	Not in labour force	164	2.9
	Unemployed	86	1.5
	Employed	56	1.0

Source of base data: NZDS 1996–97

The relationship between socioeconomic status and disability is complex. Low status undoubtedly increases the risk (and probably the severity) of disability, acting through risk exposures and disease and injury experience. Yet disability also restricts educational and work opportunities, so impacting adversely on socioeconomic markers such as labour force participation and income. Although such selection (reverse causality) clearly operates, there is now a wealth of evidence that it generally makes only a relatively small contribution to socioeconomic gradients in a range of health outcomes (Marmot et al 1995; Evans et al 1994). For education, reverse causation cannot apply with respect to mid life or late life disability because educational attainment is usually fixed by the age of 25.

The univariate analyses presented in Table 41 have been supported by construction of a multiple regression model that allows the contribution of socioeconomic factors to disability risk to be analysed in more detail, independently of demographic or other potentially confounding variables (Table 42).

**Table 42:** Multivariable analysis of disability in people aged 15–64 years, 1996–97

Variable	Level or unit	Odds ratio	Confidence interval (95 percent)
Household income	\$1000	0.993	0.990–0.995
Education	School qualification	1.00	
	No qualification	1.27	1.11–1.45
Labour force participation	Employed	1.00	
	Unemployed	1.43	1.02–2.02
	Not in the labour force	2.10	1.80–2.45

Source of base data: NZDS 1996–97

The model predicts that each additional \$10,000 in annual pre-tax household income will decrease the risk of a person being disabled by 7 percent (after adjusting for other variables including age, gender, ethnicity and education). Similarly, having an educational qualification is associated with a 27 percent decrease in risk of disability (relative to not having such a qualification, taking all other variables into account).

The association with labour force status is even stronger: being unemployed is associated with a 43 percent increase in risk of disability, and not being in the labour force is associated with a 110 percent increase in risk. The strength of the latter association may indicate that significant bidirectional causality does apply to this relationship.

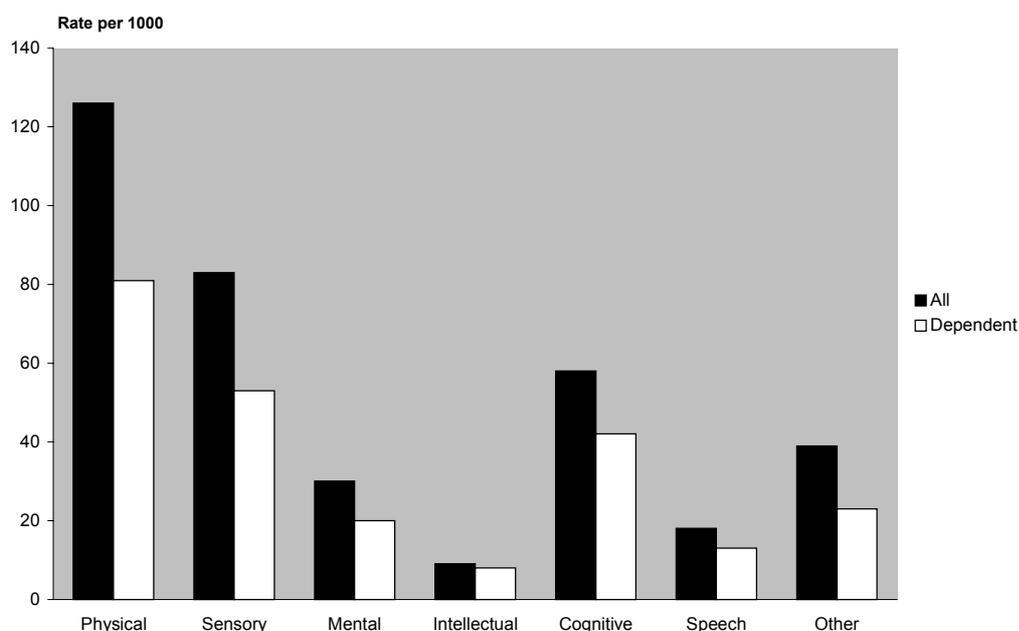
In summary, a clear socioeconomic gradient exists for non-fatal health outcomes (disability), similar to that illustrated in Chapters 2 and 3 for fatal outcomes (life expectancy and years of life lost). Socioeconomic, ethnic and gender inequalities interact in complex ways to yield the observed differentials in health status among population subgroups. These inequalities reflect different causal patterns, which in turn indicate possible intervention strategies.

## Characteristics of disability

### Types of disability

The rates of various types of disabilities in the whole population are summarised for all levels of severity and for disability associated with dependency in Figure 89. The rates do not add up to the total for each severity category (197 per 1000 and 114 per 1000 respectively), since people can experience more than one disability type at a time. The ‘Other’ category represents self reported limitations that could not be classified into any category; this residual category was needed more often for children than for adults.

**Figure 89:** Disability by type and level of severity, 1996–97

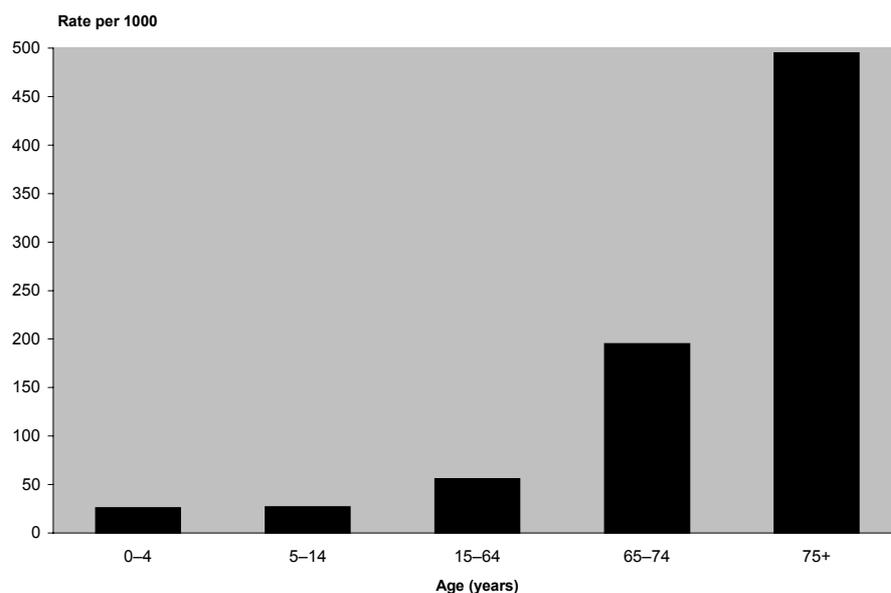


Source of base data: NZDS 1996–97

### Physical disability

Physical disability is the most common type of disability at all ages and all levels of severity. In children, this category includes the consequences of chronic diseases of childhood (such as asthma), but more especially the late effects of injury, birth trauma, complications of premature birth and birth defects. Thereafter, the rate increases slowly through adulthood and begins to rise steeply in old age (Figure 90). Although some of this disability is the result of injury (for example, osteoporotic hip fractures in older people), the overwhelming cause is chronic disease. Physical disability may be subdivided into mobility (lower body) and agility (upper body) subtypes, but often these are mixed.

**Figure 90:** Physical disability by age group, 1996–97

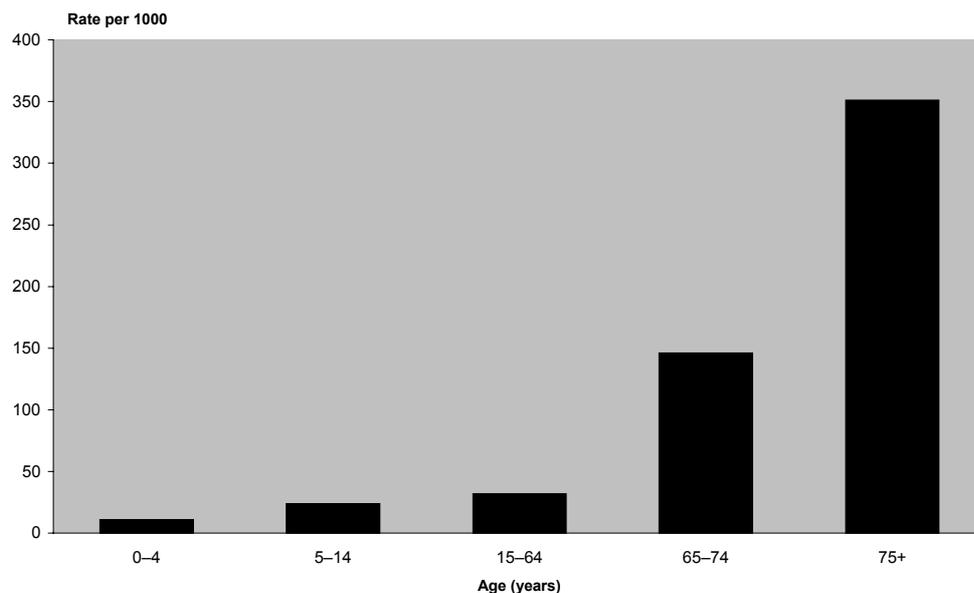


Source of base data: NZDS 1996–97

### Sensory disability

Sensory disability is the second most common type of disability in the population as a whole. Although hearing disability is more common than vision disability at all ages, only 1 per 1000 adults report total deafness compared with 3 per 1000 reporting total blindness. Like physical disability, sensory disability increases exponentially with age (Figure 91). One out of every three people aged 75 and over reports a sensory disability requiring assistance (other than ordinary glasses). Much of this sensory disability (especially hearing loss) cannot be attributed to specific disease processes and presumably reflects the loss of physiological reserve.

**Figure 91:** Sensory disability, by age, 1996–97

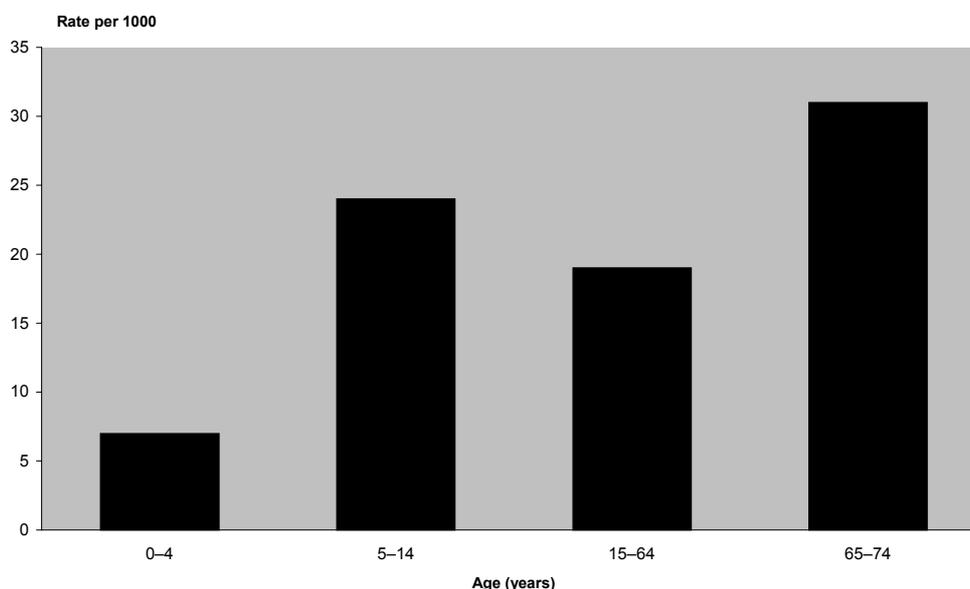


Source of base data: NZDS 1996–97

## Mental disability

Over all ages, the prevalence of mental disability needing assistance was approximately 20 per 1000 (Figure 92), and the total prevalence of mental disability 30 per 1000. These rates are very similar to the estimate of 28 per 1000 for ‘psychiatric disability’ among Australians in the early 1990s (ABS 1993).

**Figure 92:** Mental disability, by age, 1996–97



Source of base data: NZDS 1996–97

Only 4 per 1000 people living in private households and 5 per 1000 people in residential institutions reported mental disability as their sole disability. Although it is likely that this rate underestimates the true prevalence, these results are close to the estimated prevalence of 6 per 1000 people with psychiatric illness requiring ongoing support services. In addition, approximately 15 per 1000 people reported a mental disability needing assistance as well as another type of disability (generally physical and/or sensory). From the available survey data it is not possible to distinguish what proportion of this group have co-primary rather than secondary disabilities (a distinction that is relevant when considering intervention strategies).

The total estimated prevalence of 20 per 1000 therefore includes some secondary mental disability, biasing the estimate up. This may partly compensate for the probable under reporting of primary mental disability resulting from the stigma associated with psychiatric illness and the exclusion from the survey of certain non-health-related institutions (such as prisons and boarding houses).

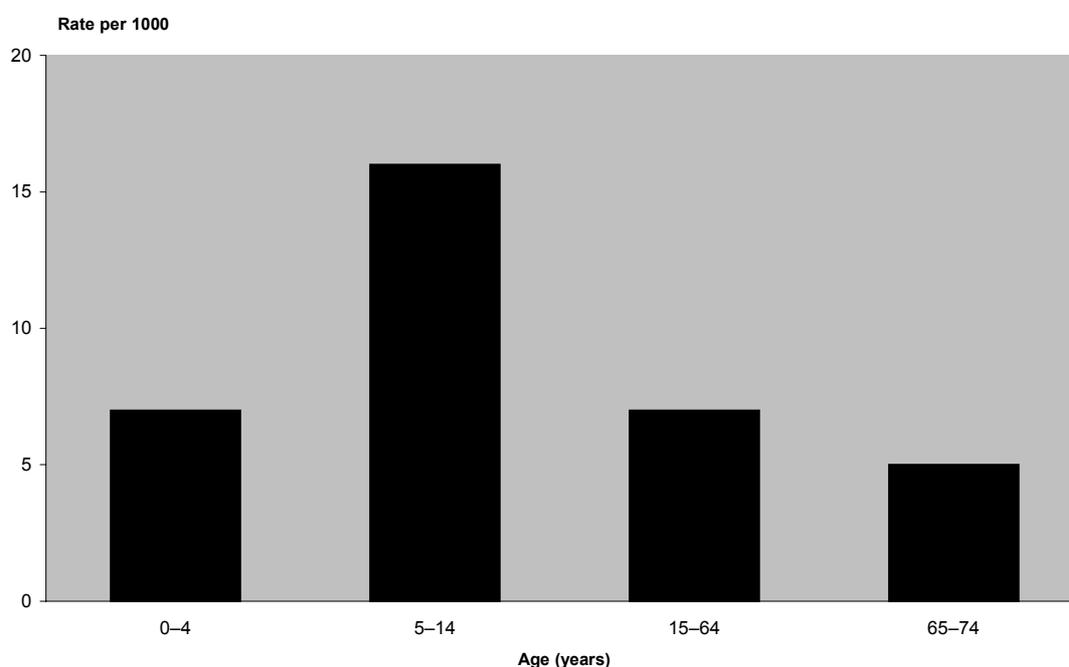
In contrast with physical and sensory disabilities, mental disability did not show a monotonic increase with age (Figure 92). The rate was lowest among children aged 0–4 years, then increased sharply in older children. The prevalence then dropped slightly in adulthood, only to rise again among older people. This is consistent with the SF-36 data reported in Chapter 4, which also showed little relationship with age for the mental health scales among adults (other than worse mental health scores for the 15–24 age group, especially for females).

## Intellectual disability

This is the least prevalent type of disability reported (Figure 93). Unlike other types, the highest rate is reported in the 5–14 age group (16 per 1000). This may be an artefact of the survey design, or could possibly reflect the labelling of school-age children as disabled because of poor academic performance. Many of these children do acquire sufficient cognitive skills by school leaving age to live and work independently in the community and lose the ‘disabled’ label, which could explain why the prevalence of intellectual disability appears to decline again in adulthood (to 6 per 1000 in the 15–64 age group) to much the same level as in young children (7 per 1000 in the 0–4 age group). Further decline in older age groups may reflect the lower life expectancy of those with severe, lifelong intellectual disability.

It should be noted that the survey may have underestimated the prevalence of intellectual disability as a result of the exclusion of some types of institutions (some larger community homes) from the sample frame.

**Figure 93:** Intellectual disability by age group, 1996–97

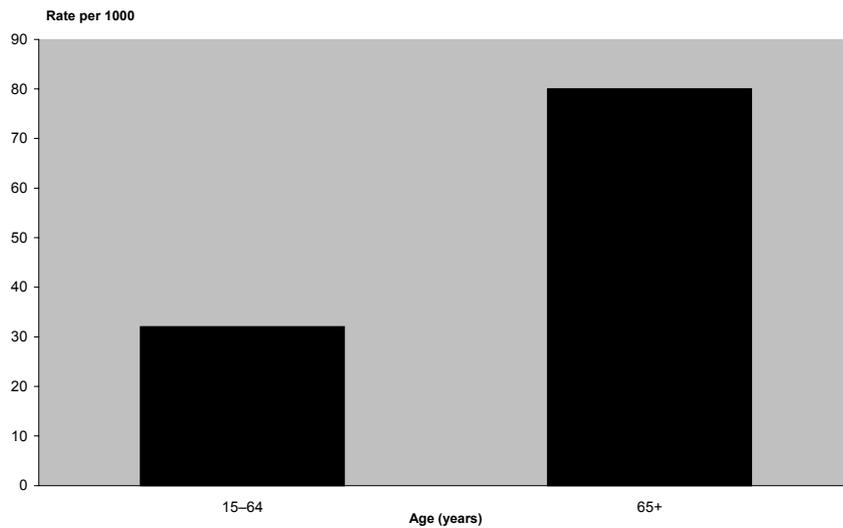


Source of base data: NZDS 1996–97

## Cognitive disability

Cognitive disability, including limitations in learning and memory, shows a similar pattern to physical and sensory disability of increasing prevalence with age (Figure 94). Dementia is a particular problem in the very old and so the prevalence is likely to increase as the population ages and old age mortality declines still further.

**Figure 94:** Cognitive disability, by age, 1996–97

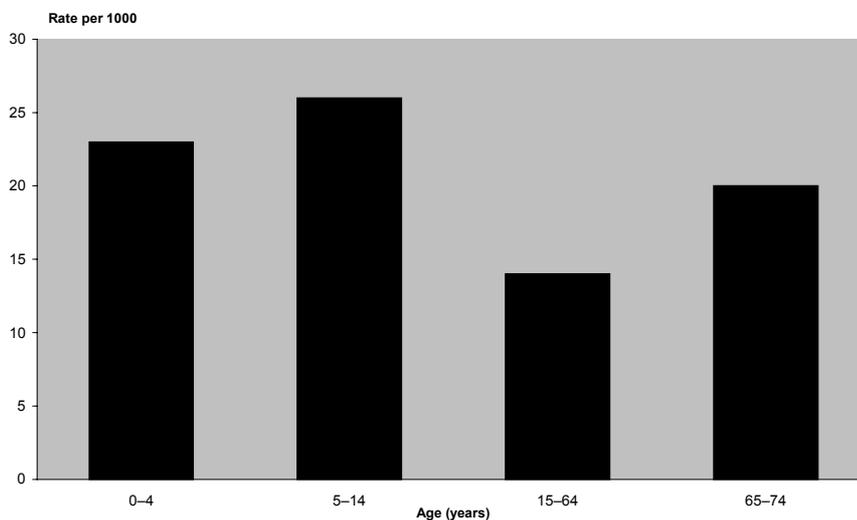


Source of data: NZDS 1996–97

### Speech disability

This type of disability comprises a mix of speaking and swallowing disorders (Figure 95).\* The overall rate of speech disabilities of 13 per 1000 includes two peaks: the first in childhood, reflecting primary disorders of the speech organs or language centres in the brain; the second in advanced old age, usually resulting from stroke and often associated with swallowing difficulties.

**Figure 95:** Speech disability, by age, 1996–97



Source of base data: NZDS 1996–97

---

\* Communication disability is a more complex category and may reflect speech limitations, sensory limitations (hearing and vision), cognitive or intellectual disability, and mental illness.

## **Other disability**

Only 6 percent of adults and 9 percent of children reporting a single disability had a disability that could not be classified using the typology presented here. However, the overall rate of 'Other' (unclassifiable) disability needing assistance was a more substantial 23 per 1000. This reflects the inadequacy of any classification scheme to capture the complexity of disability. These unclassifiable types were distributed fairly evenly across the age spectrum (although slightly higher in children) and across both genders.

## **Co-disability (multiplicity)**

Many people report more than one type of disability, and the rate of co-disability increases with age. Some combinations, such as mental with physical disability, are more common than others, and sometimes one disability may be secondary to another.

Among people aged 15–64 the rates of single and multiple disability needing assistance were 27 per 1000 and 55 per 1000 respectively – that is, multiple disability represented 67 percent of the total disability in this age range. For older people (65 years and over), 82 percent of all people with disability had more than one type of disability. And among disabled older people living in residential facilities, almost all (96 percent) were multiply disabled.

This high prevalence of co-disability has a number of policy and monitoring implications. Because co-disability makes mapping from disability to disease (or injury) problematic, the benefit of specific policies designed to prevent or control specific causes (diseases or risk factors) can be difficult to predict or evaluate. Primary disability cannot readily be distinguished from secondary disability, again making it difficult to predict the benefits of particular policy options. Finally, the impact of disability may be underestimated if the assessment of severity is based solely on the need for assistance, without taking the number of disabilities into account.

