The Burden of Disease and Injury in New Zealand

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Foreword

To achieve its health and independence objectives, the Government requires reliable and valid information on population health outcomes, how equitably these outcomes are distributed across subgroups of the population, and the causes of these outcomes. This information is required to monitor current trends, forecast future needs for Government intervention, and evaluate the effectiveness and efficiency of Government policies and programmes in meeting its objectives in this area of social policy.

The process employed by the Government to meet this information need has been a *State of the Public Health* reporting cycle, comprising annual reports on progress towards specific health targets and five yearly reports on population health status and health determinants. This reporting cycle is supported by a programme of national health, nutrition, disability and risk factor surveys (most recently carried out in 1996–97), dedicated disease and injury surveillance systems and registers, and national health statistical collections (including cause of death and hospital discharge statistics).

In 1999 the second five yearly report on population health status, *Our Health, Our Future: The Health of New Zealanders 1999* was published. It includes a description of population health status in terms of the two dimensions of health: quantity of life (mortality) and quality of life (morbidity). The report then integrates these two dimensions using both 'health expectancy' and 'health gap' summary measures of population health. Finally, the scope for health gain is analysed.

The Burden of Disease and Injury in New Zealand provides more detail about the health gap measures than could be included in *Our Health, Our Future.* It is intended to serve as a resource for a wide range of users, including health planners and policy analysts, health service funders and providers, community groups and others with an interest in summary measures of population health in general and health gap measures in particular.

The New Zealand Burden of Disease Study was carried out by a joint team from the Ministry of Health and the Health Funding Authority. Comments on this report should be sent to the Public Health Directorate, Ministry of Health, PO Box 5013, Wellington.

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Disclaimer

Opinions expressed in this report are those of the author and should not be construed as representing the view of the Ministry of Health.

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Introduction

Traditionally, the only 'health' outcome that could be monitored at the population level was mortality. In a low mortality society such as New Zealand's, deaths have become increasingly concentrated into old age. This has made mortality data less informative about health at earlier stages of the life cycle. Also, with the majority of the population living into old age and so increasingly at risk of chronic disease and disability, the need for information on quality as well as quantity of life has become more pressing.

Yet separate analyses of the 'length of life' and 'quality of life' dimensions of health are insufficient for evidence-based policy. Increasingly, when setting policy, a trade-off between gains in quantity and gains in quality of life must be made, creating the need for a composite unit of health that integrates both dimensions.

One approach to the construction of such an integrated or summary measure of population health (SMPH) is to extend the concept of life expectancy to *health* expectancy (Ministry of Health 1999). Another is to generalise the concept of years of life lost (YLL) (Ministry of Health 1999) to years of *healthy* life lost (a health gap measure incorporating both loss of life years and loss of quality of life), and so measure the burden of disease and injury, both fatal and non-fatal.

Extending YLL in this way requires that non-fatal health states be assigned values (disability weights) based on social preferences for these states of being. Years lost to (severity adjusted) disability (YLD) can then be added to years lost to premature mortality (YLL) to yield an integrated unit of health – the 'disability adjusted life year' or DALY. Thus one DALY represents the loss of one year of healthy life. Robust methods for eliciting social preferences for non-fatal health states, such as the standard gamble, the person trade-off and the time trade-off, are now available; the person trade-off is preferred for burden of disease analysis (Murray and Lopez 1996).

Health gap indicators have at least two advantages over health expectancy indicators. First, DALYs are built up on a condition by condition basis. That is, YLL and YLD are first calculated separately for each disease or injury, then summed to estimate its burden on the population (or subgroup). This makes DALY data readily decomposable by cause – that is, DALY estimates have the property of additive decomposition (whereas health expectancy estimates do not). Causal analysis of health gap estimates need not be restricted to proximal causes (diseases and injuries): using estimates of population attributable risks for each disease and injury included in the burden of disease analysis, the causal analysis can be extended to the level of risk factors or even determinants. Such analyses greatly enhance the policy relevance of the data, since most interventions relate to specific causes.

Secondly, the DALY – as a standardised 'quality adjusted life year' (QALY) measure – can be applied directly to the cost utility analysis of specific interventions. In this way the same unit of health can serve both to monitor population health status (including equity objectives) and to prioritise interventions designed to alter that health status, so helping to meet efficiency objectives. By contrast, health expectancy indicators cannot provide outcome measures suitable for economic analysis of policies or programmes.

On the other hand, health gap measures have a number of limitations. Being built up on a disease by disease basis, burden of disease analysis fails to include disability that cannot be attributed to a specific morbid process – that is, disability resulting from senescence in the absence of a specific medical diagnosis.* At the same time, the DALY as currently defined does not take co-morbidity or co-disability into account (although adjustment methods are being developed (Mathers et al 1999) and have been applied to some extent in the analyses reported here), and so may over-estimate the burden of (non-fatal) disease and injury relative to the fatal burden, especially among older people (who have high rates of co-morbidity and co-disability).

Estimating DALYs requires extensive epidemiological data: estimates of the incidence (in the given year) and duration of a hundred or more conditions are required, for each age group, gender, ethnic group and (ideally) social class. Information is also required on the average or typical disability associated with each incident case of disease or injury and its severity distribution, taking into account both stage of disease and access to and effectiveness of current treatment and rehabilitation services. Much of the necessary epidemiological data are unavailable for New Zealand at present, so it is necessary to rely on data from other countries or to use epidemiological modelling to fill data gaps. The resulting estimates of burden are therefore imprecise, at least as regards the YLD component of the estimates for many conditions.

Also, the social preferences for the different non-fatal health states – on which the disability weights for the conditions included in the analysis are based – may vary across cultures, social groups and periods. Ideally, a valuation exercise should be undertaken in each country (and be representative of the sociocultural composition of the national population) so that country specific disability weights can be used in calculating YLDs. Furthermore, these values are likely to change over time and so will require updating, perhaps once per decade.

Although data deficiencies and the lack of New Zealand specific disability weights make the study less reliable and valid than might otherwise be the case, the analysis presented here remains useful for a variety of policy applications. Future iterations can be made more statistically robust and culturally specific, and will also add value by building up a time series.

* Health expectancy calculations use population level data, such as disability prevalence estimates from a population-based health survey, and so provide a more comprehensive measure of population health.

Methods

Years lost to premature mortality (YLL)

YLL have been calculated by the 'remaining life expectancy' method (Ministry of Health 1999), using different standards for males and females (model life table West level 26 female for females and level 25 female for males, in order to provide standard lifetables with life expectancy at birth of 82.5 and 80.0 years for females and males respectively). This method has been chosen for consistency with that used in the Global Burden of Disease Study (Murray and Lopez 1996) but differs from that used in the Australian Burden of Disease Study (Mathers et al 1999). The use of different standards for males and females is intended to represent the biological difference in survival potential between the genders.

Years lost to disability (YLD)

YLD are calculated by estimating the incidence of each condition in New Zealand in 1996–97, the average duration of each incident case (or, more precisely, of the associated disability until death or recovery) and the average severity of the associated disability (the average disability weight):

YLD = number of incident cases x average duration x average disability weight

For most conditions this involves calculating a weighted average, across all stages, sequelae or complications of the condition, for both duration and disability severity. Furthermore, both duration and disability distribution need to be adjusted for the effectiveness and coverage (access) of currently available interventions. Incidence, average duration and average disability weight are all indexed by age, gender and (where possible) ethnicity. These are then summed across population strata or across causes (conditions) to obtain the respective YLD totals.

Incidence and duration

For some conditions, incidence estimates were directly available from disease registers or epidemiological studies. For others, incidence was modelled from data on prevalence, recovery and mortality, using multi-state life table methods (Roberts and Tobias 2001; Harvard University 1991). Modelling was also used to obtain estimates of duration and to ensure internal consistency between the incidence, duration and mortality estimates. Where insufficient New Zealand data were available to run the model, the incidence or duration estimates developed for the Australian Burden of Disease Study (Mathers et al 1999) were used, regressed where possible against the corresponding New Zealand and Australian mortality data.