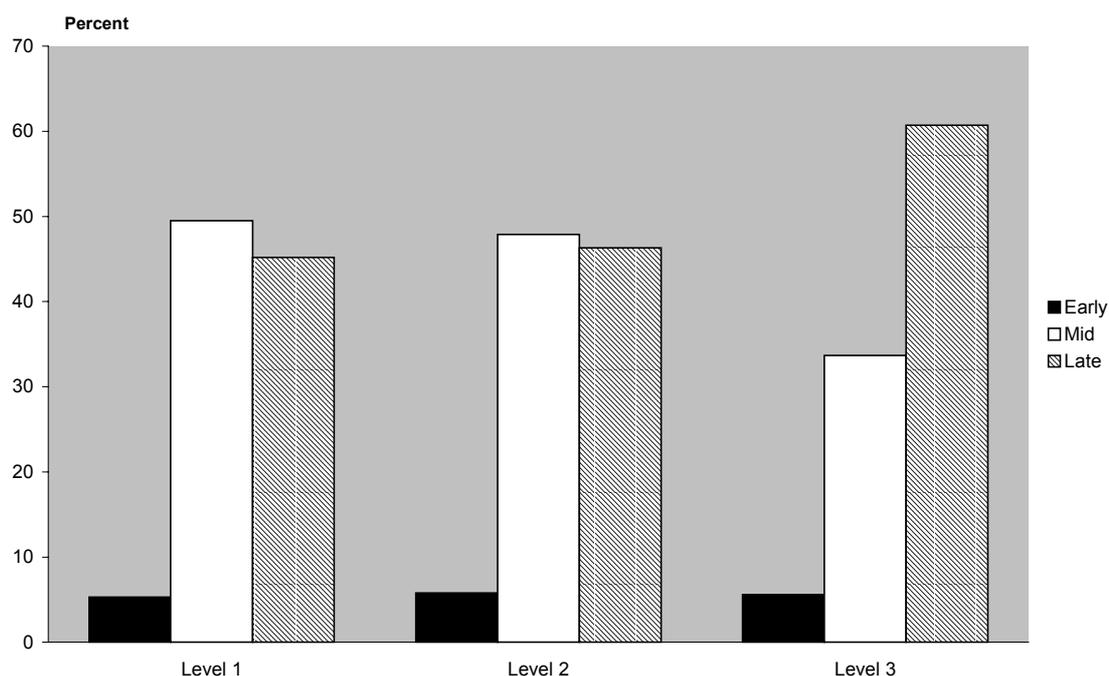
## **Age of onset and duration**

Time-related dimensions of disability cannot be analysed from a cross sectional survey, since temporal data will be confounded by age (for example, children obviously cannot have disability of late onset or many years' duration). Instead, only the experience of the subset of older people (65 years and over) included in the survey can be examined, since only this group has had the opportunity to experience disability of early, mid and late life onset, and of varying duration (Figure 96). However, even within this group, a degree of age confounding remains. Full understanding of ages of onset and durations of disability requires cohort studies or the use of modelling approaches to unravel the effects of age, period and cohort.

Only 6 percent of older participants (65 years and over) reported early onset or lifelong disability in the 1996–97 New Zealand Disability Surveys. By contrast, 45 percent experienced mid life onset of disability, and 49 percent reported onset in late life (Figure 96). This pattern is reflected in the distribution of disability durations among these respondents: approximately half had been disabled for less than 10 years.

For almost two thirds of older people with severe disability (Level 3 disability – needing daily assistance), the age of onset was late life, largely reflecting the age related incidence of severely disabling chronic diseases such as stroke, Parkinson's disease and dementia.

**Figure 96:** Age of onset of disability, people aged 65 years and over, by level of disability, 1996–97



Source of base data: NZDS 1996–97

People living in institutions tend to have experienced disability for a shorter time than people living in their own homes. In the former group, disability is more likely to be late life in onset; in the latter group, mid life disability is more prevalent. Mid life onset is associated with greater capacity and opportunity to adapt to or cope with the disability, and so is less likely to result in institutionalisation.

## Causes of disability

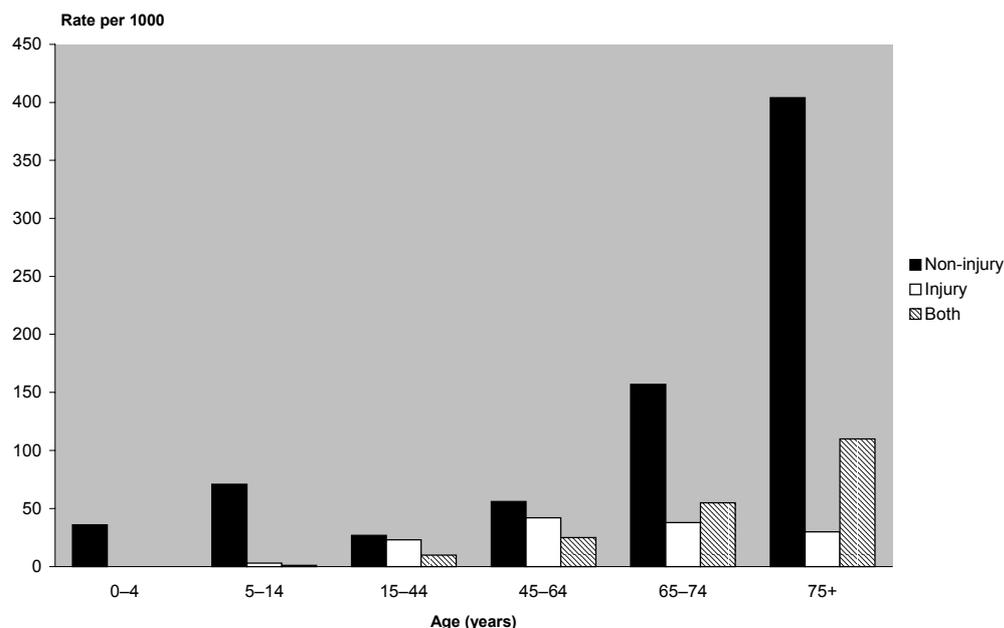
Cross sectional surveys such as the 1996–97 New Zealand Disability Surveys have difficulty collecting valid data on causes of disability at a detailed level. Mapping from disability to disease is complex: a single functional loss may result from many different causes; a single disease or injury may produce many functional consequences (different types of disability). Moreover, many older people experience co-morbidities and co-disabilities that interact in complex ways.

The surveys collected data on the causes of reported disability using a two stage approach. In the first stage, people reporting one or more disabilities were asked whether their disability was the result of:

- a disease or illness
- an accident or injury
- a congenital defect, or birth event
- a natural ageing process (adults only)
- psychological or physical abuse (adults only)
- a work related illness or injury (adults only).

The causal pattern of disability in the whole population is analysed here in terms of broad cause groupings: injury, non-injury and both (Figure 97). At this very broad level of causation, almost all survey respondents were able to attribute their limitations to a cause or causes. Non-injury related causes (acute and especially chronic disease, developmental processes such as birth defects, senescence and disuse) accounted for between two thirds and three quarters of disability, both dependent and total. The late effects of injury were responsible for at least one fifth and at most one third of both dependent and total disability.

**Figure 97:** Injury and non-injury causes of dependent disability, by age, 1996–97



Source of base data: NZDS 1996–97

In the second stage, people attributing their disability to a disease or injury process were asked to provide more detail about the disease diagnosis or the nature and circumstances of the injury. However, the data are difficult to analyse and interpret at this level of resolution, because the questionnaire did not distinguish the primary disability among people reporting more than one disability type, or the major cause among people attributing their disability to more than one of the above cause categories. Also, unfamiliarity with medical diagnostic labels may have biased the data relating to specific diseases as causes of disability (checklists or other prompts were not provided to survey participants).

Accordingly, only relatively broad cause categories can be differentiated for analysis (Table 43). Yet it can be seen that the causes of disability in childhood are approximately equally split between childhood diseases (acute and chronic) and birth-related causes (premature birth, complications of delivery and the perinatal period, birth defects, chromosomal disorders and hereditary conditions). Injury plays a small but not insignificant role in the causation of early onset disability.

In contrast, among the 15–24 and 25–44 age groups injury is the major cause of disability. This includes the severe head and spinal cord injuries that commonly follow road traffic crashes, as well as the generally less severe occupational, sports and domestic injuries. Disability resulting from birth-related causes or childhood diseases often persists into adulthood, but becomes relatively less important as injury gains a greater share.

From middle age onwards, the causal structure of disability reflects the emergence of the chronic diseases, which come to dominate the experience of disability in old age – and therefore in the population as a whole. Injury remains a significant if minor contributor to the burden of disability even at advanced ages, although the major injury cause of disability is not road traffic crashes but falls in the home, leading to osteoporotic fractures (especially of the hip).

**Table 43:** Specific causes of dependent disability, by age, 1996–97

Cause	Percentage of total disabilities in age group			
	0–14	15–44	45–64	65+
Disease	48	31	44	56
Birth process	50	20	8	4
Ageing	0	4	19	49
Accident	5	38	29	21
Work	0	20	27	14
Abuse (physical or psychological)	not asked	8	3	0
Other or not specified	22	12	9	12

Source of base data: NZDS 1996–97

Note: percentages may add up to more than 100 as some people report more than one cause.

## Specific disease and injury causes of disability

The contribution of individual causes to the burden of disability can be estimated by calculating the *population attributable risk* (PAR) of specific diseases and injuries for dependent disability. This counterfactual analysis takes into account both the strength of the association between the cause and the outcome (the relative risk of disability given the condition), and the prevalence of the condition. As neither relative risk nor prevalence data are available for most disease–disability pairs in New Zealand, it is not possible to quantify or even rank causes (Table 44).

**Table 44:** Major specific diseases and injuries causing disability

Cause group	Cause
Neuropsychiatric disorders	Dementias (Alzheimer's disease, vascular dementia)
	Depressive states
	Hearing disorders (especially those associated with ageing)
	Vision disorders of ageing (macular degeneration of the retina, cataract, glaucoma, refractive errors)
	Anxiety states
	Chronic neurological disorders (Parkinson's disease, multiple sclerosis, epilepsy)
	Alcohol and drug related psychological disorders
Musculoskeletal disorders	Osteoarthritis
	Back problems (including intervertebral disc disorders)
Cardiovascular disorders	Ischaemic heart disease
	Stroke
	Peripheral vascular disease
Diabetes	Diabetes (including complications)
Respiratory disorders	CORD
	Asthma

**Table 44 continued**

Cause group	Cause
Infant disorders	Birth defects, chromosomal disorders and hereditary conditions Perinatal complications (including premature or difficult delivery)
Injuries	Head injury Cord injury Fractures other than osteoporotic Hip fracture (and other osteoporotic fractures) Soft tissue injuries

Source: compiled from multiple sources  
Note: causes listed in random order.

Unlike mortality, where only a few causes dominate, a much wider range of diseases and injuries contribute significantly to the total population burden of disability (Susan et al 1997; Guccione et al 1994; Reynolds et al 1998; Kempen et al 1998; Guralnik et al 1996).

The leading cause of physical disability in New Zealand, as in other similar countries, is probably the group of (non-fatal) chronic musculoskeletal disorders, and predominantly osteoarthritis (especially of the knee and hip). In surveys in the US (Guccione et al 1994) and Australia (ABS 1993), nearly half of older people reported arthritis and at least one quarter of these reported functional and/or role limitation as a result. Because of their impacts on mobility and agility, arthritis and related musculoskeletal conditions (such as intervertebral disc disorders and related back and neck problems) can limit the performance of all self care and independent living tasks, especially those involving walking, bending, stretching and lifting.

Ischaemic heart disease, which is by far the leading cause of death and a major cause of hospitalisation (see Chapters 1 and 6), is ranked lower as a cause of disability (dependent or non-dependent). Nevertheless, it has a strong association with limitations in mobility related tasks (tasks requiring endurance, such as walking, climbing stairs, doing housework). By contrast, stroke accounts for a greater share of dependent disability, and especially severe disability needing daily assistance with self care tasks, although it is less frequent than ischaemic heart disease as a cause of death. This is because stroke generates a wide range of functional limitations, covering all major types and subtypes: agility, mobility, sensory, cognitive, speech, swallowing and incontinence. However, at least half of all stroke events are still followed by complete recovery within six months, and limited recovery can continue for months or even years after that (see Chapter 8, Box 16).

Although the second ranked cause of death at the cause group level (after cardiovascular disease), cancer is not within the top tier of causes of disability. Of course, some cancer patients experience severe disability, but typically this is restricted to a relatively brief pre-terminal phase. In earlier stages, most cancers and their treatment impose relatively little disability.

So far, the diseases considered are conditions that directly impair physical functioning. Functional and role limitations can also result from psychological or sensory disorders in the absence of other impairment. Evidence from the USA (Guralnik et al 1996) indicates that the loss of vision often associated with ageing (including macular degeneration of the retina, cataract and glaucoma) is among the leading causes of dependent disability. Furthermore, poor vision often causes secondary physical disability through disuse (if it imposes a sedentary lifestyle). Retaining or restoring visual acuity appears to be critical in the maintenance of physical functioning, especially mobility, in the older person.

Cognitive impairment, ranging from mild to severe, is frequently (but not inevitably) associated with ageing. Alzheimer's disease is the most common clinically diagnosable dementia, but vascular causes, including stroke related dementia and those associated with small vessel disease, are becoming increasingly recognised. Clinical depression is probably less common among older people than younger age groups. Yet among older people in particular, depression (perhaps resulting from a major life event such as the death of a partner) may interact with relatively minor cognitive and sensory losses and minor physical impairments to trigger a vicious cycle leading to further disability and wider deterioration in the quality of life (see Chapter 6, Box 20).

Many other chronic diseases and injuries are also associated with significant disability. Examples are diabetes (see Chapter 6, Box 17) and falls in older people (Chapter 6, Box 22).

## Summary and conclusions

One out of five people live with one or more disabilities, one out of nine are dependent (need assistance to live independently or are institutionalised), and one out of 32 need continuous or daily assistance. At any given time 15 percent of people aged 65 and over with dependent disability (approximately 23,000 people) live in residential facilities: this institutionalised population (which numbers about 28,000 in total) makes up about 2 percent of people aged 65–74, less than 8 percent of those aged 75–84, but a much higher 29 percent of those aged 85 and over.

This residential distribution reflects the exponential rise of disability with age. Approximately 6 percent of people aged 0–44 are dependently disabled. The proportion doubles in middle age to approximately 12 percent, then doubles again to reach approximately one quarter in the 65–74 age group. Among people aged 75 and over this proportion rises to just over half, which means that almost half of people at advanced ages are still living independently at home without any need for assistance.

This age pattern is slightly different for males and females. Boys are far more likely to be disabled than girls, but male and female rates of disability across all severity levels are not significantly different throughout adult life. Only at advanced ages (75 years and over) does a female excess emerge – the result of longer survival rather than a higher incidence of disability.

Māori have an approximately one third higher rate of dependent disability than non-Māori, which is at least partially explained by ethnic differences in socioeconomic status. A steep gradient exists in disability rates across socioeconomic groups, suggesting that as wealthier and more educated cohorts grow into old age, the age-specific prevalence of disability may decline. This health gain would, of course, be offset by the longer survival of these more advantaged cohorts.

Causal analysis of the New Zealand Disability Surveys data indicates that one fifth to one third of the burden of disability may be attributable to the late effects of injury, especially road traffic injury in younger people and osteoporotic fractures following falls in older people. The two thirds to four fifths of dependent disability resulting from non-injury related causes includes both pathological (morbid) and physiological causes; the former range from birth defects to the chronic diseases, the latter range from senescence (loss of physiological reserve and homeostatic feedback) to disuse.

Only 6 percent of disabled people aged 65 and over experienced onset of their disability at birth or in childhood (early onset or lifelong disability). The majority report mid life or (especially) late life onset of disability, reflecting the overwhelming impact of the chronic diseases of middle and old age on disability outcomes. Over half of disabled older people have been disabled for less than 10 years.

The majority of disabled people have more than one disability, and this proportion increases with age from two thirds for dependently disabled adults aged 15–64 years, to 96 percent for disabled older people living in long stay residential facilities. The high prevalence of co-morbidity and co-disability makes it difficult to quantify the type distribution or the causal structure of disability. Physical disability (including mobility and agility subtypes) is clearly most prevalent, across all levels of severity. Sensory and cognitive disabilities are also common, and share with physical disability a marked age structuring, with prevalence increasing sharply with age. Intellectual and speech disabilities are much less prevalent: the former is predominantly a lifelong disability; the latter shows two peaks – in childhood and again in old age. A small but significant proportion of disabilities reported for children and adults could not be classified into any of these categories.

Advanced statistical and modelling techniques will be necessary to unravel the separate and cumulative effects of different diseases, injuries and other processes in relation to disabilities of different types and severities in various population subgroups. Yet, from the analysis and literature review presented here, it is possible to conclude that the major causes of disability are not the same as the major causes of (premature) death. Although some causes are important for both outcome dimensions – including injuries (falls and road traffic injury, in particular) and cardiovascular diseases (especially ischaemic heart disease and strokes) – others are not. Cancer is a major cause of premature death but not of disability. The opposite holds for arthritis and related musculoskeletal conditions, mental disorders such as depression and anxiety, and the losses of memory, hearing and visual acuity that often accompany the ageing process.

Instead of beginning with population level data on disability and mapping backwards from disability to disease (or other cause), an alternative would be to map forwards from cause (disease, injury etc.) to outcome (disability). Such an approach is used in Chapter 8 which summarises findings from the New Zealand Burden of Disease Study.

# Chapter 6: Morbidity

## Introduction

One of the most reliable ways to measure morbidity in the population would be to examine a large nationally representative sample of people of all ages regularly and repeatedly over the course of many years, refreshing the cohort at each wave. However, no ongoing cohort study of this kind is available for New Zealand. Instead, it is necessary to build up a description of the pattern of disease and injury experienced by the population from a variety of more limited data sources. These sources fall into two main groups: cross sectional health surveys and records of people's use of health services.

Health surveys include national and regional studies. An example is the 1996–97 New Zealand Health Survey (NZHS), which questioned over 8800 adults and children about their health status, health risk behaviours and use of health and hospital services (Ministry of Health 1999d). Health surveys are useful because they have the potential to capture data on illnesses and injuries even if these events do not result in people receiving medical treatment. However, they do not usually include people who are hospitalised or who live in residential facilities such as rest homes, so the prevalence of certain health conditions may be underestimated. Another disadvantage is that typically they rely on self reports of symptoms, illness events or contact episodes with a health professional, which can be unreliable, especially if people are being asked to recall events that occurred a month or more previously.

Records of health service utilisation include general practice consultations and hospital admissions. In the last decade, two regional studies have investigated the range of health conditions encountered in general practice (McAvoy et al 1994; Tilyard et al 1995), and the New Zealand Health Information Service (NZHIS) routinely compiles patient discharge data from public and private hospitals.

One of the main advantages of morbidity data extracted from health service records is that the data will generally be classified using a standard set of clinically recognised conditions (for example, the International Classification of Diseases or the International Classification of Primary Care). This makes it possible to determine with reasonable accuracy the incidence or prevalence of those conditions likely to result in a GP consultation or hospital admission. However, morbidity data collected from health service records exclude conditions that do not result in contact with the health services. For this reason, health service utilisation data may under-represent the incidence and prevalence of some quite disabling health conditions for which no treatments are currently available, or for which all treatment options have been exhausted.

Another disadvantage is that service use can be influenced by factors other than the incidence or prevalence of disease. For example, the types of people and conditions treated in a hospital will, to some extent, be shaped by the kinds of services available and the degree to which the demand for certain medical or surgical interventions, especially for non-urgent problems, is met. Patterns of hospital treatment may also be influenced by the referral practices of GPs and other primary health care providers, as well as by patients' attitudes, preferences and resources.

Disease registers overcome many of the limitations of routine health service records and so provide a more accurate indication of disease incidence. However, the only national registers currently in operation are the New Zealand Cancer Registry and the National Birth Defects Monitoring Programme (both managed by the NZHIS).

## Morbidity in the community

There have been no recent national surveys of community morbidity in New Zealand. A 1983 survey in two regions found that about 76 percent of respondents had experienced at least one morbid condition in the previous two weeks, with the five most common conditions being back or neck ache, headache, hangover, skin trouble (including rashes and itches) and coughs and sore throats (Burt and Cooper 1983a; 1983b). Only 11 percent of these conditions were brought to the attention of a doctor; the rest were either ignored or treated using self medication or home remedies.

Although this survey is now 15 years old, the patterns described are generally consistent with those identified in the more recent (1995) Australian National Health Survey, which reported 65 percent of males and 73 percent of females experiencing one or more illnesses in the preceding two weeks, including long term conditions (AIHW 1998). Twenty three percent of respondents had consulted a doctor in this period and 13 percent had consulted a dentist or other health professional. The most frequently reported recent illnesses were diseases of the respiratory system, including asthma, colds and influenza (22 percent of the population), headaches (13 percent), circulatory system diseases (12 percent) and digestive system diseases (11 percent).

In the 1992–93 New Zealand Health Survey, 20 percent of respondents had restricted their normal activities, including taking time off work or school, because of a short term illness or injury in the previous four weeks (SNZ and Ministry of Health 1993); of these people, just under half did not consult a GP for treatment of the condition. The most common reasons given for not seeking treatment were: there was no need, the condition was not serious enough, or the condition had already received some kind of treatment. Cost, lack of transport, and difficulty getting an appointment were other reasons given for not obtaining treatment.

In the 1986 Christchurch Psychiatric Epidemiology Study, 28 percent of respondents had experienced some kind of mental health disorder in the previous six months, although less than one third of these people had visited a health service for a mental health consultation (Hornblow et al 1990).

## Morbidity and general practice

Although New Zealanders do not consult a doctor for most of the illnesses or injuries they experience, most visit a GP at least once in a year. According to the 1996–97 New Zealand Health Survey, 80 percent of children (0–14 year olds) and 79 percent of adults (aged 15 years and over) had consulted a GP in the previous 12 months (Ministry of Health 1999d). The average number of GP visits per year was four for adults and six for children and older people (65 years and over). This estimate is very close to that for utilisation of GP services in 1996–97 derived from Health Funding Authority expenditure data of 4.2 consultations per capita (all ages) (Ministry of Health 1998c). Although some of these visits were for well person care (for example, routine check ups, immunisations, pregnancy and childbirth services), most were for treatment of a short term health condition, management of a disability or long term health condition (chronic disease), or an injury or poisoning.

Studies of GP–patient encounters provide more detailed information about the kinds of health conditions most frequently seen in general practice. The WaiMedCa study collected data on

16,760 health problems seen at 11,888 GP–patient encounters in the Waikato region during 1991–92 (McAvoy et al 1994). The most common cause group seen was respiratory disorders, followed by musculoskeletal disorders and skin disorders (Table 45). The three most common individual conditions were high blood pressure, upper respiratory tract infection and acute bronchitis.

About half of all the health problems seen by GPs in the WaiMedCa study were classified as new problems, meaning that they had never been treated before or were new episodes of pre-existing problems. Upper respiratory tract infections, acute bronchitis, tonsillitis, sprains and strains, eczema and minor psychological conditions (including depression and anxiety states) were the most common new problems, together making up more than one quarter of all new problems seen. New problems were most likely to be found among children and younger adults. Older people were more likely to be treated for recurring or existing problems.

**Table 45:** Main diagnoses managed in GP–patient encounters, Waikato region, 1991–92

Disorder group	Percentage of all health problems	Specific disorders	Percentage of all health problems
Respiratory	18.6	High blood pressure	4.2
Musculoskeletal	13.1	Upper respiratory tract infection	3.9
Skin	11.3	Acute bronchitis	3.8
General	10.0	Pre and postnatal care	3.7
Cardiovascular	8.8	Otitis media	3.5
Reproductive	6.7	Asthma	3.2
Ear	5.9	Tonsillitis	2.8
Digestive	5.8	Eczema	2.0
Female genital	3.7	Sprain/strain	2.0
Psychological	3.4	Presumed infections	1.8
Endocrine	3.0	Sinusitis	1.3
Eye	2.2	Hayfever	1.3
Neurological	2.0	Viral infection	1.2
Urological	1.7	Laceration	1.2
Blood	0.6	Conjunctivitis	1.1
Male genital	0.4	Dermatophytosis	1.1
		Urinary tract infection	1.1
		Diabetes	1.1
		Osteoarthritis	1.1

Source: McAvoy et al 1994

Note: coding based on chapter headings of the *International Classification of Primary Care*.

Similar patterns were identified in a 1990 study of a sample of 106 New Zealand GPs (Tilyard et al 1995). As in the WaiMedCa study, skin, respiratory and musculoskeletal disorders were the three most common cause groups identified. The most common individual problem was high blood pressure (5.6 percent of all GP–patient encounters), followed by back complaints, upper respiratory tract infections, asthma, coughs, abdominal pain, diarrhoea and vomiting, and headaches. In Australia the 1995 National Health Survey found high blood pressure, upper respiratory tract infection and acute bronchitis to be the leading three health problems managed in general practice (AIHW 1998).

## Variations in GP visits

### By age

Age is an important determinant of the kinds of disorders seen in general practice, as well as the number of visits people make to a GP in any given year. Encounter studies and population surveys both demonstrate that young children and older adults are more likely than other groups to use GP services (McAvoy et al 1994; Triggs et al 1995). This reflects the greater vulnerability of these groups to the effects of disease or injury.

In the WaiMedCa study, the leading problems seen in GP–child consultations were otitis media (12.6 percent), upper respiratory tract infections (10.7 percent), asthma (6.0 percent) and tonsillitis (5.8 percent). Other common problems were eczema, viral infections, conjunctivitis and bronchitis, each of which made up more than 2 percent of the total number of problems managed in children (McAvoy et al 1994).

In the adult age groups, the most common reasons for consultation were musculoskeletal, respiratory, cardiovascular, skin and reproductive problems. Younger adults (25–44) were more likely to be seen for respiratory problems, and middle aged adults (45–64) for musculoskeletal problems. At least 10 percent of consultations with women aged 15–44 were for reproductive conditions. Among older people (65 years and over) over 30 percent of consultations were for cardiovascular problems, mainly high blood pressure and ischaemic heart disease (IHD).

### By gender

Gender appears to be a less important determinant of rates of GP–patient encounters for treatment. Although women generally have higher rates of GP contact than men, the rates become quite similar when visits for preventive health checks (such as cervical smears), contraception and maternity care are excluded (Triggs et al 1995). However, women are more likely to consult a doctor for psychological problems (Ministry of Health 1997a).

### By ethnicity

In the WaiMedCa study the overall rate of contact with GPs for Māori was about 90 percent the rate for non-Māori (Davis et al 1997). The study also found that Pacific people made fewer GP visits per year than other groups and that they tended to delay going to the doctor for longer. In contrast, in the 1996–97 New Zealand Health Survey similar proportions of Māori and European/Others had visited a GP at least once in the preceding year, with Māori significantly more likely than Pacific and European/Other people to visit a GP six or more times in a year (Ministry of Health 1999d).

Although the precise reasons for these differences in GP use are hard to identify, on the whole the evidence suggests that Māori and Pacific people do not use GP services as often as their overall patterns of mortality and hospital use indicate is necessary (Davis et al 1997). Supporting this conclusion, the 1996–97 New Zealand Health Survey identified significant ethnic differences in the reporting of unmet health needs. Nineteen percent of Māori and 18 percent of Pacific people indicated unmet needs for GP services in the past year, compared with 11 percent of European/Others (Ministry of Health 1999d).

## Referrals for hospital treatment

Of the approximately 16 million GP–patient encounters occurring in a year,\* only a small proportion result in patients being referred for hospital treatment. In the WaiMedCa study, 9 percent of GP–patient encounters resulted in any type of referral, with one third of these referrals being to another health professional (mainly physiotherapists), one third to a private specialist and one third to a public hospital specialist (McAvoy et al 1994). Less than 1 percent of encounters resulted in a direct referral for patient admission to hospital. The most common individual disorders leading to hospital referral were angina, asthma, pre- and postnatal care, meningitis, appendicitis and dehydration. Altogether, these disorders accounted for one quarter of all GP initiated requests for hospital admission.

## Morbidity and hospital services

In the course of a year, approximately one quarter of the population uses some type of public or private hospital service. As well as GP referrals, a sizeable proportion of hospitalisations are initiated by public and private specialists.

The 1996–97 New Zealand Health Survey found that 26.6 percent of adults (aged 15 years or older) and 24.9 percent of children (aged 0–14) had used some type of public hospital service (inpatient, day patient, outpatient or emergency department) in the preceding 12 months; over that period 14.7 percent of adults and 10.9 percent of children had been admitted as an inpatient or day patient to a public or private hospital (Table 46). Females at all ages were more likely to be admitted to hospital than males. Hospitalisation rates increased steeply with age: in the 75 and over age group one quarter of respondents had been admitted to a public or private hospital over the previous 12 months.

**Table 46:** Use of hospital services in the previous 12 months, 1996–97

Hospital use	Adults (%)	Children (%)
Used any kind of public hospital service	26.6	24.9
Admitted to a public hospital (day or inpatient)	10.6	10.0
Used a public hospital outpatient department	13.0	9.9
Used a public hospital emergency department	10.9	13.3
Admitted to any kind of hospital (public or private)	14.7	10.9

Source of base data: 1996–97 NZHS

\* 4.2 per capita (all ages) in 1996–97 multiplied by the estimated usually resident population of 3.75 million.

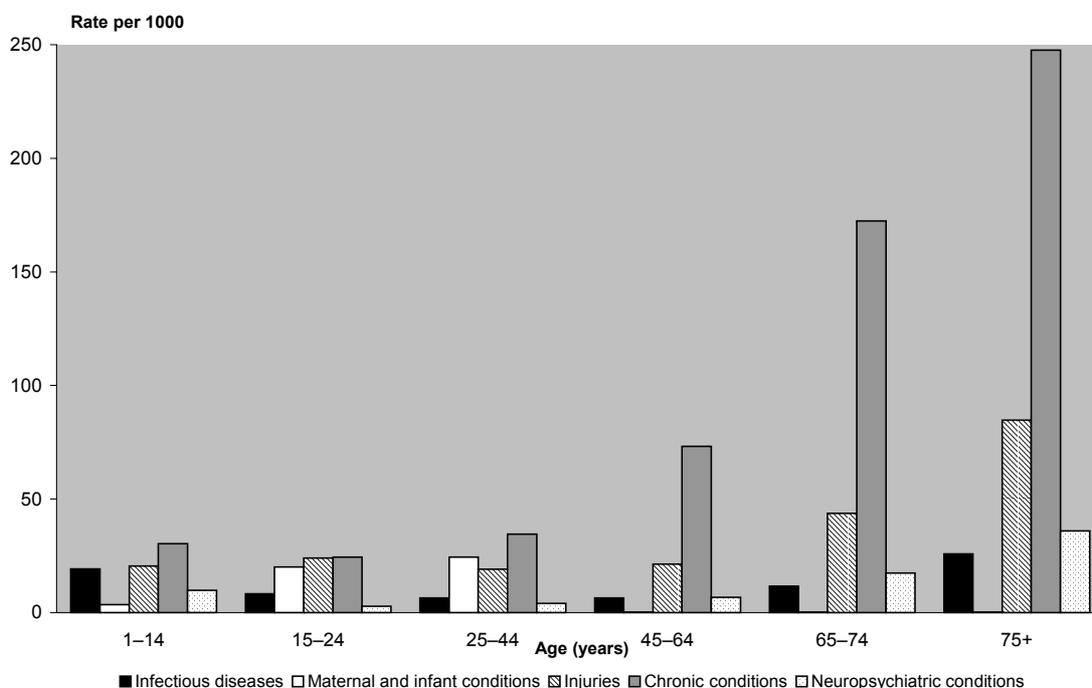
# The causes of hospitalisation

The many hundreds of different diseases and disorders treated in public hospitals can be grouped into five broad cause clusters:

- infectious diseases
- maternal and infant conditions (excluding normal pregnancy and birth care)
- injuries (intentional, unintentional, and adverse effects of medical treatment)
- chronic diseases
- neuropsychiatric conditions.

Figure 98 and Table 47 summarise the main individual diseases and injuries resulting in hospitalisation in 1997, grouped into these five clusters.

**Figure 98:** Main groups of disorders diagnosed in hospitals, by age, 1997



Source of base data: NZHIS

**Table 47:** Disorders diagnosed in hospitals, 1997

	Percentage of all public hospital day and inpatient discharges
<b>Infectious diseases</b>	<b>9.6</b>
<b>Maternal and infant conditions</b>	<b>12.3</b>
Complications of pregnancy, childbirth and the puerperium	6.6
Perinatal conditions	4.3
Congenital anomalies, chromosomal abnormalities, and hereditary disorders	1.4
<b>Injuries</b>	<b>19.2</b>
Unintentional injuries	12.8
Adverse effects	5.1
Intentional injuries	1.3
<b>Chronic diseases</b>	<b>45.3</b>
Cardiovascular diseases	11.0
Digestive diseases	7.4
Cancer (all sites)	6.6
Respiratory diseases	6.1
Disorders of the musculoskeletal system	4.4
Reproductive system diseases	3.9
Kidney diseases	1.8
Endocrine disorders (including diabetes)*	1.3
Dental disorders	1.2
Skin diseases	0.9
Diseases of the blood and lymphoid tissues	0.7
<b>Neuropsychiatric conditions**</b>	<b>6.1</b>
Vision disorders	2.2
Hearing and balance disorders	1.6
Neurological disorders	1.6
Organic brain syndromes	0.6
<b>Ill defined disorders</b>	<b>7.4</b>
<b>Total</b>	<b>100.0</b>

Source of base data: NZHIS

\* includes only hospitalisations with diabetes as a primary diagnosis (0.6 percent); hospitalisations with diabetes as a primary or secondary diagnosis accounted for 5.6 percent of all discharges

\*\* excludes admissions to psychiatric institutions other than hospitals

## Chronic diseases

In 1997, the largest proportion (45 percent) of public hospital day and inpatient discharges were for chronic diseases. The most common groups of chronic diseases treated were: cardiovascular diseases (including IHD and stroke (11 percent); digestive diseases (7.4 percent); cancers (6.6 percent); and respiratory diseases (6.1 percent).

Age was a key determinant of hospitalisation for chronic diseases. Between 58 and 66 percent of all hospitalisations in the 45–64, 65–74 and 75 or older age groups were for chronic diseases (Figure 98).

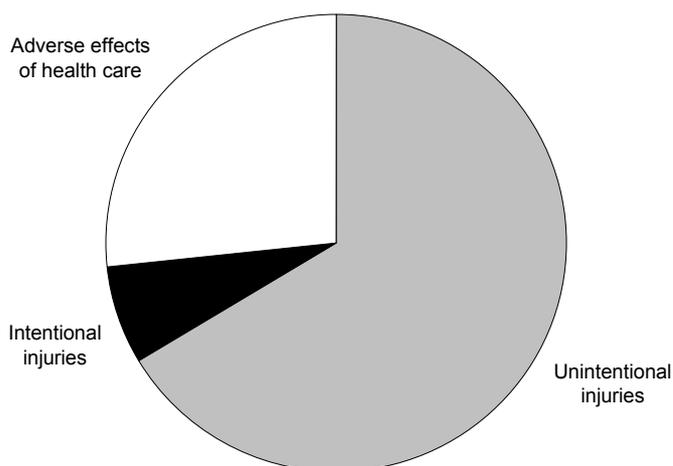
Cardiovascular disease is the most frequent chronic disease group leading to hospitalisation, with 11 percent of public hospital admissions in 1997 being for stroke (see Box 16), IHD (see Box 15) or other kinds of cardiovascular disease. Diabetes (see Box 17) is a related major cause of hospitalisation, accounting for approximately 6 percent of hospitalisations in 1997, if admissions with diabetes as a secondary as well as a primary diagnosis are included. Chronic lung diseases, including chronic obstructive respiratory disease (CORD) and asthma (see Box 18), are also important causes of hospitalisation, as are digestive (including hepatic) and neuropsychiatric disorders; each of these three cause groups accounts for over 6 percent of total hospitalisations.

At various stages of their course, cancers – especially lung cancer, colorectal cancer, breast cancer, prostate cancer, and leukaemias and lymphomas – are important causes of hospitalisation as well as death; in total, cancers account for 6.6 percent of hospitalisations (see Box 19).

## Injuries

Injury was the second most common reason for hospitalisation in 1997, making up 19 percent of all inpatient and day patient discharges (Table 47). Two thirds of these were for unintentional injuries (see Box 21), over one quarter were for the adverse effects of surgery or other medical procedures, and the rest were intentional injuries (Figure 99).

**Figure 99:** Main groups of injuries leading to hospitalisation, 1997



Source of base data: NZHIS

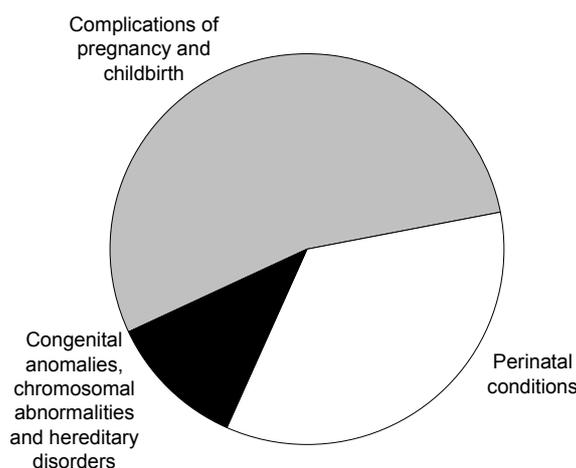
Intentional injuries caused approximately 7 percent of all injury related hospitalisations in 1997; about half were the result of attempted suicide or other forms of self harm, with the remainder sustained as the result of assaults or other forms of physical violence. The highest rates of hospitalisation for attempted suicide and self harm were in the 15–24 age group, with the equivalent of 2 in every 1000 young people hospitalised for this reason per year. The highest rates of hospitalisation for assault were also in this age group, with about 3 in every 1000 people hospitalised. Males were more likely than females to be hospitalised for injuries sustained as a result of assault; females were more likely to be hospitalised for self inflicted injuries (in contrast with the much higher male rate of completed suicide).

Adverse effects or complications of surgery and other forms of medical care led to 27 percent of all injury related hospitalisations in 1997. This amounted to a total of 25,288 hospitalisations and indicates the extent of adverse health outcomes resulting from health care. Older people are most likely to have co-morbidities and respond adversely to medical and surgical interventions: the highest rates of hospitalisation for adverse effects were in the 65–74 and 75 and older age groups.

## Maternal and infant conditions

In 1997, 12 percent of hospitalisations were for the treatment of maternal and infant conditions, excluding hospitalisations for normal births (Figure 100). Over half of these were for complications of pregnancy and childbirth, and a further third were for treatment of perinatal conditions such as premature birth and intrauterine growth retardation (low birth weight). The remainder were for birth defects (congenital anomalies), chromosomal abnormalities and hereditary disorders.

**Figure 100:** Main groups of maternal and infant conditions leading to hospitalisation, 1997



Source of base data: NZHIS

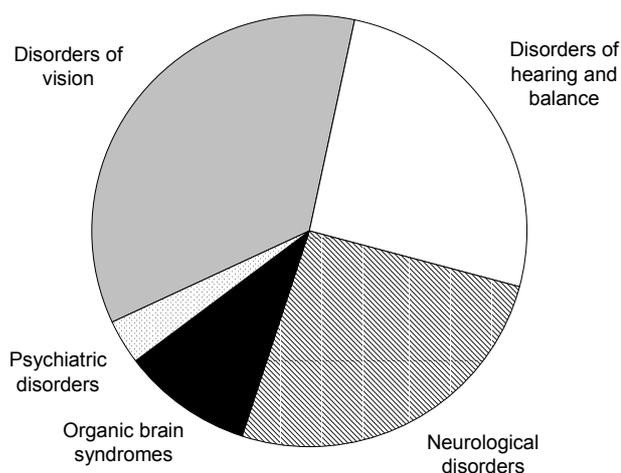
## Infectious diseases

Almost 10 percent of hospitalisations were for infectious diseases, nearly half of which were for upper respiratory and lower respiratory tract infections. Children under one year of age had the highest age specific rate of hospitalisation for infectious disease, with the next highest rate being in the 75 and older age group.

## Neuropsychiatric conditions

Neuropsychiatric conditions made up 6.1 percent of public hospital day and inpatient discharges, with over 85 percent of these being for treatment of disorders of vision, hearing and balance, and neurological disorders (Figure 101). Psychiatric disorders and organic brain disorders made up 13 percent of hospitalisations in this cause group, although admissions to psychiatric institutions are not included in these figures (see Box 20). People in the 65–74 and 75 and older age groups had the highest rates of hospitalisation for neuropsychiatric conditions.

**Figure 101:** Main groups of neuropsychiatric conditions leading to hospitalisation, 1997



Source of base data: NZHIS

## Ethnicity and the causal pattern of hospitalisation

Table 48 shows the relative risk of hospitalisation in 1997 for Māori and Pacific people compared with European/Others, disaggregated by major cause group.

**Table 48:** Relative risk of hospitalisation for Māori and Pacific people compared with European/Others, by cause, adjusted for age, 1997

Cause of hospitalisation	Māori		Pacific	
	Female	Male	Female	Male
<b>Infectious diseases</b>	<b>1.4</b>	<b>1.4</b>	<b>2.0</b>	<b>2.0</b>
<b>Maternal and infant conditions</b>	<b>1.0</b>	<b>0.7</b>	<b>1.4</b>	<b>0.9</b>
Complications of pregnancy, childbirth and the puerperium	1.2		1.7	
Perinatal conditions	0.8	0.7	1.2	1.1
Congenital anomalies, chromosomal abnormalities and hereditary disorders	0.6	0.6	0.8	0.7
<b>Injuries</b>	<b>1.1</b>	<b>1.1</b>	<b>0.9</b>	<b>1.0</b>
Unintentional injuries	1.0	1.0	0.8	1.0
Intentional injuries	1.3	1.4	0.7	1.1
Adverse effect or complication of medical or surgical treatment	1.2	1.1	1.1	1.0
<b>Chronic diseases</b>	<b>1.3</b>	<b>1.1</b>	<b>1.1</b>	<b>1.1</b>
Cancers	1.1	0.9	0.9	0.8
Endocrine disorders	2.5	2.2	2.9	2.7
Cardiovascular diseases	1.6	1.1	1.4	1.0
Respiratory diseases	1.6	1.4	1.3	1.6
Digestive diseases	1.0	1.0	0.8	1.0
Diseases of the blood and lymphoid organs	1.0	1.1	1.3	0.7
Diseases of the kidney and urinary tract	1.4	1.1	1.5	1.3
Diseases of the male and female reproductive systems	1.1	0.8	0.8	0.7
Disorders of the musculoskeletal system	0.8	0.9	0.7	0.7
Diseases of the skin	1.1	1.1	1.1	1.0
Dental disorders	1.0	1.0	1.1	1.2

**Table 48 continued**

Cause of hospitalisation	Māori		Pacific	
	Female	Male	Female	Male
<b>Neuropsychiatric conditions</b>	<b>1.2</b>	<b>1.2</b>	<b>1.0</b>	<b>1.0</b>
Disorders of vision	1.3	1.4	2.0	1.6
Disorders of hearing and balance	1.3	1.2	0.9	0.8
Neurological disorders	1.0	0.9	0.5	0.8
Organic brain syndromes	1.0	0.9	0.2	0.4
Psychiatric disorders	0.9	1.0	0.6	0.3
<b>Ill defined</b>	<b>1.1</b>	<b>1.0</b>	<b>1.1</b>	<b>1.1</b>
<b>All disorders</b>	<b>1.2</b>	<b>1.1</b>	<b>1.2</b>	<b>1.2</b>

Source of base data: NZHIS

Note: relative risks are ratios of age standardised hospitalisation rates.