Disability weights

In the absence of New Zealand specific values (social preferences for health states), Dutch disability weights (Stouthard et al 1997) were used. These were derived using a person trade-off method, the raters being panels (focus groups) of health professionals and lay people. The Dutch weights are largely similar to those used in the Global Burden of Disease Study (Murray and Lopez 1996) and were also used in the Australian Burden of Disease Study. Where a Dutch weight was not available (because the condition concerned had not been included in the Dutch valuation exercise), either the Global Burden of Disease Study weight was used, or a multiplicative regression model was applied to interpolate weights between indicator conditions (Mathers et al 1999).

Discounting

As in the Global Burden of Disease Study (Murray and Lopez 1996) and other national studies (for example, the Australian Burden of Disease Study (Mathers et al 1999)), both undiscounted and discounted (3 percent per year) DALYs were calculated. Only discounted data are presented in this report. The 3 percent discount rate was chosen to allow international comparisons and because this rate is recommended by the International Panel on Cost Effectiveness in Health and Medicine (Gold et al 1996).

Age weighting

Age weighting was applied in the Global Burden of Disease Study to give more weight to a year of life lived in adulthood than in childhood or old age. This approach was not adopted in the Australian study and is not used here. In practice, age weighting has relatively little effect in any case.

Co-disability

The Global Burden of Disease Study did not attempt to model the effect of co-morbidity or co-disability on YLD and so may have overestimated the burden of non-fatal disease relative to premature mortality. The Australian Burden of Disease Study, however, adjusts the YLD estimates for major co-morbidities between mental disorders, between birth defects, and between chronic physical disorders at older ages (Mathers et al 1999). Where possible, the Australian adjustment factors have been applied to the New Zealand data presented here, so providing a partial correction for co-disability.

Risk factor analysis

The population attributable risks (PARs) developed by the Ministry of Health (Ministry of Health 1999) were applied to the DALY data, so allowing an estimate to be made of the burden attributable to several major risk factors. The method assumes independence of risks and so overestimates the attributable burden; on the other hand, conservative estimates of relative risks were used when calculating the PARs. The risk factors included are those for which recent national prevalence data, and reliable estimates of excess risk of disease incidence and mortality, were available. The method used to calculate attributable fractions is detailed in Appendix 2.

Data sources

Sources of data included the New Zealand Health Information Service (NZHIS) mortality and hospital separations databases, the New Zealand Cancer Registry, the New Zealand Birth Defects Monitoring Programme, the 1996–97 New Zealand Health Survey, the 1996–97 New Zealand Disability Surveys, the Notifiable Diseases database, ACC and other injury databases, and a wide range of epidemiological studies (such as the ARCOS studies (Bonita et al 1997)).

Selection and classification of conditions

Initially all diseases and injuries responsible for more than 20 deaths or 500 hospitalisations (that is, approximately 0.1 percent of each) in 1996 were identified from the NZHIS mortality and hospital separations databases. These were then compared with the conditions selected for the Australian Burden of Disease Study and the Public Health ICD Groups developed by the Ministry of Health (Ministry of Health 1998). A final selection of approximately 85 conditions was made for which disease models (natural history models) were available from the Australian study or elsewhere, so allowing sequelae or stages of each condition to be identified. For all of these conditions and sequelae, disability weights were available either from Dutch or Australian burden of disease analyses. Dental disorders and dermatological conditions (other than skin cancers and skin and soft tissue infections) were excluded from the study because of data limitations.

The 85 conditions were grouped into 16 higher level categories, for each of which a residual lower level category representing the 'not elsewhere classified' cases was created. Some reclassification of codes was also necessary; for example, two thirds of deaths from 'heart failure' were reclassified to ischaemic heart disease (IHD) and the remaining third were split equally between hypertensive heart disease and inflammatory heart disease. Thus the total number of lower level categories was approximately 100. For ease of presentation, several related higher level categories have been aggregated, forming 11 rather than 16 higher level categories:

- infectious diseases (including respiratory tract infections)
- infant conditions (maternal, perinatal and infant conditions, birth defects, chromosomal disorders and hereditary conditions)
- injuries (unintentional, intentional including suicide, and adverse effects of health care)
- cancers
- endocrine, metabolic, haematologic and immunological conditions (including diabetes)

- cardiovascular diseases (including IHD, stroke* and other cardiovascular diseases)
- chronic respiratory diseases (including chronic obstructive respiratory disease and asthma)
- other chronic disorders (genitourinary including kidney diseases, and digestive or gastrointestinal diseases including cirrhosis and other forms of chronic liver disease)
- musculoskeletal disorders
- neurosensory disorders (neurological disorders, disorders of vision, disorders of hearing)
- mental illness (psychological or psychiatric disorders).