Of the five major cause groups, Māori and Pacific people had the highest relative risk of hospitalisation for infectious diseases; indeed, Pacific people were twice as likely as Europeans/Others to be hospitalised for this cause. For injuries, Māori had a slightly higher overall rate of hospitalisation compared with European/Others, with higher rates of hospitalisation for sports injuries, road traffic injuries, adverse effects of medical treatment and intentional injuries. For chronic diseases, Māori females had the highest relative risk of hospitalisation, mainly because of their comparatively high rates of hospitalisation for cardiovascular diseases (especially IHD, heart failure and stroke), respiratory diseases (especially CORD and asthma) and endocrine disorders (such as diabetes). Māori and Pacific people were hospitalised for diabetes at approximately three times the rate of European/Others. Many of these causes of hospitalisation are potentially avoidable (see Chapter 10).

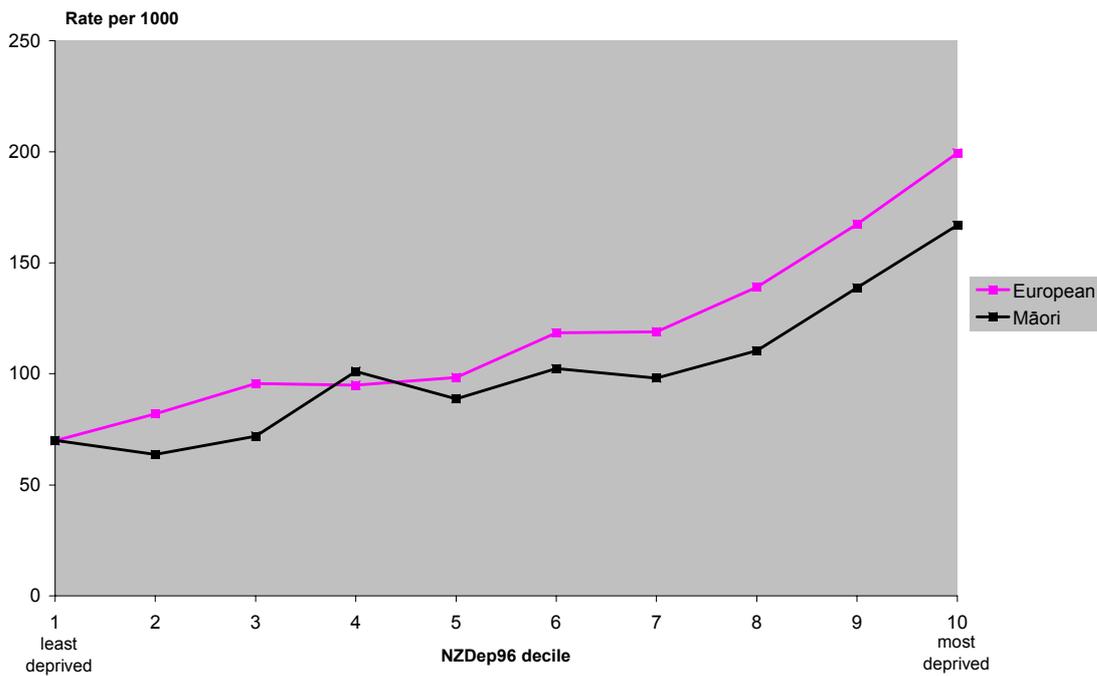
Overall, however, Māori and Pacific people were only 10 to 20 percent more likely to be hospitalised than European/Others (adjusted for age). It is important to note that these estimates are not adjusted for the different socioeconomic distributions of the three ethnic groups.

## Hospitalisation and socioeconomic status

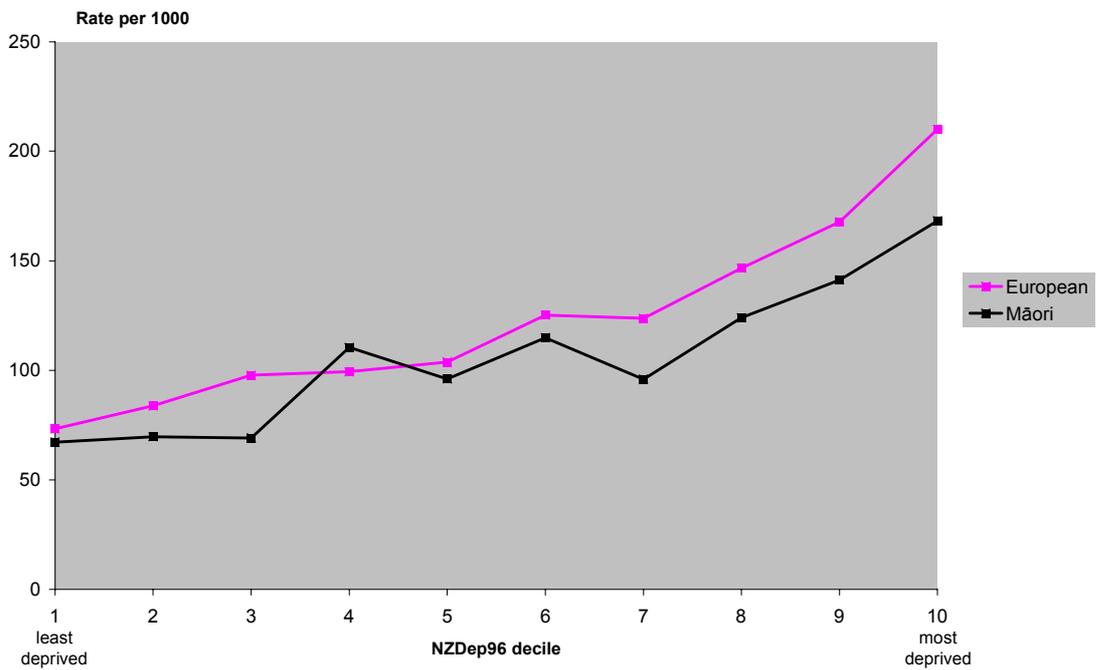
Figures 102a and 102b show that people living in more deprived areas have higher rates of hospitalisation than those living in less deprived areas. This relationship applies not only to a minority of people living in the most deprived areas, but holds across the whole population – the gradient is more or less linear across all NZDep96 deciles. Furthermore, the relationship holds for both genders and both Māori and non-Māori ethnic groups. Indeed, once stratified for socioeconomic status, it can be seen that Māori hospitalisation rates (age standardised) are similar to or *lower* than those of non-Māori for most deprivation strata.

It should be noted that the higher rate of utilisation of hospital in- and day-patient services by more deprived socioeconomic groups may be less than proportionate to their greater need for health care services. People living in more deprived areas may still experience greater barriers to access to health services than their more advantaged counterparts.

**Figure 102a:** Hospitalisations of males, by NZDep96 decile and ethnicity, 1996–97



**Figure 102b:** Hospitalisations of females, by NZDep96 decile and ethnicity, 1996–97



Source of base data: NZHIS

Note: rates are age standardised to Segi's world population.

## Trends in hospitalisation rates

Over the 10 years from 1988 to 1997 chronic diseases were the leading group of disorders causing inpatient and day patient hospitalisations for both males and females (Table 49). For males, the second leading group of disorders was injuries, whereas for females it was maternal and infant conditions (especially complications of pregnancy and childbirth).

**Table 49:** Hospitalisations in 1988 and 1997, by cause group and gender

Cause of hospitalisation	Male			Female		
	1988 rate	1997 rate	Percentage change	1988 rate	1997 rate	Percentage change
Infectious diseases	10	15	49	10	14	49
Maternal and infant conditions	6	10	67	17	27	57
Injuries	21	28	36	12	19	53
Chronic diseases	50	53	5	47	50	7
Neuropsychiatric conditions	6	8	41	5	7	52
Ill defined	7	9	30	7	10	33
All disorders	99	123	24	98	127	30

Source of base data: NZHIS

Note: rate per 1000 age standardised to Segi's world population.

From 1988 to 1997 age standardised rates of hospitalisation for all causes combined *increased* – by approximately 24 percent for males and 30 percent for females. Substantial increases occurred in the rates of hospitalisation for all cause groups except chronic diseases. These trends cannot be interpreted as evidence for an increase in the incidence or severity of any of these diseases or injuries; such evidence can only be derived from population-based epidemiological studies.

Instead, increases in hospitalisation rates may reflect an increasing prevalence of health conditions as a result of falling case fatality rates – an unanticipated consequence of improved health care technology and service delivery. Alternatively (or in addition), this trend could result from changes in referral patterns (partly reflecting new health care technologies, but also changes in availability and acceptability of hospital care, and changing incentives and practice patterns in primary care).

Changes in readmission rates, in the completeness of inclusion of day patients as admissions, and in coding practices resulting from adoption of the Australian version of the International Classification of Diseases (Clinical Modification) (ICD 9 CM A) and Australian coding standards in July 1995, may also have affected the apparent trends.

## Major causes of morbidity

Selected major causes of morbidity are described in more detail in a series of eight boxes: ischaemic heart disease (Box 15), stroke (Box 16), diabetes (Box 17), asthma (Box 18), cancer (Box 19), mental illness (Box 20), unintentional injury (Box 21), and falls in older people (Box 22).

## Box 15: Ischaemic heart disease (coronary heart disease)

The Auckland Regional Coronary or Stroke Study (ARCOS) involved 10 years of continuous surveillance of fatal and non-fatal ischaemic heart disease (IHD) events in the Auckland region between 1984 and 1993, providing the most reliable data on the incidence of IHD related events in a New Zealand population (Beaglehole et al 1997).\* As well, the study included three independent risk factor surveys of the adult Auckland population at five yearly intervals, allowing associations between various behavioural and physiological variables and IHD event rates to be investigated.

### Incidence\*\*

In 1993, the last surveillance year, men aged 35–64 years had an age standardised rate of IHD events (mainly heart attacks) of 345 per 100,000; in other words, approximately a 10 percent probability of experiencing an IHD event by the age of 64 (Table 50). Half the male IHD events were non-fatal, 41 percent resulted in death before reaching hospital, and 7 percent resulted in death after reaching hospital. Women aged 35–64 had an IHD event rate of 92 per 100,000 – almost one quarter the male rate, although women were more likely to die following an IHD event.

**Table 50:** Ischaemic heart disease events in people aged 35–64, Auckland region, by gender, 1984 and 1993

Rate	Male		Female	
	1984	1993	1984	1993
Non-fatal events	249	180	61	44
Coronary deaths before hospitalisation	188	141	43	36
Coronary deaths after hospitalisation	57	24	22	12

Source: Beaglehole et al 1997

Note: rate per 100,000 is age standardised to Segi's world population.

IHD event rates declined dramatically over the period 1984–1993, with decreases occurring in both fatal and non-fatal events. In the ARCOS study, rates of non-fatal IHD events declined by 3 percent per year on average over this period for both males and females. Rates of fatal IHD events before and after hospitalisation decreased by 3 percent and 9 percent respectively. These trends are consistent with improvements in medical treatment and reductions in major risk factor prevalences over this period (smoking, high blood pressure and blood cholesterol all declined while other risk factors did not). Since most deaths occur before the patient reaches hospital, the major contributor to the mortality reduction has probably been the fall in incidence.

### Hospitalisations

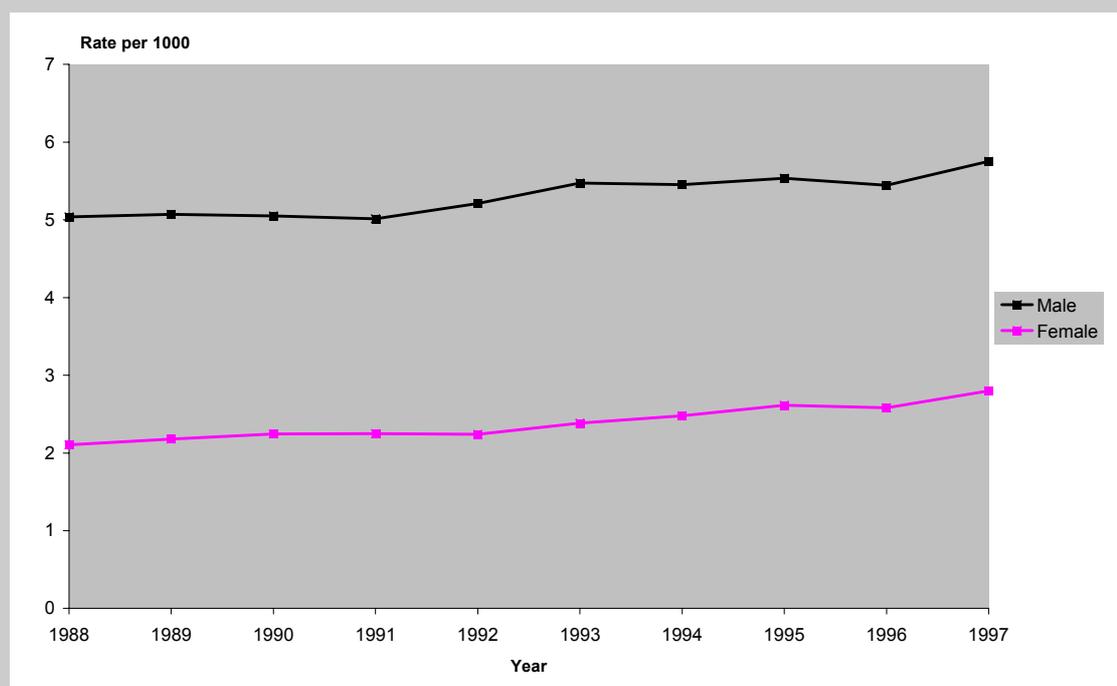
In 1997 just over 4 percent of day and inpatient hospitalisations were for treatment of IHD, which accounted for 40 percent of all hospitalisations for cardiovascular disease. The rate of hospitalisation for IHD begins to increase exponentially from age 45 onwards, with the highest rate being in the 75 and over group (33 per 1000).

\* The study is linked to the World Health Organization's Multinational Monitoring of Trends and Determinants in Cardiovascular Disease (MONICA) Project.

\*\* more precisely, first IHD event rate

From 1988 to 1997 rates of hospitalisation for IHD steadily *increased* for males (from 5.0 per 1000 to 5.8 per 1000) and females (from 2.1 per 1000 to 2.8 per 1000) (Figure 103). This increase occurred despite the steady decline in the incidence of IHD events identified in the ARCOS study. As well as changes in patterns of care (such as increasing rates of hospitalisation for less severe forms of IHD) and developments in health care technology (for example, new revascularisation procedures), this rising trend in IHD hospitalisation could reflect a rising *prevalence* of IHD in the community – the result of an even more rapid decline in the case fatality of IHD than in its incidence.

**Figure 103:** Hospitalisations for ischaemic heart disease, by gender, 1988–97

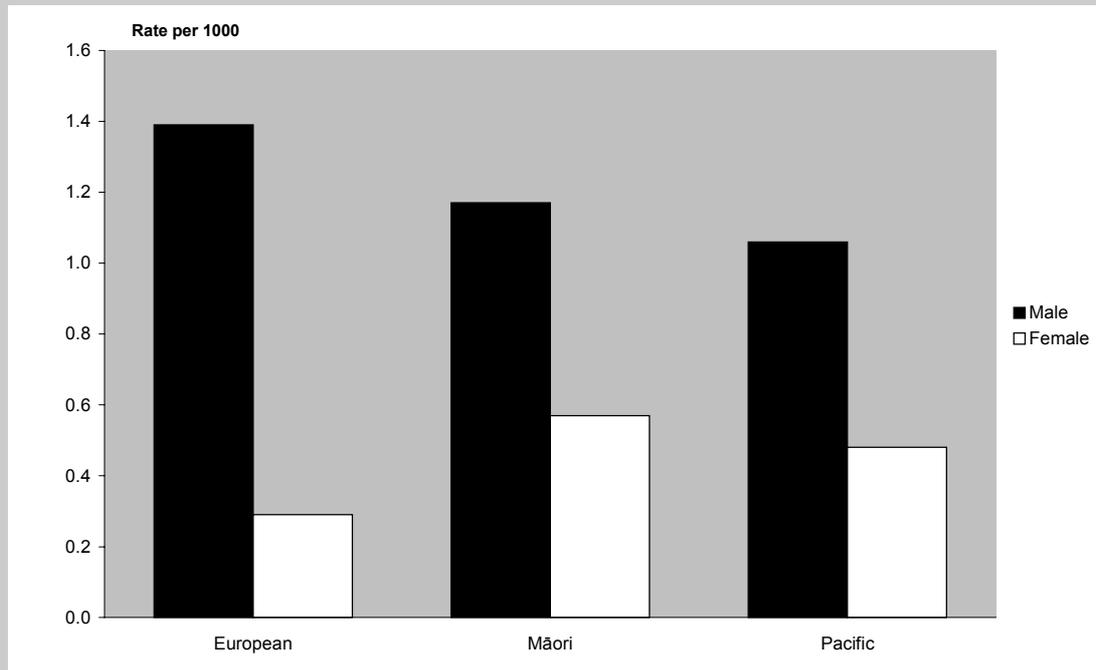


Source of base data: NZHIS

Note: rate is age standardised to Segi's world population.

Although Māori and Pacific people are more likely to die from IHD than European/Others, data from the ARCOS study indicate that rates of hospitalisation for non-fatal myocardial infarctions among people aged 35–64 are not significantly different for any ethnic group (Figure 104). Indeed, Māori and Pacific people in these age groups may now be more likely to obtain hospital treatment for non-fatal IHD events than was the case in the past, indicating improved access to secondary health care services (Bell et al 1996).

**Figure 104:** Hospitalisations for non-fatal myocardial infarction in people aged 35–64, Auckland region, by gender and ethnicity, 1990–92



Source: Bell et al 1996

Note: rate is age standardised to Segi's world population.

### Disability associated with ischaemic heart disease

Incidence and hospitalisation data provide only a partial indication of the degree of disability associated with IHD, as they give little idea of the prevalence of long term IHD-related disability in the community. In the 1995 Australian National Health Survey, 21 percent of men and 11 percent of women aged 65–74 reported having heart disease or having had a stroke. Other Australian studies indicate that 8 percent of people aged 65 and over have a primary disability caused by cardiovascular disease, accounting for approximately one fifth of all disability in the older age group (AIHW 1998).

### Box 16: Stroke

As well as causing 9 percent of all deaths in New Zealand (the second ranked cause of death at the individual disease level, after IHD), stroke is a major cause of severe disability in adults, especially older people.

#### Stroke rates

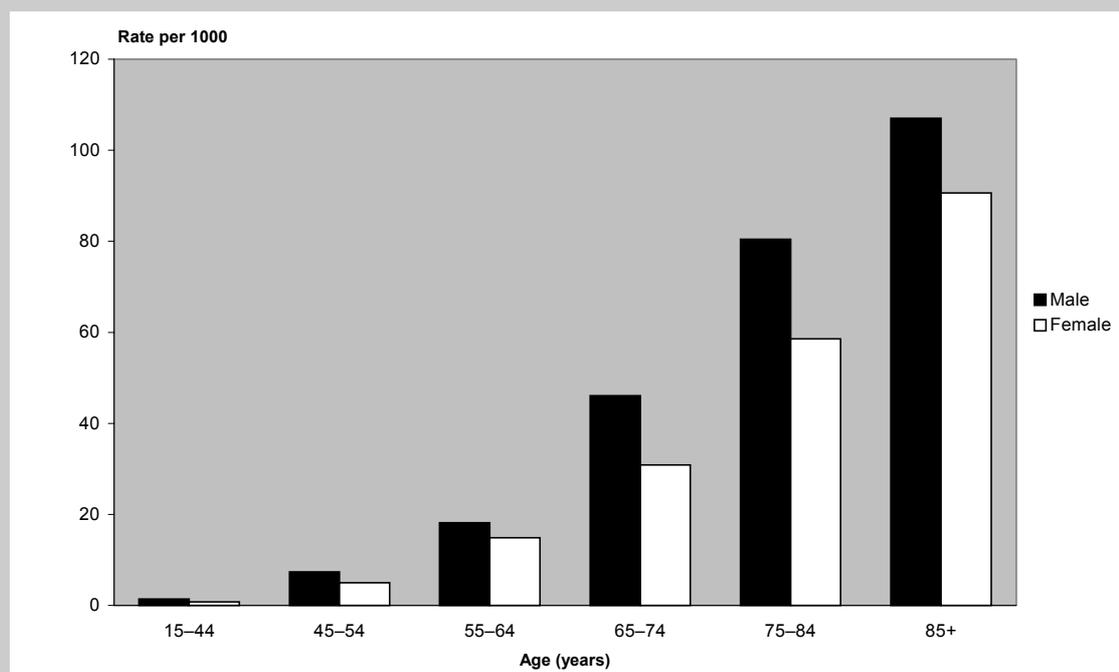
The ARCOS study documented the incidence, prevalence, case fatality, outcomes and management of strokes among all residents of the Auckland region at two points in time: 1981–82 and 1991–92. As well as tracing stroke events through public hospital admission lists, death certificates, autopsy reports and GP records, ARCOS followed up stroke survivors to track their long term health outcomes (Bonita et al 1993; Bonita et al 1994; Bonita and Solomon et al 1997).

In 1991–92, the age standardised incidence rate of stroke in the Auckland population was 148 per 100,000 for males and 124 per 100,000 for females. After age 45, the lifetime risk of having a stroke was one in four for males and one in five for females. Approximately 75 percent of all first stroke events occurred in people aged 65 and older, and 50 percent in people aged 75 years or older. Māori and Pacific people had higher stroke incidence rates and higher case fatality rates than other ethnic groups (Bonita and Broad et al 1997).

Stroke incidence rates did not change significantly in the ARCOS study population in the 10 years to 1991–92, although survival rates improved significantly. In 1991–92, 21 percent of first strokes in males resulted in death within one month of the stroke event, down from 27 percent in 1981–82. Improvements in survival were even greater for females over this period, with 25 percent of first strokes resulting in death within a month in 1991–92 compared with 38 percent in 1981–82. These reductions in stroke mortality may reflect reductions in the severity of stroke, or improvements in acute stroke care, or both (Bonita et al 1997).

The ARCOS study estimated that approximately 8 in every 1000 people living in Auckland in 1991 had experienced at least one episode of stroke in their lifetime (an age standardised rate of 833 per 100,000). In the 65–74 age group, 37 in every 1000 people had a history of stroke, rising to 95 in every 1000 in those aged 85 and over. In all age groups, lifetime stroke prevalence rates were higher among males than females (Figure 105).

**Figure 105:** Stroke prevalence, Auckland region, by age and gender, 1991–92



Source: Bonita and Solomon 1997

## Hospitalisations for stroke

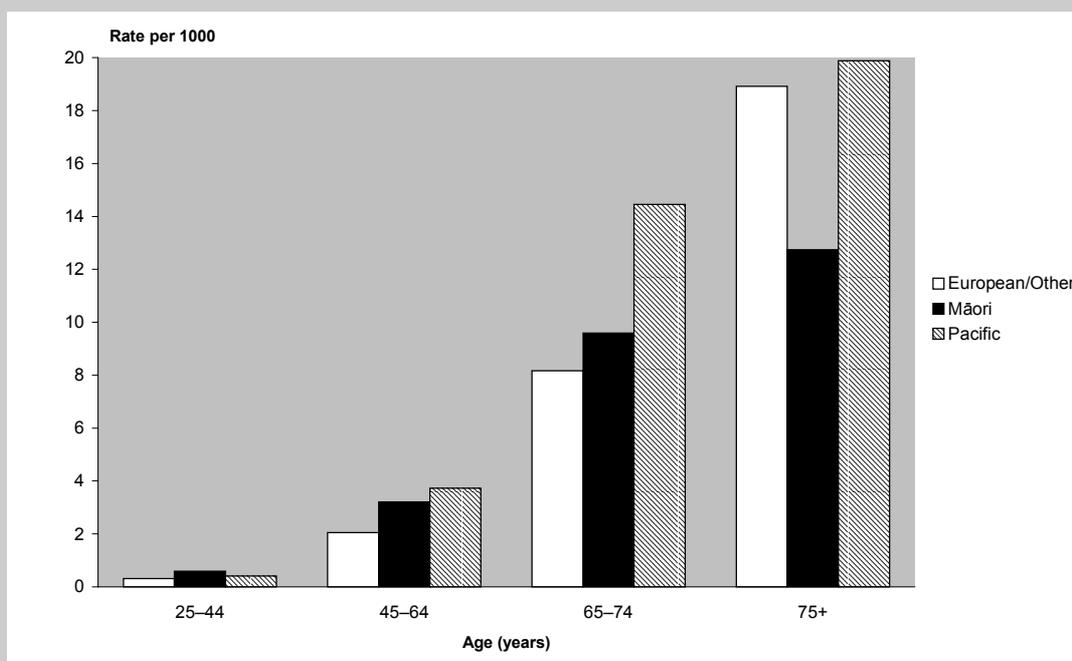
Stroke hospitalisation data do not accurately reflect the incidence rates estimated from the ARCOS study, for a number of reasons.

- A small and changing proportion of people with stroke die before admission to hospital (about 6 percent).
- A substantial but declining proportion of people with stroke are not referred or refuse admission to hospital (estimated at 24–28 percent in 1990–91).
- Hospital statistics do not fully differentiate between acute stroke admissions and transfers between hospitals for rehabilitation.
- The clinical diagnosis of stroke is not always supported by appropriate scans: in the 1990–91 study, only 65 percent of hospital admissions for stroke met the ARCOS criteria for definite stroke.

According to 1997 hospitalisation data, strokes were responsible for about 12 percent of all day- and inpatient public hospital discharges for cardiovascular disease, corresponding to 1–2 percent of all day- and inpatient hospitalisations. In keeping with the findings from the Auckland stroke studies, hospitalisations for stroke were much more common in the post 45 age groups, with those aged 75 and over having the highest rate at 19 per 1000.

Compared with European/Others, Māori had higher rates of hospitalisation for stroke in the 45–64 and 65–74 year age groups, but lower rates in the 75 and older age group (Figure 106). Pacific people had the highest rates of hospitalisation for stroke in all three of the older age groups, including a stroke hospitalisation rate in the 65–74 age group close to double that of European/Others. These ethnic differences in stroke hospitalisation probably reflect higher prevalence, or poorer control, of risk factors such as high blood pressure and diabetes.

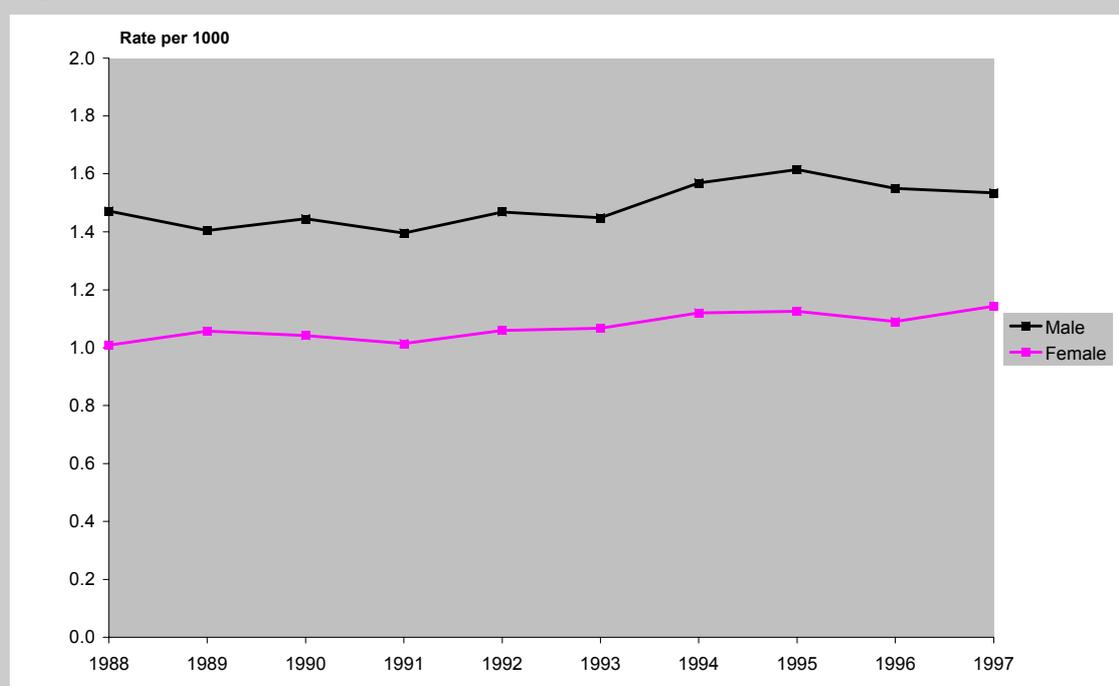
**Figure 106:** Hospitalisations for stroke, by age and ethnicity, 1997



Source of base data: NZHIS

Hospitalisation rates for stroke have increased slightly for both males and females over the past decade (Figure 107). This probably reflects the availability of better care, with a higher proportion of patients with first ever or recurrent stroke being hospitalised in order to receive the benefits of expert inpatient acute stroke care. Even so, at least 20 percent of patients with stroke are not admitted to hospital but are cared for at home or in an institution (Bonita et al 1993). The male hospitalisation rate has remained about 40 percent higher than the female rate throughout this period.

**Figure 107:** Hospitalisations for stroke, by gender, 1988–97



Source of base data: NZHIS

Note: rate is age standardised to Segi's world population.

### Disability associated with stroke

The 1991–92 ARCOS study estimated that approximately 50 percent of stroke survivors recover, without needing assistance for a residual disability, within 12–18 months (and mostly within the first six months). Approximately 30 percent are left with disability needing non-daily assistance, and about 20 percent need daily assistance with at least one activity of daily living (washing, dressing, bathing, feeding, transferring, toileting) (Bonita and Solomon et al 1997). Women are more likely to experience incomplete recovery because they tend to be older than men when they first have a stroke.

When the ARCOS rates are applied to the estimates of the disabled population from the 1996–97 New Zealand Disability Surveys, stroke can be estimated to account for approximately 5 percent of the burden of severe disability and 3 percent of the burden of all dependent disability in the adult population. This estimate confirms stroke as a major cause of severe disability, especially if adjusted for the range and severity of the functional limitations involved. As a result, stroke makes considerable demands on the health and disability support services and on families and communities.

The major stroke related disabilities are difficulties with speech, communication and swallowing; cognitive impairment; secondary depression or other psychological disturbances; weakness or paralysis of one or more limbs; incontinence, and difficulties with sexual functioning. The devastating consequences on mobility, activities of daily living and role fulfilment reflect the multiplicity of disabilities involved. The impact on family and other informal carers can also be severe.

### **Box 17: Diabetes**

There are two main types of diabetes. Type 1 diabetes usually arises during childhood and is caused by the auto-immune destruction of insulin producing cells. Type 2 diabetes is characterised by insulin resistance and a relative deficit in insulin secretion; it most commonly occurs in people over 40 years of age and makes up about 85–90 percent of all diabetes in New Zealand. Obesity and physical inactivity are major risk factors for type 2 diabetes; genetic susceptibility is also important.

#### **Diabetes in the population**

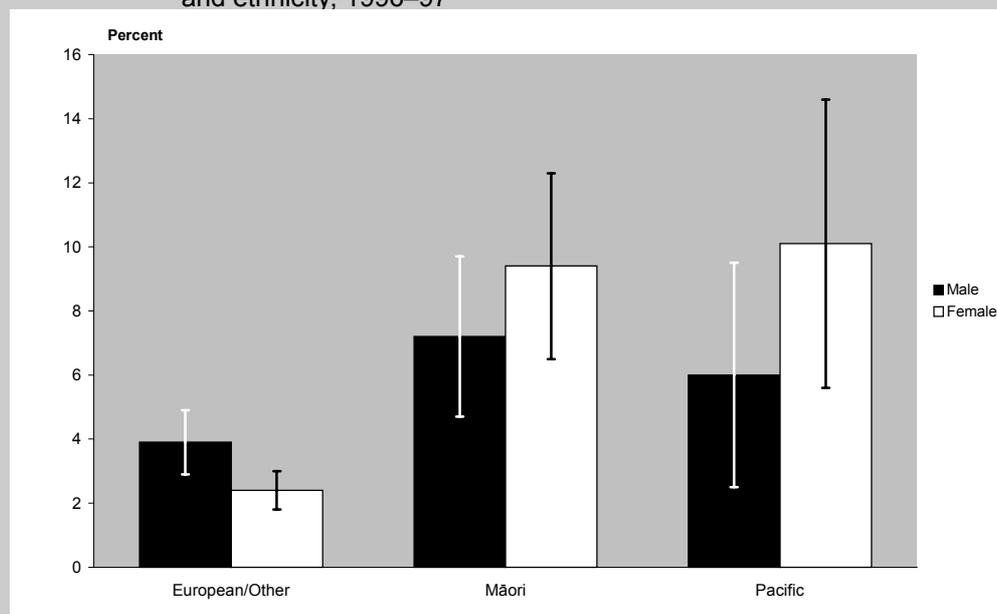
In the 1996–97 New Zealand Health Survey, 3.7 percent of people aged 15 years or over reported having been diagnosed with either type 1 or type 2 diabetes (Ministry of Health 1999d). Diabetes was more prevalent in the older age groups: 11 percent of people in the 75 and older age group had been diagnosed with diabetes. People living in more deprived areas and those with lower incomes were more likely to have the disease. Prevalence rates for diagnosed diabetes were higher than in earlier New Zealand studies, which is in keeping with the international evidence that diabetes is increasing in prevalence worldwide (Simmons 1996b).

It is estimated that one third to one half of all diabetes in the community remains undiagnosed (Ministry of Health 1999d), so the actual prevalence of diabetes is likely to be markedly higher than the rates of diagnosed diabetes found in the New Zealand Health Survey.

#### **Ethnic differences**

In line with previous New Zealand studies (Simmons 1996b), Māori and Pacific respondents to the New Zealand Health Survey were more than twice as likely as European/Others to report a diagnosis of diabetes – 8.3 percent, 8.1 percent and 3.1 percent respectively (Figure 108). Māori and Pacific people were also diagnosed with diabetes at younger ages than European/Others, with the median age of diabetes diagnosis for Māori and Pacific people being 43 years and 47 years respectively, compared with 55 years for Europeans/ Others.

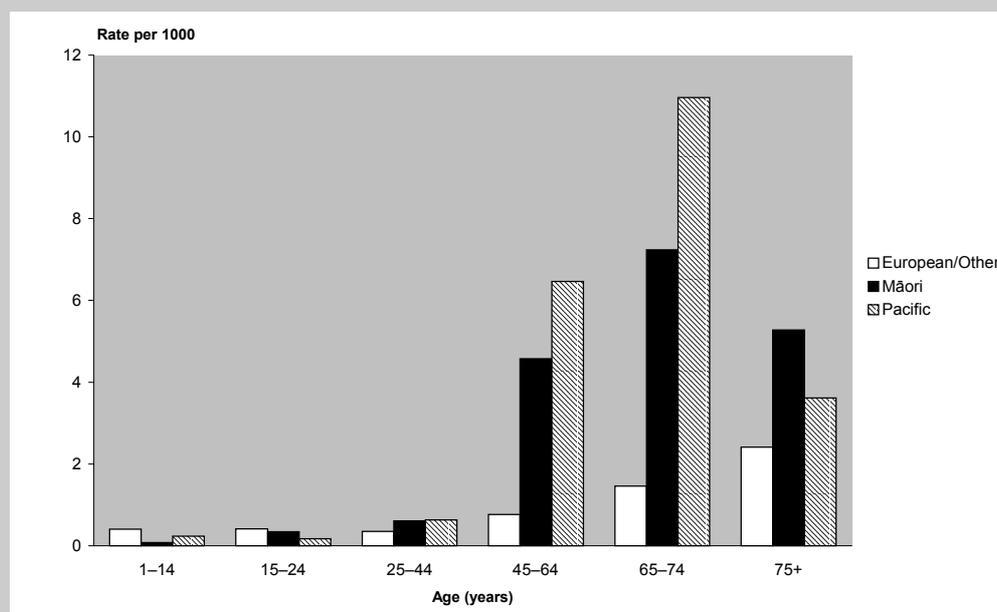
**Figure 108:** Prevalence of diagnosed diabetes in people aged 15 years and over, by gender and ethnicity, 1996–97



Source of base data: NZHS 1996–97  
 Note: error bars indicate 95 percent confidence intervals.

Reflecting the higher prevalence and earlier onset of diabetes among Māori and Pacific people, diabetes (primary cause) hospitalisation rates for Māori males and females in 1997 were about three times higher than for European/Other males and females. Pacific males were over three times more likely to be hospitalised for diabetes than European/Other males; the hospitalisation rate for Pacific females was five times higher than that for European/Other females (Figure 109).

**Figure 109:** Hospitalisations for diabetes (primary cause), by age and ethnicity, 1997



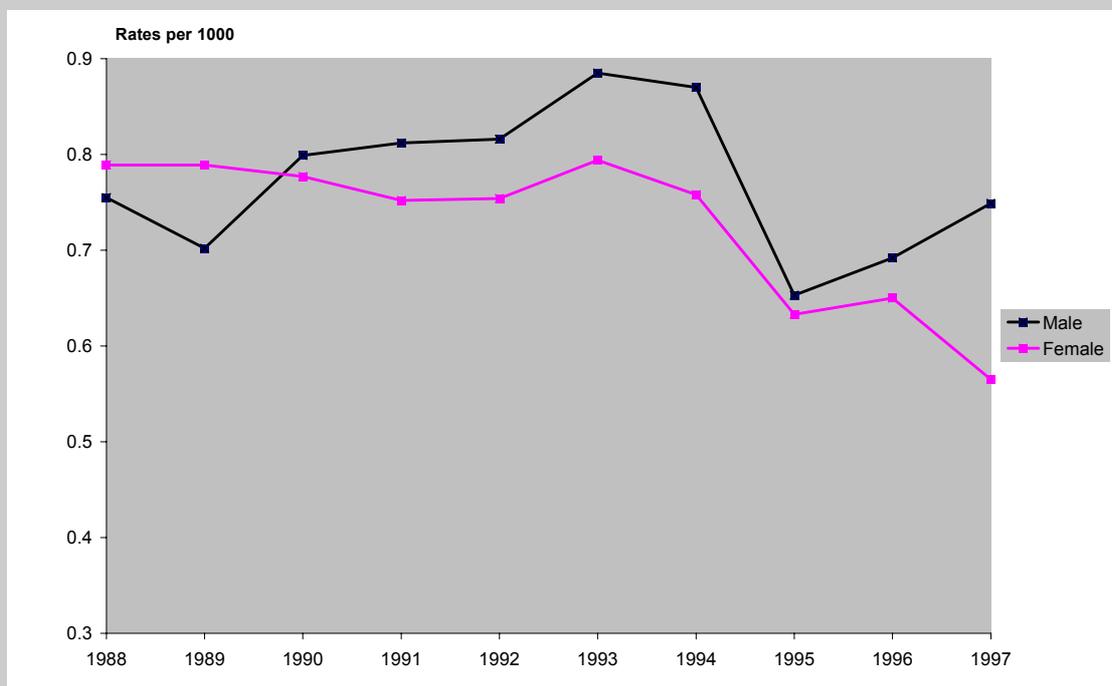
Source of base data: NZHS

**Trends in diabetes (primary cause) hospitalisations**

Rates of day and inpatient hospital admissions for diabetes (primary cause) declined overall for females between 1988 and 1997. They increased for males up to 1994, then declined

(Figure 110). A wide range of factors may have contributed to the recent reduction, including improved care in the community, and it will be interesting to see if this trend continues in the face of rising diabetes prevalence.

**Figure 110:** Hospitalisations for diabetes (primary cause), by gender, 1988–97



Source of base data: NZHIS

Note: rate is age standardised to Segi's world population; broken axis.

Hospitalisations for diabetes as the primary diagnosis account for only about 10 percent of all diabetes-related hospitalisations. In 1997, there were 30,733 discharges for diabetes as the primary or secondary diagnosis, 5.6 percent of the 551,980 discharges in that year (Ministry of Health filtered dataset). Even this may under-estimate the burden of diabetes-related hospitalisations, due to incomplete recording of diabetes as a secondary diagnosis.

### Disability associated with diabetes

As well as causing an estimated 1200 deaths per year (Tobias and Roberts 1999), diabetes is associated with important non-fatal health outcomes. These include heart disease, blindness, kidney failure, incontinence, sexual dysfunction, and lower limb amputation (resulting from diminished sensation in and blood supply to the feet). Together, these diabetic complications contribute significantly to the burden of disability experienced by people from middle age onwards, especially in the Māori and Pacific ethnic groups. Reflecting this, in the 1996–97 New Zealand Health Survey 33 percent of people with diabetes rated their health as 'fair' or 'poor' compared with only 11 percent of people without diabetes (Ministry of Health 1999d).

Increasing evidence now exists for the effectiveness of health promotion and health care in the prevention and management of diabetes, and new guidelines and models of care for diabetes are being actively developed and trialled in New Zealand (Simmons 1999).