For some analyses, neurological diseases, sense organ disorders and mental illnesses are combined to create a super category of neuropsychiatric disorders.

Data presentation

Estimates of YLL, YLD, YLD:YLL ratio and DALY have been obtained for over 100 conditions (including over 500 stages or sequelae) in nine age groups, for both genders and two major ethnic groups (Māori and non-Māori). Estimates are not provided for Pacific peoples because of data limitations. However, rough estimates of the burden of disease and injury for Pacific peoples in New Zealand have been derived by modelling, and are reported elsewhere (MOH 2001). The complete list of conditions and disability weights for each are summarised in Appendix 1.

The (discounted) YLL results are presented first, followed by the YLD results and YLD:YLL ratios. DALYs are then calculated. Only highly summarised results are presented.** The burden associated with cancer is, however, presented in more detail, to illustrate the depth of detail available (Appendix 4). Finally, the burden attributable to eight major risk factors is analysed. Unfortunately, it is not yet possible to analyse the burden at the level of social or other determinants of health, although of course such determinants shape the risk factor exposure of population subgroups.

* Stroke is considered a cardiovascular, not a neurological, condition for consistency with the ICD9.

** More detailed tables are available from the Public Health Intellligence Group, Ministry of Health, as are the undiscounted results.

The Burden of Fatal Diseases and Injuries

In 1996 premature mortality resulted in the loss of 316,674 years of life for the population as a whole (discounted at 3 percent per year).

This loss of life years corresponds to an age standardised rate of 66 years of life lost per 1000 person years, using Segi's world population as the reference. Age standardisation is necessary to allow different subgroups of the population to be fairly compared with one another. Table 1 shows that males bear a higher burden of premature mortality than females: 78 per 1000 compared with 55 per 1000 respectively, a male excess of 43 percent.

Table 1: YLL, by gender, 1996

YLL	Male	Female	Total
Number	168,796	147,879	316,675
Rate	78.2	54.6	66.0
Rate ratio	1.43	1.00	–

Source of base data: NZHIS
Note: rate per 1000 age standardised to Segi's world population.

Pooling both genders, Māori bear a higher burden than non-Māori: age and gender standardised rates of 125 per 1000 and 60 per 1000, a Māori excess of over 100 percent (Table 2).

Table 2: YLL, by ethnicity, 1996

YLL	Māori males	Non-Māori males	Māori females	Non-Māori females	Māori total	Non-Māori total
Number	25,541	143,255	20,082	127,797	45,623	271,051
Rate	141.6	71.4	109.7	48.7	125.0	59.6
Rate ratio	1.98	1.00	2.25	1.00	2.10	1.00

Source of base data: NZHIS
Note: rate per 1000 age standardised to Segi's world population.

The ratio of extreme groups – Māori males versus non-Māori females – is 2.9 (142 per 1000 compared with 49 per 1000), providing some insight into the scope for health gain still remaining from further reductions in premature mortality. Indeed, had all subgroups experienced the same premature mortality rate in 1996 as non-Māori females, the total years of life lost by the population would have been approximately 219,000 – 30 percent less than actually occurred.

Table 3 shows that, for the population as a whole in 1996, approximately 11 percent of the premature mortality burden was sustained in childhood and adolescence (0–24 years), a similar proportion in the 25–44 year age group, approximately one-quarter in middle age (45–64 years) and just over one half in old age (65 years and over). However, the age distribution of the burden was very different among Māori, reflecting both their younger age structure and higher age specific mortality rates at younger ages. Māori children alone bear 16 percent of the total burden borne by Māori, with one-quarter of the total being sustained before age 25. Young adults (25–44) bear a further one-fifth and middle aged adults one-third of the total burden, leaving only one-fifth to be borne by the small population of Māori aged 65 or more years.