### Box 18: Asthma

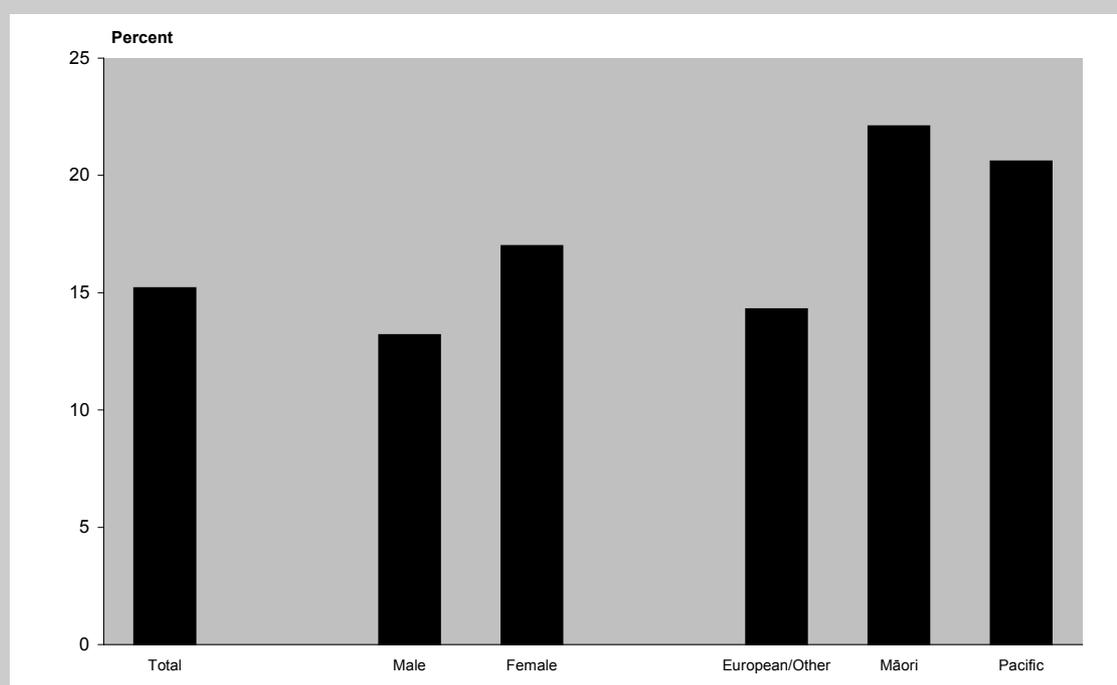
Asthma is characterised by reversible obstruction of the airways. Asthma attacks, in which people experience breathing difficulties and wheezing of varying severity, can occur without warning and may last several hours or even days.

### Asthma prevalence

Two large-scale national population studies of asthma prevalence have been undertaken in recent years. In 1991–93 over 25,000 people aged 20–44 participated in the New Zealand phase of the European Community Respiratory Health Survey (Lewis et al 1997). In 1996–97 the New Zealand Health Survey interviewed 7862 adults about their experience of asthma symptoms, with data on asthma prevalence reported for people aged 15–44 years (Ministry of Health 1999d). Prevalence rates for older people were not reported because the diagnosis of asthma is more difficult in these age groups, among whom similar respiratory symptoms may be caused by other conditions such as heart failure and chronic obstructive respiratory disease.

In the 1991–93 survey, the overall 12 month asthma prevalence rate was 15.2 percent, with higher rates for females, and Māori and Pacific people (Figure 111).

**Figure 111:** Asthma prevalence in people aged 20–44, by gender and ethnicity, 1991–93



Source of base data: Lewis et al 1997

Note: asthma is defined as 'woken by shortness of breath' or 'an attack of asthma in the past year' or 'current use of asthma medication'.

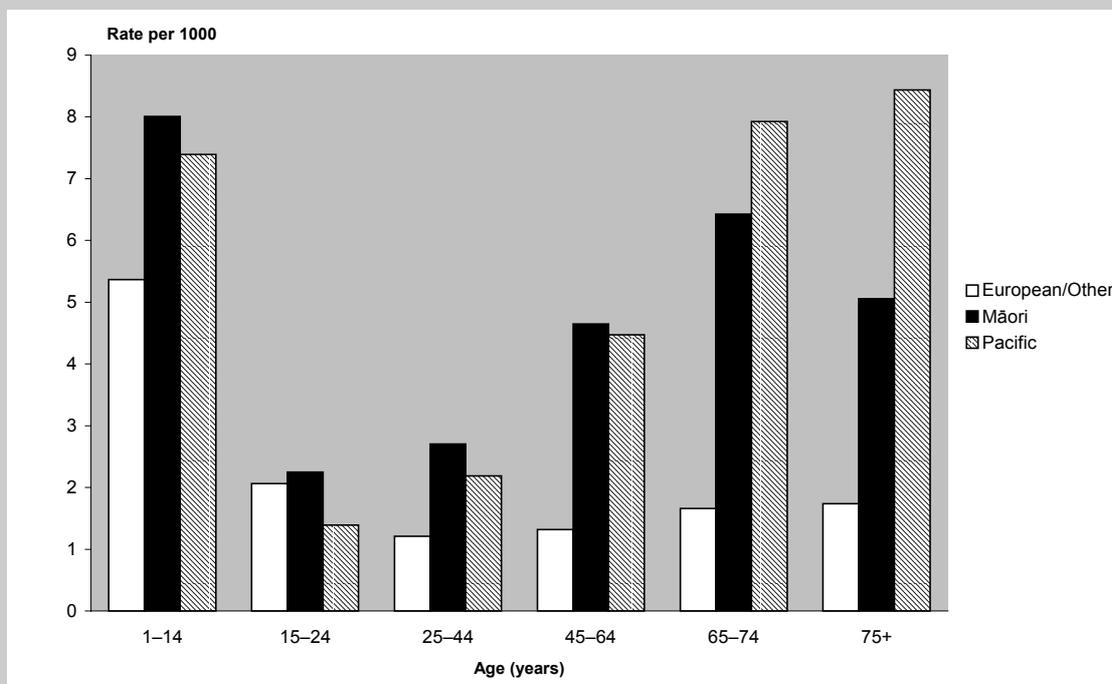
Similarly, 15.5 percent of people aged 15–44 in the 1996–97 survey had *probable asthma*, with higher rates in the younger age groups and among females (particularly Māori and European/Other females). Females were also more likely to have experienced an attack of asthma in the preceding year and to be on asthma medication. Why females are more likely to have asthma is unclear, although environmental, genetic and hormonal factors are all thought to be important.

There is now good evidence that the prevalence of asthma has been increasing over the past decade or longer, not only in New Zealand but throughout the industrialised world (Ministry of Health 1999d). Improved case finding and changes in diagnostic classification may partly explain this trend, but are not the only reasons: its explanation remains a topic of active research. It is possible that the trend may already have peaked, at least in some countries, and asthma incidence may be stabilising or even decreasing once again (Seaton 1999).

## Hospitalisations

In 1997, 6 percent of all hospitalisations were for respiratory diseases; of these, over one third were for asthma. Unlike many other chronic diseases, some of the highest asthma hospitalisation rates were in the younger age groups. Māori and Pacific people in the 45–64, 65–74 and 75 and older age groups also had comparatively high rates of asthma hospitalisation (Figure 112).

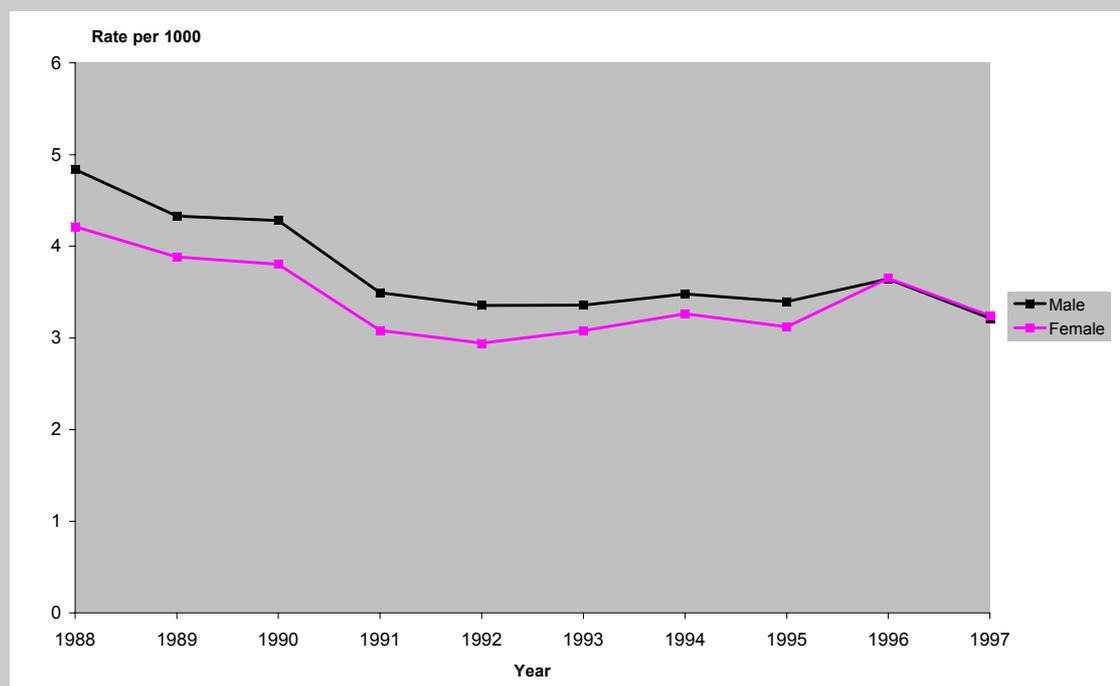
**Figure 112:** Hospitalisations for asthma, by age and ethnicity, 1997



Source of base data: NZHIS

This suggests that even though there has been an overall decline in asthma hospitalisation rates in the last 10 years (Figure 113), asthma management continues to be problematic for children and for Māori and Pacific adults. There is evidence, for example, that Māori may experience more severe, complicated and prolonged asthma than non-Māori, especially in older age groups (Crane et al 1994). Asthma is also more prevalent among people from low income families (Ministry of Health 1999d).

**Figure 113:** Hospitalisations for asthma, by gender, 1988–97



Source of base data: NZHIS

Note: rate is age standardised to Segi's world population.

### Disability associated with asthma

Although accurately measuring the disability related outcomes of asthma is difficult, it is likely that asthma contributes to a significant loss of quality of life for a sizeable minority of children and those in the 15–24 age group in particular, including days off school or work and restrictions in social activity and recreation. In the New Zealand Health Survey, 20 percent of people with asthma rated their health as 'fair' or 'poor' compared with only 7 percent of people without asthma (Ministry of Health 1999d).

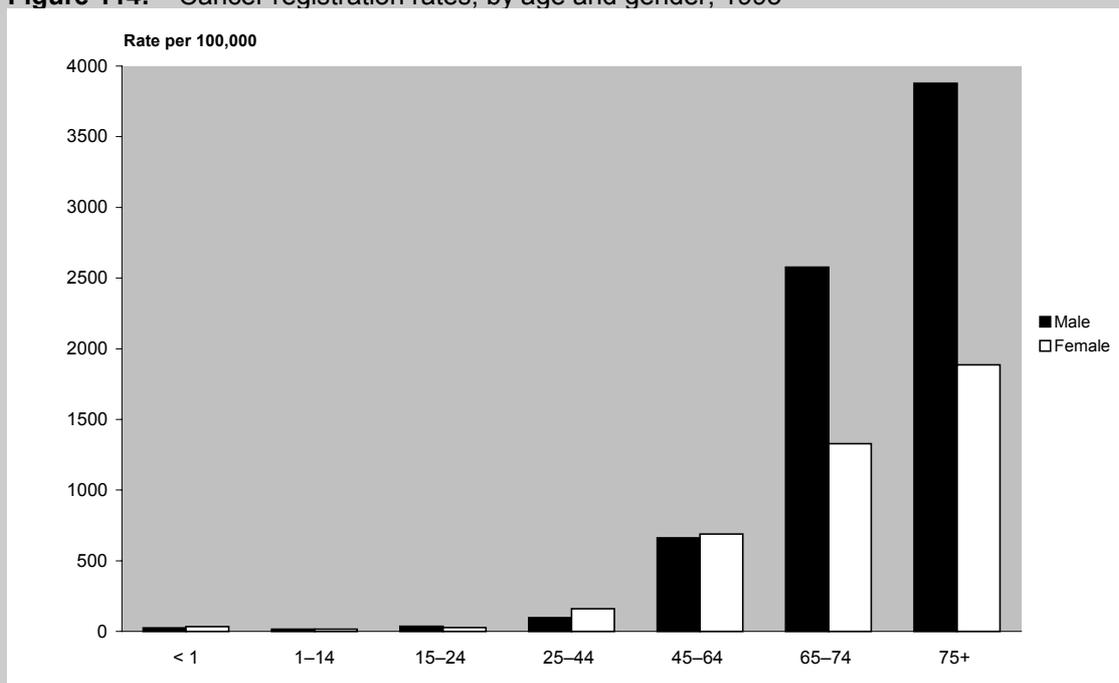
### Box 19: Cancer

Since 1994 all new cases of cancer (apart from non-melanotic skin cancers) must legally be notified to the New Zealand Cancer Registry, which uses standards established by the International Agency for Research on Cancer to register and classify primary malignancies. This has improved the coverage of cancer incidence, but it also means that trend analysis using pre- and post-1994 notification data must be interpreted with care. Work is also in progress to reduce the current four year delay in publication of cancer registration data (to two years).

#### Incidence

In 1995 there were nearly 16,000 registrations of new malignant tumours, with the highest rates being in the middle aged and older age groups (Figure 114). In the 25–44 and 45–64 age groups, females were slightly more likely than males to develop cancer, but in the 65–74 and 75 and older age groups the male cancer incidence rate was more than double that of females.

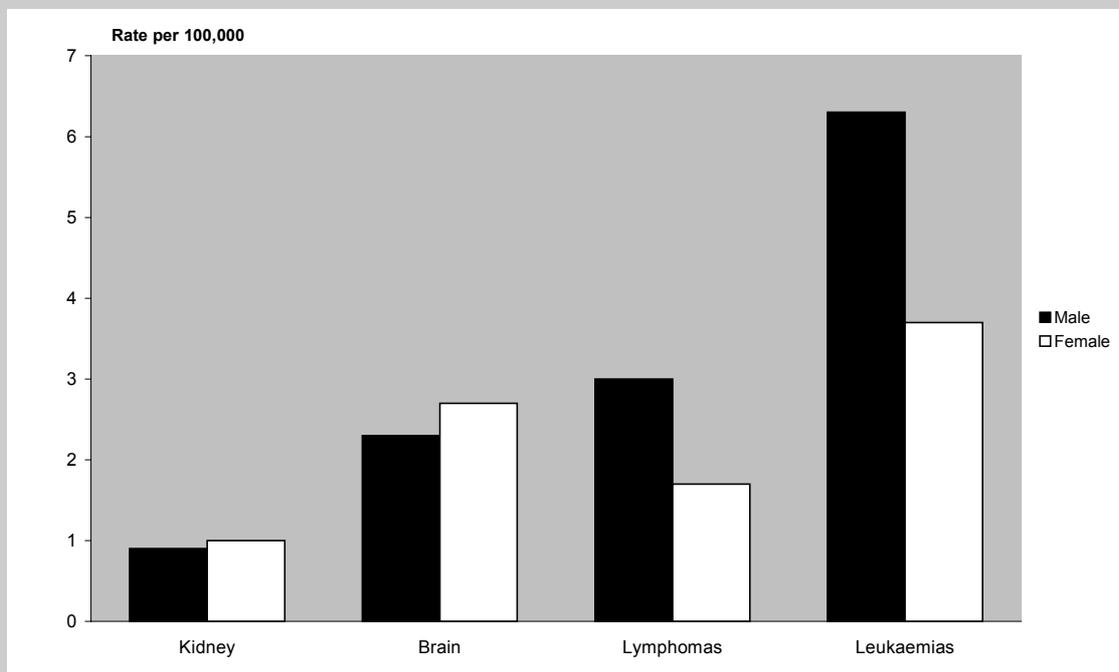
**Figure 114:** Cancer registration rates, by age and gender, 1995



Source of base data: New Zealand Cancer Registry

Compared with the older age groups, cancer incidence was very low in children, with the most common cancers in this group being leukaemias, lymphomas and brain tumours (Figure 115).

**Figure 115:** Cancer registration rates in children (0–14 years), by gender and site, 1995



Source of base data: New Zealand Cancer Registry

In the age groups from 15 to 44, the most common cancers were melanomas and cancers of the reproductive organs, particularly breast cancer (Table 51). Breast cancer was also the most common malignant tumour found among females after 45 years. Males in these older age groups were most likely to be diagnosed with prostate cancer. Lung cancer, colorectal cancer and melanoma were the next most common types of cancers found in these older age groups, for both males and females.

**Table 51:** Cancer registration rates, by age, gender and site, 1995

Site (ICD 9 code)	Age	Male	Female	Total
Stomach (151)	15–44	1.5	0.8	1.2
	45–64	18.1	8.5	13.4
	65+	88.5	41.8	61.8
Colon (153)	15–44	2.2	2.9	2.6
	45–64	66.8	69.4	68.1
	65+	267.9	244.6	254.6
Rectum, rectosigmoid junction, and anus (154)	15–44	2.8	1.2	2.0
	45–64	44.2	35.4	39.9
	65+	168.5	97.2	127.6
Liver and intrahepatic bile ducts (155)	15–44	1.6	0.4	1.0
	45–64	7.6	2.9	5.3
	65+	22.1	9.3	14.8
Pancreas (157)	15–44	0.5	0.4	1.6
	45–64	11.9	9.7	10.8
	65+	52.2	52.4	52.3
Trachea, bronchus and lung (162)	15–44	2.0	1.3	1.6
	45–64	81.2	48.3	65.0
	65+	376.8	151.7	247.8
Melanoma of skin (172)	15–44	21.9	34.6	28.3
	45–64	93.7	89.3	91.5
	65+	209.4	121.3	158.9
Female breast (174)	15–44	–	32.3	32.3
	45–64	–	250.9	250.9
	65+	–	312.2	312.2
Uterus (179, 182)	15–44	–	1.8	1.8
	45–64	–	30.4	30.4
	65+	–	48.6	48.6
Cervix uteri (180)	15–44	–	12.8	12.8
	45–64	–	21.7	21.7
	65+	–	22.0	22.0
Ovary and other uterine adnexa (183)	15–44	–	6.0	6.0
	45–64	–	32.5	32.5
	65+	–	54.1	54.1

**Table 51 continued**

Site (ICD 9 code)	Age	Male	Female	Total
Prostrate (185)	15–44	0.6	–	0.6
	45–64	133.3	–	133.3
	65+	1137.8	–	1137.8
Testis (186)	15–44	11.7	–	11.7
	45–64	4.5	–	4.5
	65+	2.3	–	2.3
Kidney and other unspecified urinary organs (189)	15–44	1.1	1.4	1.3
	45–64	19.5	9.7	14.7
	65+	58.5	30.4	42.4
Brain (191)	15–44	3.3	2.4	2.9
	45–64	9.3	8.2	8.8
	65+	18.2	19.0	18.7
Lymphoma (200–202)	15–44	7.9	5.2	6.5
	45–64	30.3	22.8	26.6
	65+	82.3	51.5	64.7
Leukaemia (204–208)	15–44	4.9	2.9	3.9
	45–64	14.4	10.8	12.7
	65+	76.6	42.7	57.2

Source of base data: New Zealand Cancer Registry  
 Note: rate is per 100,000.

### Trends in cancer registrations

The number of cancer registrations has been steadily increasing over the past 10 years, from around 10,000 in 1986 to nearly 16,000 in 1995 – an increase of almost 60 percent. This corresponds to an increase in the age standardised registration rate for all types of malignant tumours of 34 percent in males (from 281 per 100,000 in 1986 to 377 per 100,000 in 1995) and 18 percent in females (from 250 per 100,000 in 1986 to 296 per 100,000 in 1995). Since coverage of the Registry improved over this period, cancer incidence may not have increased to the same extent.

The overall trend in registration rates disguises significant changes in the registrations rates of cancers of different types. Trends in age standardised registration rates over the past decade for the most common types of cancer (those accounting for 5 percent or more of total registrations) are shown in Tables 52a and 52b.

**Table 52a:** Cancer registration rates for most common sites, males, 1986–95

Year	Site (ICD 9 code)					
	Prostate (185)	Large bowel (153, 154)	Trachea bronchus and lung (162)	Melanoma (172)	Non-Hodgkins lymphoma (200, 202)	Leukaemia (204–208)
1986	33.6	50.1	51.3	17.1	8.3	9.8
1987	36.7	50.9	50.9	19.1	9.8	10.9
1988	36.3	54.4	52.9	24.1	9.1	11.0
1989	35.2	50.0	52.0	24.8	10.9	11.2
1990	35.0	51.0	47.3	21.3	10.6	10.4
1991	38.3	49.4	45.2	20.7	10.2	10.8
1992	43.4	49.7	46.3	24.2	10.2	10.9
1993	50.9	49.5	45.0	25.4	11.0	11.2
1994	84.6	56.9	47.5	36.5	12.5	11.8
1995	103.2	53.2	42.2	41.1	12.9	12.2

**Table 52b:** Cancer registration rates for most common sites, females, 1986–95

Year	Site (ICD 9 code)							
	Breast (174)	Large bowel (153, 154)	Melanoma (172)	Trachea bronchus and lung (162)	Non- Hodgkins lymphoma (200, 202)	Cervix (180)	Uterus (179, 182)	Leukaemia (ICD 204–208)
1986	68.6	41.8	22.2	17.5	5.4	12.4	8.1	5.3
1987	65.8	44.4	23.3	19.1	6.5	12.9	9.9	7.1
1988	70.7	41.9	30.1	21.2	7.4	14.6	10.4	7.1
1989	77.7	40.0	27.0	21.5	6.9	12.7	10.2	6.9
1990	79.7	38.7	22.6	20.3	7.7	12.6	10.0	7.8
1991	74.3	42.1	26.4	20.4	7.7	13.4	9.0	6.7
1992	73.3	39.1	25.0	20.9	7.5	10.7	8.7	6.7
1993	68.8	37.4	23.8	21.6	7.7	10.6	8.7	7.4
1994	81.2	45.1	32.9	22.6	7.9	9.9	9.2	7.8
1995	80.8	43.9	39.1	20.7	9.6	10.6	10.0	7.1

Source of base data: New Zealand Cancer Registry

Note: rate per 100,000 is age standardised to Segi's world population.

From 1986 to 1995 registration rates for prostate cancer among males and for melanoma among both genders rose substantially, although this may be partly due to improved detection as well as changes in registration requirements. There was also a statistically significant increase in rates for non-Hodgkins lymphoma among both males and females, and in registrations for female breast cancer.

Lung cancer rates among males have decreased significantly over the last decade, in contrast to a slight increase for females.

Rates for other common types of cancers (large bowel cancer, cancer of the uterus and cancer of the cervix) have remained reasonably steady or have declined slightly over the past 10 years. Most recently, invasive cervical cancer rates have begun to decline, especially in younger women. This is probably due to the impact of the National Cervical Screening Programme (Ministry of Health 1998b).

Because cancer registration was incomplete prior to 1995, the earlier time series should be interpreted with caution (especially for melanoma).

### **Hospitalisations**

In 1997 cancers accounted for 6.6 percent of all public hospital inpatient and day patient discharges and 15 percent of all hospitalisations for chronic diseases. Mirroring cancer registration patterns, rates of hospitalisation for cancer were highest in the 45 and older age groups, with the rate in the 45–64 age group (12.1 per 1000) being almost three times the rate for the 25–44 year age group (4.4 per 1000). The highest rate of cancer hospitalisation was in the 75 and older age group, among whom over 40 per 1000 were hospitalised for cancer in 1997.

The cancers treated during these hospitalisations were located in a wide range of different sites, with the highest rates in males being for non-melanotic skin cancer, leukaemias and lymphomas, and lung, trachea and bronchus cancers. The highest rates in females were for breast cancer, leukaemias and lymphomas, and non-melanotic skin cancer.

Compared with European/Others, Māori had higher rates of hospitalisation in 1997 for all types of cancers except colorectal cancer, melanoma, kidney and bladder cancers, ovarian cancer, and the leukaemias and lymphomas. Lung cancer hospitalisation rates for Māori males were more than twice those for European/Other males. Compared with European/Other females, Māori females were three times as likely to be hospitalised for cancer of the cervix and four times as likely as to be hospitalised for lung cancer.

Compared with European/Others, Pacific people had either lower or similar rates of hospitalisation for colorectal cancer, melanoma, non-melanotic skin cancer, and kidney and bladder cancer. However, Pacific males had higher rates than European/Other males for stomach cancer, primary liver cancer, prostate cancer and lung cancer. Pacific females had higher hospitalisation rates than European/Other females for cancer of the cervix, but similar rates for breast cancer and lower rates for lung cancer.

### **Disability associated with cancer**

Cancer causes over one quarter of all deaths. However, compared with cardiovascular disease, diabetes, chronic lung disease and chronic neurological diseases, cancer is relatively less important as a cause of long term disability. This reflects the fact that most (although not all) cancers are rapidly cured with no residual disability, or are relatively rapidly fatal.

## Box 20: Mental illness

Comprehensive national statistics on the mental health of the New Zealand population are not available. However, limited data have been collected from a range of sources including regional psychiatric epidemiology surveys, longitudinal cohort studies and public hospital and psychiatric institution admission records.

### Epidemiological studies

#### Regional surveys

The best available data on the prevalence of mental illness in the non-institutionalised adult population come from the 1986 Christchurch Psychiatric Epidemiology Study (Wells et al 1989; Oakley Browne et al 1989). The study found that 63 percent of males and 68 percent of females had experienced at least one period of severe disability in their lifetime as a result of a mental disorder (Table 53). Males were more likely to experience disability related to alcohol abuse/dependence and other substance use disorders; females were more likely to experience disability related to mood disorders and anxiety disorders.\* Most of the people in the study who had experienced some kind of psychiatric disorder in the preceding six months did not visit a health service for a mental health consultation during this period (Hornblow et al 1990).

**Table 53:** Prevalence of selected psychiatric disorders in people aged 18–64, Christchurch urban area, 1986

	Male		Female		Total	
	Lifetime	Six months	Lifetime	Six months	Lifetime	Six months
All psychiatric disorders	63.0	28.0	68.5	27.8	65.8	27.9
Mood disorders	10.0	6.3	19.4	12.4	14.7	9.4
– major depressive episode	8.8	3.4	16.3	7.1	12.6	5.3
Anxiety/somatoform disorders	10.0	4.7	19.4	11.9	10.5	8.4
Substance use disorders	33.6	15.4	8.7	3.0	21.0	9.1
– alcohol use disorders	32.0	14.1	6.1	2.6	18.9	8.3

Source of base data: Wells et al 1989, Oakley Browne et al 1989

From the Christchurch Psychiatric Epidemiology Study data, as well as overseas studies, it has been estimated that in any given six month period:

- about 30 percent of adults will experience mental health problems such as stress disorders and other significant behavioural or emotional difficulties, although many of these problems will not develop into a clinically significant psychiatric disorder
- 28 percent will experience depression, substance abuse, anxiety disorders, anti social personality disorders, eating disorders, pathological gambling disorders or cognitive disorders
- a further 1 percent of adults will experience a psychotic disorder (schizophrenia, mania, schizo affective disorder) (Bushnell and Collings 1994).

\* The most widely applied system used to classify the many different clinically significant behavioural or psychological disturbances collectively known as mental health disorders is the DSM IV system. This identifies seven categories of major mental health disorder: mood disorders, schizophrenia and other psychotic disorders, anxiety disorders, substance dependence (including alcohol and drug disorders), conduct disorders, personality disorders, and dementias (Ministry of Health 1997c).

### **Longitudinal cohort studies**

The Christchurch Health and Development Study has tracked the incidence and prevalence of psychiatric disorders in a cohort of nearly 1000 young people born in Christchurch in 1977 (Horwood and Fergusson 1998). From age 16 to 18, 40 percent of the study participants experienced at least one psychiatric disorder, with 18 percent experiencing two or more disorders. Some of these were severe enough to require treatment from a mental health professional; others were relatively minor. The most common disorders were: substance dependence (24 percent), mood disorders (22 percent), anxiety disorders (17 percent) and conduct disorders (5 percent), with females having higher rates of mood and anxiety disorders and males having higher rates of substance dependence and conduct disorders. Māori males and females were more likely to experience a psychiatric disorder than their non-Māori counterparts, with Māori males being most likely to experience conduct disorders and substance dependence.

### **1996–97 New Zealand Health Survey**

The survey found that males and females in the 15–24 years age group had lower SF-36 mental health summary (MCS) scores (and scores on individual SF-36 scales relating to mental health including the mental health and role emotional scales) than males and females in older age groups (see Chapter 4). This suggests that young people experience lower levels of mental health than adults, which is in keeping with other studies indicating that late adolescence is a life stage characterised by a comparatively high risk of mental health problems (Maskill 1991). In contrast, there were no significant differences between other adult age groups in mental health status as measured on the SF-36 scales.

The survey also confirmed that young people are more likely than adults to engage in potentially hazardous alcohol consumption. Using the Alcohol Use Disorders Identification Test (AUDIT), the survey determined that 41 percent of males and 26 percent of females in the 15–24 age group were drinking in ways that carried a high risk of future damage to physical and mental health, compared with 20 percent of males and 9 percent of females in the 25–44 age group (Ministry of Health 1999d).

### **Hospitalisations for mental illness**

National statistics report the number and rates of inpatient hospital admissions for the treatment of mental illness (NZHIS 1998). However, these statistics have only limited value in identifying the incidence or prevalence of mental disorders in the New Zealand population. This is because a considerable proportion of psychiatric treatment and support services is now provided in community settings rather than hospitals. Therefore, hospital mental health data cover mental illnesses at the more severe end of the spectrum of psychiatric morbidity, or disorders that require a high degree of specialist attention and, in some cases, secure treatment environments. Broad features of the latest available mental health hospitalisation data (which are for 1994) include the following.\*

- Males have a higher age standardised rate of first admission for psychiatric disorders than females. Māori – especially Māori males – have higher rates of first admission and readmission for mental disorders than the rest of the population.

---

\* The 1994 hospitalisation data cover patients admitted with a primary diagnosis of mental illness to licensed public hospitals (including psychiatric and medical wards), as well as facilities licensed under the Alcoholism and Drug Addiction Act 1966 (NZHIS 1998).

- Males are more likely than females to be hospitalised for alcohol dependence or abuse, which is the most common diagnosis given to males first admitted to hospital or psychiatric institutions for psychiatric treatment (22 percent of male first admissions).
- The leading group of diagnoses given to females first admitted to hospital for psychiatric treatment is ‘affective psychoses, paranoid states and other psychoses’ (14 percent of female first admissions). Females have a slightly higher age standardised rate of admission for this group of diagnoses than males. Females are also more likely to be admitted for neuroses and depressive disorders.

The highest age specific rates of hospitalisation for mental disorders are in the 65 and over age group, the leading cause of admission being psychotic conditions associated with dementia and related organic brain syndromes. These conditions comprise about one third of all first admissions for both males and females in old age.

To provide more comprehensive and timely data on the range of mental disorders treated in New Zealand, the Ministry of Health is establishing a Mental Health Information National Collection. This will collect service and patient related data from over 450 public and private providers delivering mental health services in community facilities, as well as in hospitals. An important function of the Collection will be to monitor targets set in the National Mental Health Plan, which is a comprehensive programme of initiatives intended to improve the quality of the country’s mental health services (Ministry of Health 1997a).

### **Disability associated with mental illness**

Mental illness can lead to major functional and role limitation, including loss of independence, social isolation and low work productivity (Ormel et al 1994). In some cases, this disability can be even greater than that resulting from major chronic physical diseases such as stroke or diabetes.

Close examination of data from the Christchurch Health and Development Study suggests that in the 15–24 age group, those with mood disorders (such as depression) are more likely to report associated role limitation than those with anxiety disorders, conduct disorders or substance dependence (Horwood and Fergusson 1998). Also, young people with multiple psychiatric disorders report higher overall levels of disability than those with only a single disorder. In general, the greater the associated disability, the greater the need for specialised mental health treatment and support services.

## **Box 21: Unintentional injury**

Sources of injury-related morbidity data include population studies, surveys of general practice encounters, accident-related benefit claim records and hospital records. These data sources are maintained by a number of different agencies. Taken together, they show that injuries cause a sizeable proportion of the more severe health outcomes, including disability and premature death.

### **Injury in the community**

#### **Population studies**

In the 1996–97 New Zealand Health Survey more than one quarter of adults and just under one quarter of children had received some kind of medical treatment for injury or poisoning in the past 12 months (Ministry of Health 1999d). These injuries were caused by a wide variety of activities and events, but over one quarter were related to sports or games, and a further quarter to falls. Males were more likely than females to experience sports injuries, and females were more likely to be injured in falls. For males, the 15–24 age group had the highest rate of reported treatment for injury in the past year (43 percent). For females, the highest rate of injury treatment was in the 75 and older age group (mainly falls).

#### **Surveys of GP encounters**

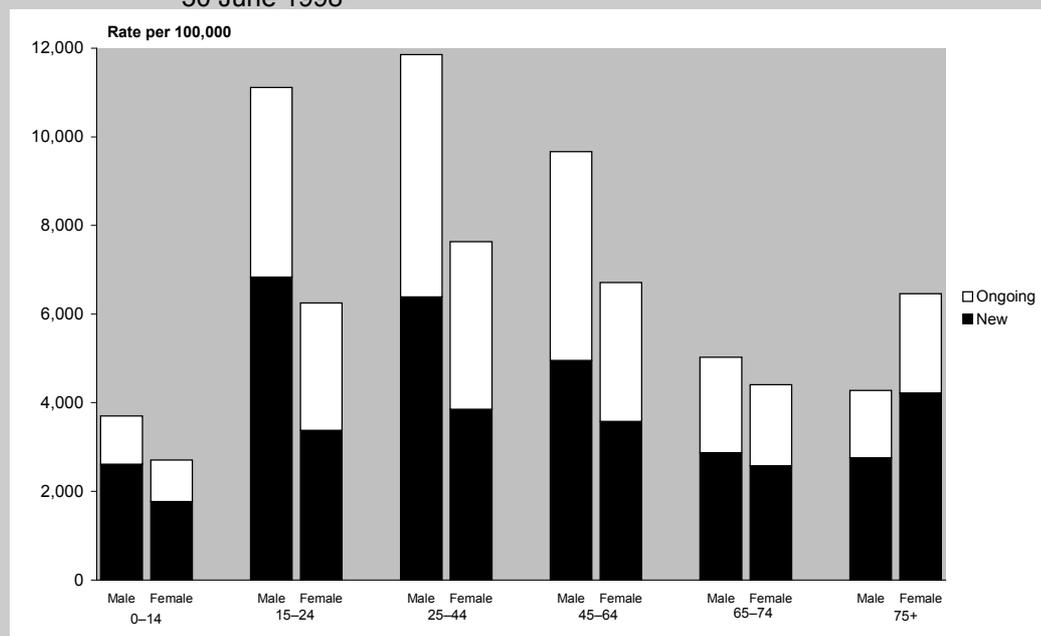
In the WaiMedCa study, treatment for injuries and poisoning accounted for 6 percent of all patient–GP encounters (McAvoy et al 1994).

#### **ACC benefit claim data**

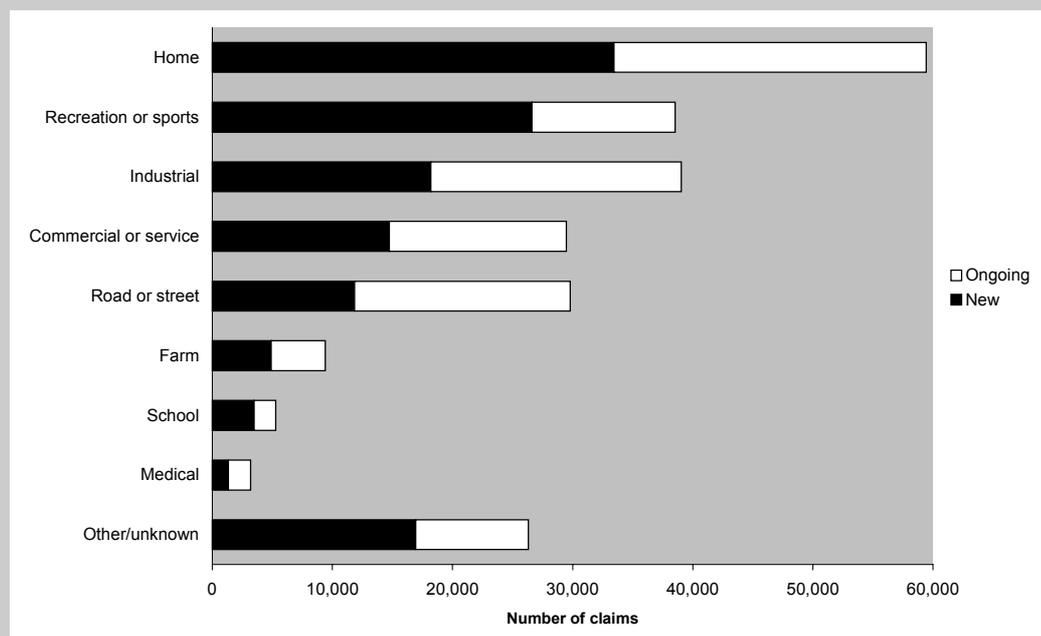
In the year to June 1998 nearly 1.5 million claims were made to the Accident Rehabilitation and Compensation Insurance Corporation (ACC) for medical and rehabilitation costs and income-related compensation for unintentional injury and occupational disease (ACC 1998). Over 80 percent of these claims were for the costs of medical treatment only, indicating that the injuries associated with these claims were likely to have been relatively minor. However, approximately 260,000 of the claims were ‘entitlement’ claims, where the claimant received income maintenance or services such as home help and attendant care; these entitlement claims were generally for more serious disabling injuries where people were incapacitated for longer than a week.

In the same period, the ACC recorded the highest rate of new entitlement claims for males in the 15–24 age group and for females in the 75 and over age group (Figure 116a). Overall, males made more claims than females. The home was the most common place where new entitlement claim injuries occurred (especially for older females), followed by recreation or sports places (especially for younger males), industrial workplaces, commercial or service workplaces, and the road or transport environment (Figure 116b).

**Figure 116a:** New and ongoing ACC entitlement claims, by age and gender, year ended 30 June 1998



**Figure 116b:** New and ongoing ACC entitlement claims, by place of injury, year ended 30 June 1998



Source of base data: ACC 1998

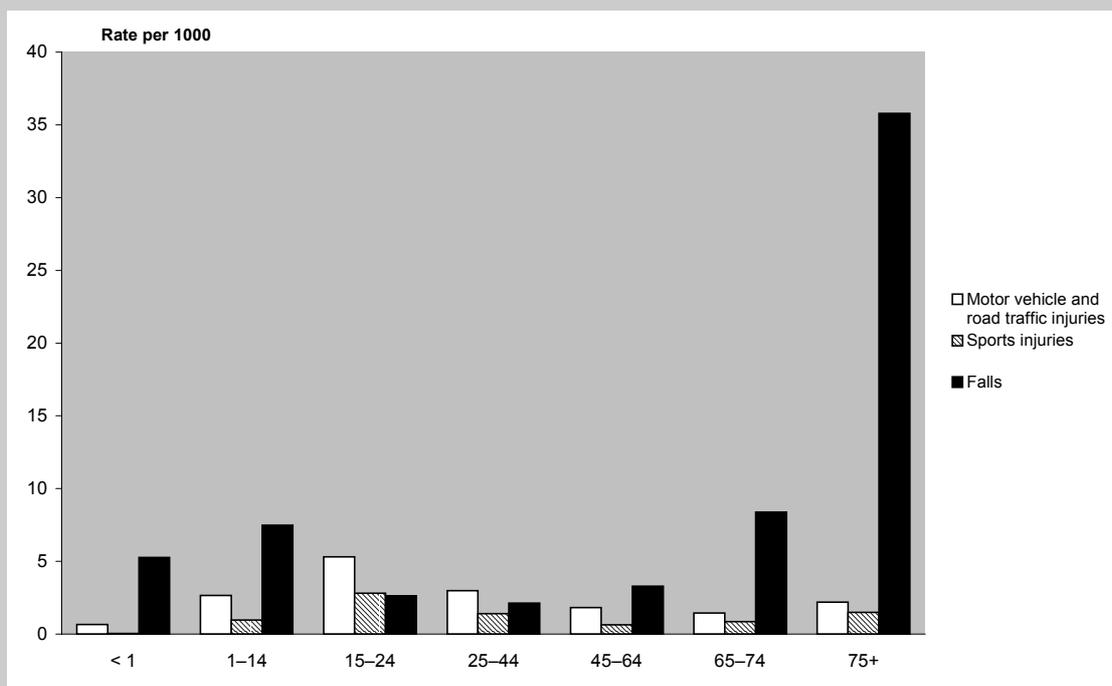
Overall, there were 44 different types of injuries recorded. However, seven injury types accounted for over three quarters of 'entitlement' claims: sprain or strain (32 percent), dental (15 percent), fracture (12 percent), contusion (6 percent), soft tissue injury (5 percent), non-infected laceration (4 percent) and occupational overuse syndrome (4 percent). Statistics relating to ongoing (as opposed to new) entitlement claims, where payments are made for more extended periods, suggest that injuries sustained at home, on roads or at the workplace are most likely to be associated with serious or long term injury-related disability.

## Hospitalisations

In 1997, unintentional injuries accounted for 13 percent of the disorders treated in public hospital daypatient and inpatient services – the largest cause group after chronic diseases. Injuries managed on an outpatient basis by hospital emergency departments are excluded from these figures. It is estimated that for every injury managed on a day or inpatient basis, there are 40 treated in emergency departments (Langley 1995).

Two thirds of injury hospitalisations were for unintentional injuries, with falls being the most common single cause, followed by road traffic injuries. Age specific rates of unintentional injury were lowest in the 25–44 and 45–64 year age groups but relatively high in the younger (1–14 and 15–24) and older (65–74 and 75 and older) age groups. This is because young people were more likely to be hospitalised for road traffic and sports injuries and people aged 65 or more (especially women) were more likely to be hospitalised for falls (Figure 117). By far the highest hospitalisation rate for falls was in the 75 and older age group. The highest hospitalisation rates for sports injuries and road traffic injuries were in the 15–24 age group while the highest hospitalisation rate for unintentional poisoning was in the 1–14 age group. Māori males and females had the highest rates of hospitalisation for road traffic injuries, with Pacific females having the lowest rates.