Table 3: YLL, by age and ethnicity, genders pooled, 1996

Age (years)	Māori			Non-Māori			Total		
	Number	Percentage	Rate	Number	Percentage	Rate	Number	Percentage	Rate
0–14	7441	16.3	36.8	11,661	4.3	18.1	19,101	6.0	22.6
15–24	3724	8.2	35.3	11,029	4.1	24.8	14,753	4.7	26.8
25–44	8299	18.2	52.6	23,998	8.9	24.3	32,296	10.2	28.2
45–64	16,194	35.5	248.0	63,614	23.5	93.9	79,808	25.2	107.4
65+	9966	21.8	607.7	160,750	59.3	388.8	170,716	53.9	397.1
Total	45,624	100.0	125.0	271,052	100.0	59.6	316,674	100.0	66.0

Source of base data: NZHIS
Rates are per 1000; total rates are age standardised to Segi's world population.

Causes of the fatal disease and injury burden

Table 4 shows that, for the whole population in 1996, cardiovascular diseases (including IHD, stroke, and other cardiovascular diseases) (35 percent) and cancers (29 percent) dominated the burden of premature mortality. The third ranked cause group was injury: unintentional injury accounted for over 7 percent of the mortality burden, and intentional injury (mainly suicide) for a further 5 percent. Together, these three cause groups made up over three-quarters of the total burden. The only other cause group to contribute more than 5 percent of YLL was chronic respiratory conditions – mainly chronic obstructive respiratory diseases (CORD) – at 6 percent.

Table 4: YLL, by cause group, 1996

DALYs	Number	Percentage	Rate
Infection	12,354	3.9	2.2
Infant	12,986	4.1	5.3
Injury	36,307	11.5	9.7
Cancer	92,791	29.3	19.4
Endocrine	9912	3.1	2.0
CVD	109,781	34.7	19.5
Respiratory	18,911	6.0	3.4
Other chronic	11,143	3.5	1.9
Musculoskeletal	1905	0.6	0.3
Neurosensory	8354	2.6	1.6
Mental	2230	0.7	0.5

Total	316,674	100.0	66.0

Source of base data: NZHIS
Note: rate per 1000 age standardised to Segi's world population.

This whole-of-population analysis disguises significant gender and ethnic variations (Tables 5 and 6). Cancer is relatively more important for females than males (accounting for 32 percent compared with 27 percent of YLL respectively), although the gender specific YLL rates are not statistically significantly different when standardised for age (19 per 1000 and 20 per 1000 respectively). In contrast, injury impacts less on females than males (in both an absolute and a relative sense), accounting for only 7 percent of YLL among females compared with 16 percent among males. This suggests that different strategies are needed to achieve further reductions in the mortality burden between the genders, with cancer prevention having higher priority for females and injury prevention for males. Reduction in the cardiovascular disease (CVD) mortality burden is equally important for both genders.

For Māori, the causal structure of premature mortality differs from that seen in the population as a whole. Māori have higher age standardised rates of infant conditions, diabetes, CVD and CORD in particular. The younger age structure of the Māori population, together with higher age specific mortality rates, account for much higher proportions of total YLL from infant causes (11 percent versus 3 percent for non-Māori) and injuries (18 percent versus 10 percent), but correspondingly lower shares from cancer (23 percent versus 30 percent) and CVD (28 percent versus 36 percent).

Table 5: YLL, by cause group and gender, 1996

Cause group	Male			Female			Total		
	Number	Percentage	Rate	Number	Percentage	Rate	Number	Percentage	Rate
Infection	5358	3.2	2.4	6996	4.7	2.1	12,354	3.9	2.2
Infant	7211	4.3	5.7	5774	3.9	4.8	12,986	4.1	5.3
Injury	26,440	15.7	14.3	9867	6.7	5.2	36,307	11.5	9.7
Cancer	45,273	26.8	20.1	47,518	32.1	19.1	92,791	29.3	19.4
Endocrine	4868	2.9	2.1	5044	3.4	1.9	9912	3.1	2.0
CVD	59,089	35.0	24.9	50,692	34.3	14.2	109,781	34.7	19.5
Respiratory	9984	5.9	4.0	8928	6.0	2.9	18,911	6.0	3.4
Other chronic	5195	3.1	2.1	5948	4.0	1.8	11,143	3.5	1.9
Musculoskeletal	554	0.3	0.2	1351	0.9	0.4	1905	0.6	0.3
Neurosensory	3649	2.2	1.6	4705	3.2	1.6	8354	2.6	1.6
Mental	1174	0.7	0.6	1056	0.4	0.6	2230	0.7	0.5
Total	168,796	100.0	78.2	147,879	100.0	54.6	316,674	100.0	66.0

Source of base data: NZHIS
Note: rate per 1000 age standardised to Segi's world population.

Table 6: YLL, by cause group and ethnicity, 1996

Cause group	Māori			Non-Māori			Total		
	Number	Percentage	Rate	Number	Percentage	Rate	Number	Percentage	Rate
Infection	1519	3.3	4.0	10,836	4.0	2.0	12,354	3.9	2.2
Infant	4923	10.8	8.0	8062	3.0	4.3	12,985	4.1	5.3
Injury	8258	18.1	14.8	28,049	10.3	8.7	36,307	11.5	9.7

Cancer	10,434	22.9	32.0	82,357	30.4	18.4	92,791	29.3	19.4
Endocrine	2625	5.8	8.4	7286	2.7	1.5	9911	3.1	2.0
CVD	12,849	28.2	43.1	96,932	35.8	17.6	109,781	34.7	19.5
Respiratory	2346	5.1	7.9	16,565	6.1	3.0	18,911	6.0	3.4
Other chronic	1260	2.8	3.9	9883	3.6	1.8	11,143	3.5	1.9
Musculoskeletal	117	0.3	0.3	1788	0.7	0.3	1905	0.6	0.3
Neurosensory	805	1.8	1.7	7549	2.8	1.5	8354	2.6	1.6
Mental	486	1.1	0.9	1744	0.6	0.4	2230	0.7	0.5
Total	45,623	100.0	125.0	271,051	100.0	59.6	316,674	100.0	66.0

Source of base data: NZHIS
Note: rate per 1000 age standardised to Segi's world population.

The causes of premature mortality vary markedly with age (Table 7). In childhood, infant conditions (including SIDS, birth defects, and premature and complicated birth) and unintentional injury together account for almost 80 percent of the loss sustained during this stage of the life cycle. Cancers (7 percent) and infectious diseases (6 percent) also exceed the 5 percent threshold in this age group.

Among young people (15–24), more than three-quarters of the mortality burden can be attributed to external causes – unintentional injury (44 percent) and intentional injury, mainly suicide (32 percent).

Among young adults (25–44 years), unintentional and intentional injury (40 percent combined) are joined by cancer as major contributors. Together, these three cause groups account for approximately two-thirds of the burden experienced by this age group. Cardiovascular diseases (mainly IHD) also emerge in this age group and account for 15 percent of the burden.

In middle age (45–64 years), injury declines in relative and absolute importance (to 7 percent), and the chronic diseases become dominant: cancer (44 percent) and CVD (33 percent) together account for over three-quarters of the burden. No other cause group reaches the 5 percent threshold.

Among older people (65 years and over), the relative ranking of cancer and CVD reverses, with CVD (including stroke as well as IHD) accounting for almost half (46 percent) of the total burden, and cancer only a little over one-quarter (28 percent). Other significant cause groups in this age group are chronic respiratory diseases (mainly CORD, 9 percent) and lower respiratory tract infections (mainly pneumonia and influenza, 5 percent).

Table 7: YLL, by age and cause group, 1996

	0–14			15–24			25–44		
	Number	Percentage	Rate	Number	Percentage	Rate	Number	Percentage	Rate
Infection	1091	5.7	1.3	253	1.7	0.5	1077	3.3	0.9
Infant	11,715	61.3	13.9	403	2.7	0.8	435	1.3	0.4
Injury	3517	18.4	4.2	11,162	75.7	20.2	12,868	39.8	11.3
Cancer	1313	6.9	1.5	1057	7.2	1.9	8118	25.1	7.1
Endocrine	260	1.4	0.2	254	1.7	0.5	908	2.8	0.8
CVD	228	1.2	0.2	697	4.7	1.2	4894	15.2	4.3
Respiratory	151	0.8	0.2	224	1.5	0.4	643	2.0	0.6
Other chronic	140	0.7	0.1	85	0.6	0.2	882	2.7	0.7
Musculoskeletal	0	0.0	0.0	29	0.2	0.1	248	0.8	0.2