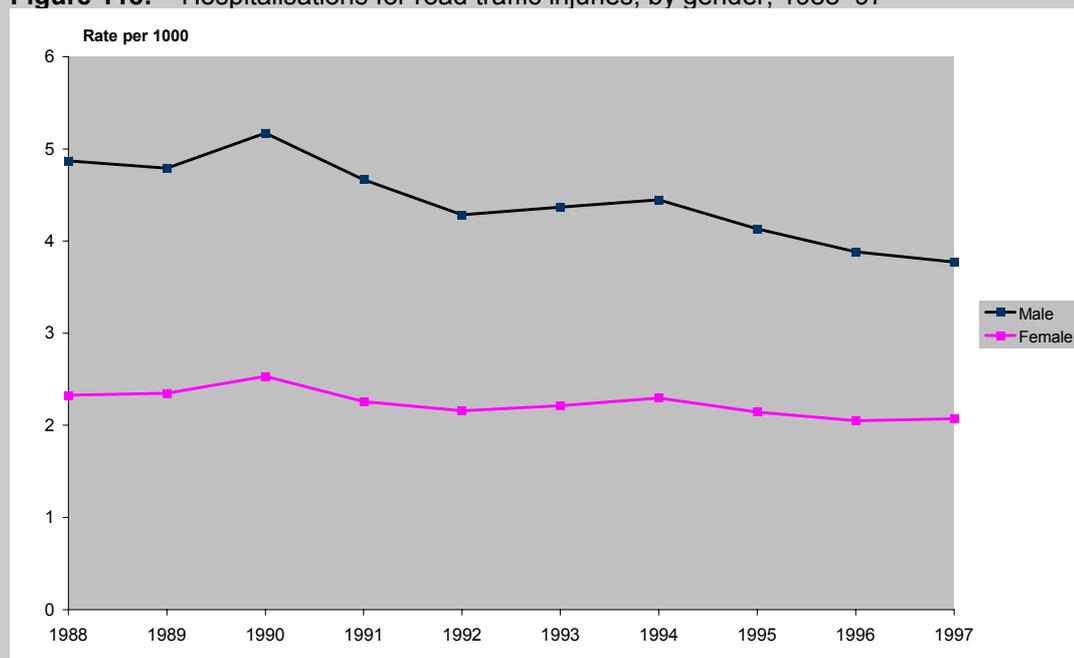
**Figure 117:** Hospitalisations for unintentional injury, by age and injury type, 1997



Source of base data: NZHIS

Examining trends in injury hospitalisations over time, rates for falls increased for both males and females over the 10 years from 1988 to 1997 (Figure 119). Rates of hospitalisation for road traffic injuries declined; this decline would appear greater if person-kilometres travelled rather than person-years were used as the denominator (Figure 118; LTSA 1996). Despite the improving trend in incidence, road traffic crashes hospitalised 13,500 people in 1997, the majority of whom were young people.

**Figure 118:** Hospitalisations for road traffic injuries, by gender, 1988–97



Source of base data: NZHIS

Note: rate is age standardised to Segi's world population.

## Box 22: Falls in older people

Falls among people aged 65 years and older are a major health problem. It has been estimated that about one third of older people living in the community will fall in any one year (Tinetti et al 1988; Downton and Andrews 1991). One half of all those aged 80 years and older will fall at least once a year. Falls present a particular problem for those living in institutional settings: nearly 50 percent of residents fall each year (Norton and Butler 1997).

### Fall rates

Falls are the second most common cause of unintentional injury deaths, after road traffic injuries. There is a strong association between age and death from falls: in 1996 the falls death rate among people aged 85 and over was 311 per 100,000 compared with 55 per 100,000 in the 75–84 age group and 12 per 100,000 in the 65–74 age group.

Falls may result in injury, particularly hip fractures, which often involve costly hospitalisation and treatment and lead to long term disability. Various studies suggest that about 20 percent of older people involved in fall incidents require medical attention and about 10 percent suffer fractures (Tinetti et al 1988; Reinsh et al 1992; Campbell et al 1990; Berg et al 1997). For older people, the high risk of fracture following a fall reflects the high prevalence of osteoporosis in this age group.

### Ethnic differences

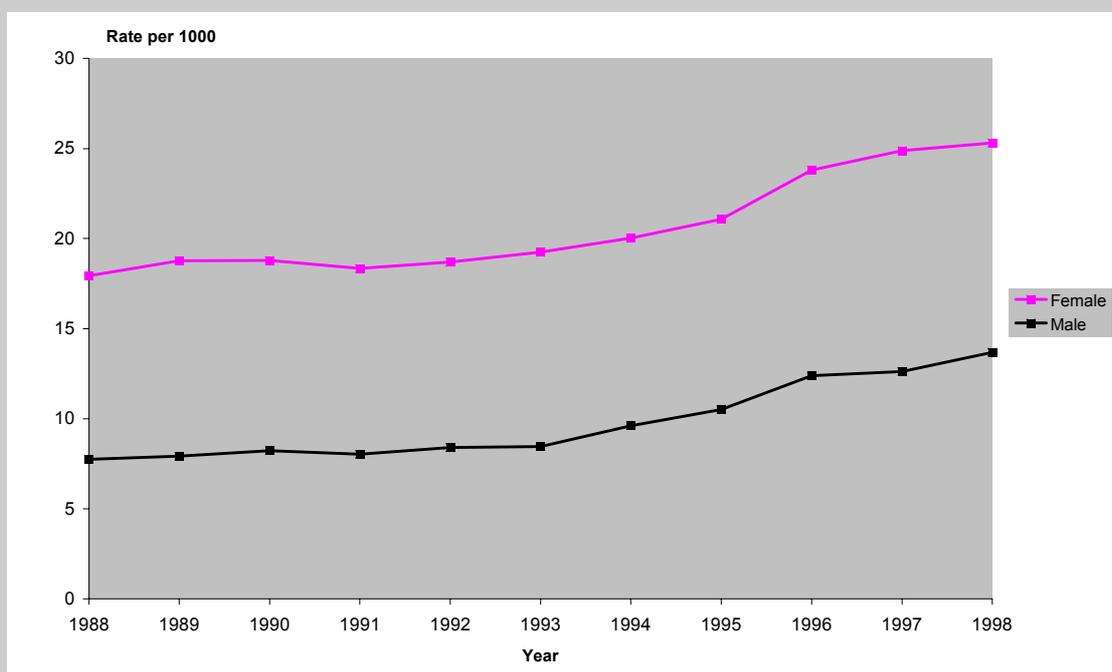
An Auckland study showed that less than 3 percent of all hip fractures were sustained by Māori and Pacific people, with the incidence of hip fracture being significantly lower than the rates for European/Others (Norton et al 1995). Although this finding partly reflects the younger age structure of the Māori and Pacific populations, the age standardised rates of hip fracture were still significantly lower among these groups compared with European/Others.

### Trends in deaths and hospitalisations from falls

Falls death rates for older people decreased over the period 1980 to 1996 by about 60 percent overall, from 105 per 100,000 to 48 per 100,000 in males, and from 111 per 100,000 to 38 per 100,000 in 1996 in females. In 1980, 110 males and 244 females sustained fatal falls compared with 89 males and 139 females in 1996.

However, the hospitalisation rates for falls *increased* by approximately 37 percent for both males and females over the same period, from 8.6 per 1000 for males and 17.2 per 1000 for females in 1988, to 15.4 per 1000 and 24.0 per 1000 respectively in 1997 (Figure 119). Likewise, numbers increased: in 1988 there were 5789 hospital admissions for falls in people 65 years and over (1323 males and 4466 females), which increased to 11,541 in 1997 (3114 males and 8427 females).

**Figure 119:** Falls hospitalisations, people aged 65 years and over, 1988–98



Source of base data: NZHIS  
Note: 1998 data are provisional.

These opposing trends in deaths and hospitalisations may reflect improved medical care of older people after a fracture (decreased case fatality), or demographic changes in the population leading to an increase in numbers of frail older people (so increasing incidence and severity).

### Disability associated with falls

A fall may result in a fear of falling again, decreased mobility, loss of confidence and restricted activity, leading to social isolation and possibly a move to institutional care (Tinetti and Williams 1997). A 'long lie' (prolonged recumbency) after a fall is particularly associated with these effects as well as with subsequent falls.

Older people living in institutions are at greater risk of sustaining falls and fall related injuries compared with people living in private homes. A study carried out in the Auckland region found that individuals living in institutions sustained 42 percent of all hip fractures among older people (65 and over), and this increased to 56 percent for those aged 85 and over. One in every 25 people living in an institution is likely to sustain a hip fracture annually, and their incidence of hip fracture is estimated to be approximately 10 times higher than those living in private homes (Butler et al 1996).

## Summary and conclusions

Illness and injury are common experiences of everyday life, with perhaps three quarters of the population experiencing symptoms of some kind in any two week period. For the most part, these symptoms are relatively non-disabling (for example, minor backaches, minor headaches, hay fever, sinusitis, minor coughs and colds, minor strains and sprains), but in any month approximately one in five people will have to restrict their normal activities because of limitations imposed by a disease or injury.

Within this spectrum of morbidity, some chronic and potentially disabling diseases affect a significant minority. For example, in one year about one in seven people aged 15–44 years experience symptoms of asthma, and in a six month period more than one quarter of adults (aged 15 years and over) experience some kind of psychiatric disorder, albeit not necessarily severely disabling.

About 80 percent of the population will visit a GP at least once in a year, with the median number of visits being approximately four. By and large, the health problems seen in general practice tend to be those that people are less willing or able to treat for themselves – only about 1 in 10 episodes of illness results in a visit to a doctor. Reflecting their greater vulnerability, young children and older people are the most frequent users of GP services. Young children are especially likely to require GP services for respiratory problems (such as upper and lower respiratory tract infections) and ear problems (such as otitis media), and older people for cardiovascular and musculoskeletal problems.

Less than 1 in 100 GP–patient encounters results in a referral for admission to hospital. Nevertheless, in any given year around 15 percent of adults and 11 percent of children are hospitalised. The majority of these admissions are for acute and chronic diseases and injuries that are urgent, serious or complex and require the specialised services available in hospitals. As such, diagnoses obtained from hospital discharge records provide some indication of morbidity at the more severe end of the disease and injury spectrum.

It is not surprising that chronic diseases are by far the most common cause of hospitalisation, given that they cause over 80 percent of deaths, many of which are likely to be preceded by periods of hospitalisation. Yet some non-fatal chronic diseases also represent major causes of hospitalisation.

Cardiovascular disease is the single most frequent chronic disease group leading to hospitalisation, highlighting its continuing impact on population health despite declining incidence (at least for IHD) over the past two to three decades. Diabetes is a related major cause of hospitalisation, both for cardiovascular and non-cardiovascular complications. So, too, are chronic lung diseases, including chronic obstructive respiratory disease and asthma; digestive disorders, including diseases of the liver; neuropsychiatric disorders (such as dementia); and musculoskeletal disorders (such as arthritis and osteoporotic fractures). In addition, cancer

related hospitalisations make up almost 7 percent of all inpatient and day patient treatment episodes.

With few exceptions (for example, asthma, many mental health problems), the prevalence of chronic diseases increase exponentially with age, reflecting the interaction between cumulative exposure to risk factors over a lifetime and the senescent loss of physiological reserve. Not surprisingly, hospitalisation rates for these diseases generally become measurable in early middle age (mid 40s), increase slowly at first, then accelerate rapidly in old age.

Injuries (intentional and unintentional) contributed to almost 20 percent of public hospital admissions in 1997. As with the chronic diseases, the highest rates of injury related hospitalisation are found among older people, who are more likely to be seriously injured in falls and to experience adverse effects or complications from medical procedures such as surgery. The younger age groups, too, have high injury hospitalisation rates, with road traffic injuries being especially significant among males aged 15–24; such injuries have the potential to impose a considerable burden of disability.

Although good morbidity information is available for hospitalisations and – to a lesser extent – for GP consultations, comparatively little is known about the incidence, prevalence, progression, remission, duration and fatality rates of even major diseases and injuries on a population basis. As well, there is relatively little information indicating which groups in the population experience high rates of co-morbidity, although it is known that this increases with age. Better population-based morbidity data, although difficult to collect, would provide insight into the impact of different diseases and injuries on levels and types of disability (as well as premature mortality) in different population groups. Such descriptive epidemiological data would provide a valuable input both for monitoring the burden of disease and injury, and for developing and evaluating policies aimed at minimising this burden or reducing inequalities in its distribution.

## Part II summary and conclusions

### Self reported health status measures

The 1996–97 New Zealand Health Survey demonstrated that reliable and valid subjective assessments of health-related quality of life can be collected from general population samples using standardised instruments such as the SF-36. However, factor analysis suggests that the meaning of some of the SF-36 scales may vary cross culturally, which indicates that the summary measures of physical and mental health derived from this survey should be interpreted with caution, especially when applied to older Māori and to Pacific people.

With this proviso, the SF-36 profiles and summary scores provide a unique insight into the ‘quality of life’ dimension of the health of New Zealanders in the late 1990s. Across all scales, the population mean scores were similar to, and generally slightly higher than, those reported from national surveys in similar countries. The major factor influencing physical health is clearly age, with the relevant scale scores and the physical health summary score declining sharply with increasing age. Such age dependency is largely absent for mental health, with the relevant summary and scale scores remaining stable throughout adult life or even improving in old age.

Although females live longer than males (see Chapter 2), males self report better health-related quality of life. The gender inequality was significant across all SF-36 scales at all ages (except for the ‘general health’ scale), but was more pronounced for the scales relating to mental health (and the mental health summary score) and among younger age groups. This reflects the relatively poor self reported mental health of young women.

Ethnic variations in health-related quality of life were significant across almost all scales, with European/Others having better health than Māori or Pacific people, although compared with objective health indicators (such as life expectancy), the differences were smaller than expected. This may reflect cultural variations in health perceptions, willingness to acknowledge negative states, or differing expectations as to what constitutes good health. The need for caution in interpreting ethnic specific SF-36 data, especially summary scores, has already been emphasised. Adjustment for socioeconomic status reduced but did not eliminate ethnic differences.

Across all ethnic groups health-related quality of life was significantly better among higher socioeconomic groups, irrespective of which indicator was used: family income, educational qualifications, labour force participation, or community deprivation as measured with a census based small area index (the NZDep96). Here, too, the differences were smaller than anticipated compared to socioeconomic gradients in objective indicators of health, such as mortality. Again, the explanation for the smaller than expected gradient may be differing health perceptions (subjective norms) among different socioeconomic groups.

The SF-36 survey provides a subjective, consumer focused view of health-related quality of life, but it is difficult to relate these outcomes to specific policy settings. A time series of SF-36 scores may reduce this limitation, but the rising expectations of each succeeding generation may confound genuine progress in health outcomes and make trends uninterpretable (the problem of the ‘falling norm’). Monitoring of health-related quality of life needs to be supplemented with more objective measures, such as the incidence and prevalence of disability – the population’s experience of functional and role limitation.

## Levels of disability

The 1996–97 New Zealand Disability Surveys, which included people living in private dwellings and in residential facilities, provide the necessary monitoring data. Almost 20 percent of the population are currently disabled, and over half of these people are dependent (need assistance with routine tasks). Just over 3 percent of the population need daily help with self care. The age patterning of disability mirrors the SF-36 findings: physical, sensory and cognitive disability increase sharply with age, but mental disability shows no clear age relationship. Overall, approximately 6 percent of children and a similar proportion of people in the 15–24 and 25–44 age groups are dependently disabled, as are 12 percent of middle aged adults, 24 percent of older people aged 65–74 years, 50 percent of people aged 75–84 years, and 80 percent of people aged 85 or more years. Unlike the SF-36 results, the survey found no significant gender difference in disability at any level of severity among adults until advanced ages: only in the 75 and older age group were women more likely to be disabled – the consequence not of higher incidence of disability among women, but of better survival once disabled.

Adjusting for age and gender, Māori were found to have about a one third higher rate of dependent disability than non-Māori, although this difference was no longer statistically significant (at least among adults) once socioeconomic status was included in a multivariable model. As with the SF-36 results, the relatively small ethnic difference in disability prevalence may partly reflect culturally specific meanings of disability, different expectations of what constitutes a limitation or need for assistance, and cultural differences in willingness to acknowledge or report limitation or need for assistance.

In contrast, socioeconomic gradients in disability, at all levels of severity, were more evident and persisted after adjustment for many potentially confounding variables in multiple regression models. Socioeconomic disability gradients were seen with income, education, labour force status and area deprivation (NZDep96), as was also found with the SF-36 scores.

It is possible to map from disability to disease or other cause. However, the causal structure of disability is far more complex than that of (premature) mortality, reflecting the interactions of multiple chronic diseases, late effects of injuries sustained over a lifetime, senescence and other developmental processes, and physiological processes such as training versus disuse. Multiple functional decrements and role limitations themselves interact to cause secondary disability, and feed back to initiate new chronic diseases, elevate injury risks, or alter the progression of existing pathophysiological processes. Nevertheless, it is clear that the disease and injury processes contributing to premature death differ from those contributing to disability. Musculoskeletal conditions, mental illnesses and conditions associated with cognitive impairment and with hearing and vision loss in older people are major causes of disability, but not of premature mortality.

## Patterns of morbidity

A variety of data sources were examined in an attempt to describe the incidence and prevalence of both disabling and non-disabling diseases and injuries affecting New Zealanders. About three quarters of the population will experience illness or injury in any two week period. The majority of these episodes are transient, not life threatening, not disabling (although they may cause temporary restriction of usual activities) and resolve spontaneously or with over the counter or home remedies. Less than 1 in 10 results in consultation with a general practitioner or other primary health care provider.

Even so, over the course of a year people will consult their GP four times on average – more for young children and older people, and far more for people with a chronic disease or disability. The most frequent reasons for GP consultation are respiratory problems (relating to acute upper respiratory tract infection or chronic lung diseases such as asthma), musculoskeletal disorders (including arthritis and back problems), skin diseases, management of chronic diseases (including cardiovascular diseases, diabetes and risk factors such as high blood pressure), advice for minor psychological and psychosocial problems (including depressive states, anxiety states and alcohol use disorders), and treatment of minor injuries (often sustained at home, at work or on the sports field).

Less than 1 in 100 GP–patient encounters results in referral to hospital. Nevertheless, over the course of a year about 15 percent of adults and 11 percent of children are admitted to hospital as a day- or inpatient. Excluding normal pregnancy and childbirth, the leading reason for hospitalisation is management of chronic disease. Cardiovascular disease is the leading chronic disease cause of hospitalisation, accounting for 11 percent of public hospital admissions in 1997. Cancer, diabetes, digestive disorders, respiratory diseases and neuropsychiatric conditions each account for approximately 6–7 percent of hospitalisations.

Injuries, including unintentional and intentional injuries and adverse effects of health care, make up approximately 20 percent of public hospital admissions. These represent the severe end of the injury spectrum and are dominated by road traffic crashes and, to a lesser extent, osteoporotic fractures following falls in older people. For every injury admission, approximately 40 injury victims are treated in emergency departments but not admitted overnight. Here, the pattern of injury is quite different, with domestic and sports injuries (mainly strains, sprains, lacerations and minor fractures) predominant.

Most (but not all) of the diseases and injuries leading to hospitalisation show higher rates for Māori and Pacific people than for European/Others (when not adjusted for socioeconomic status). The Māori and Pacific hospitalisation rates may reflect higher incidence, greater severity (progression), later presentation, poorer access to primary care, or higher rates of referral (adjusted for severity) to secondary care. To the extent that these hospitalisation rates reflect higher morbidity, they echo the higher disability and premature mortality rates also seen in these ethnic groups.

Yet health service utilisation data – even covering both primary and secondary care – provides only a limited and distorted view of morbidity. For example, many chronic diseases, including musculoskeletal disorders and mental illness, seldom lead to hospitalisation. Unfortunately, New Zealand lacks population-based survey data on the prevalence of most chronic diseases, and few disease registers or cohort studies exist to provide estimates of incidence. Major exceptions are cancers, for which a register exists, and ischaemic heart disease and stroke, for which the ARCOS study has provided high quality and relatively up to date incidence data (albeit for the Auckland region only). But nationally representative and current data on musculoskeletal disorders and psychological disorders, in particular, are not available. The 1996–97 New Zealand Health Survey has provided data on the prevalence of diabetes and asthma: approximately 4 percent of adults have diagnosed diabetes, and over the course of a year about one in seven young adults experience symptoms of asthma. The 1986 Christchurch Psychiatric Epidemiology Study, although out of date, suggests that in a six month period, more than one quarter of adults experience a clinically diagnosable (although not necessarily chronic or disabling) psychological

disorder. Data from the 1996–97 New Zealand Disability Surveys suggest that at any one time approximately 3 percent of the total population are suffering from a disabling psychiatric condition. In overseas surveys (for example, Australia), at least half of all older people (and three quarters of those aged 75 years and over) report at least one chronic disease, and half of these have two or three such conditions simultaneously.

Future health and/or disability surveys could aim to collect more comprehensive information on the prevalence of chronic diseases (and co-morbidities) alongside the disability data. At the same time, expanded disease registers and epidemiological cohort studies could capture incidence data. Mathematical modelling techniques could then be used to combine incidence and/or prevalence with mortality data, so yielding complete descriptions of the epidemiology of these diseases. Such data would provide a foundation for monitoring the burden of disease and forecasting health care needs.