Neurosensory	686	3.6	0.8	252	1.7	0.5	1064	3.3	0.9
Mental	0	0.0	0.0	337	2.3	0.6	1158	3.6	1.0
Total	19,101	100.0	22.6	14,753	100.0	26.8	32,296	100.0	28.2

	45–64			65+		
	Number	Percentage	Rate	Number	Percentage	Rate
Infection	1491	1.9	2.0	8442	4.9	19.6
Infant	272	0.3	0.4	161	0.1	0.4
Injury	5428	6.8	7.3	3332	2.0	7.8
Cancer	35,336	44.3	47.5	46,965	27.5	109.2
Endocrine	3302	4.1	4.4	5188	3.0	12.1
CVD	26,270	32.9	35.4	77,691	45.5	180.7
Respiratory	3462	4.3	4.7	14,431	8.5	33.6
Other chronic	2243	2.8	3.0	7794	4.6	18.1
Musculoskeletal	386	0.5	0.5	1245	0.7	2.8
Neurosensory	1349	1.7	1.8	5003	2.9	11.6
Mental	269	0.3	0.4	466	0.3	1.1
Total	79,808	100.0	107.4	170,716	100.0	397.1

Source of base data: NZHIS
Note: rates are per 1000, age standardised to Segi's world population.

The 20 leading specific diseases and injuries contributing to YLL are shown in Table 8. Despite declining cause specific mortality over three decades, IHD remains by far the leading single cause of premature death for both genders. For females, IHD is followed by stroke and breast cancer, whereas for males road traffic injury and lung cancer rank second and third respectively. Ethnic differences in the rankings are not major, the most noticeable differences being higher rankings among Māori compared with non-Māori for diabetes and causes of infant mortality including SIDS. The top 20 specific causes account for 72 percent of total YLL among males and 70 percent among females.

Table 8: Top 20 causes of YLL, by gender, 1996

Rank	Male		Female	
	Cause	YLLs	Cause	YLLs
1	IHD	38,570	IHD	25,526
2	Road traffic injury	10,638	Stroke	13,425
3	Lung cancer	10,245	Breast cancer	9975
4	Suicide	9946	CORD	7093
5	Stroke	8915	Colorectal cancer	6556
6	CORD	8337	Lung cancer	6413
7	Colorectal cancer	6763	LRTI	5232
8	Prostate cancer	4146	Road traffic injury	3820
9	Diabetes	3321	Diabetes	3258
10	LRTI	3134	Suicide	2895
11	Lymphoma/myeloma	2527	Lymphoma/myeloma	2594
12	Aortic aneurysm	2300	Ovary cancer	2528
13	Stomach cancer	2121	Dementia	2447
14	Leukaemia	1946	Pancreas cancer	1924
15	SIDS	1939	Aortic aneurysm	1912

16	Brain cancer	1761	Brain cancer	1686
17	Pancreas cancer	1551	Leukaemia	1580
18	Melanoma	1513	Stomach cancer	1441
19	Oesophagus cancer	1379	Cervical cancer	1427
20	Low birth weight	1303	Nephritis/nephrotic syndrome	1393
Top 20		122,355		103,125
Total		168,796		147,879
Top 20 as % of total		72.4		69.7

Source of base data: NZHIS
Note: excludes 'NEC' categories.

The Burden of Non-Fatal Diseases and Injuries

Unlike the estimates of YLL, the YLD estimates presented here are more uncertain:

- Some of the epidemiological data on which the YLD estimates are based – incidence, duration and severity distribution of each condition, indexed by age, gender and ethnicity – are not reliable, and modelling approaches or Australian data had to be used where New Zealand data were lacking.
- The health state preferences used to derive the disability weights for each condition (by stage or sequela) are based mainly on a valuation exercise undertaken in the Netherlands and may not accurately reflect the value judgements of New Zealanders.

The uncertainty in the YLD estimates for some conditions means that detailed descriptive analysis as presented for YLL is not justified; instead only a brief summary at a reasonably high level of aggregation is presented here.

In 1996 the total burden of non-fatal diseases and injuries was estimated to be 246,509 YLDs, discounted at 3 percent per year. The distribution of this burden by age, gender and ethnicity is shown in Tables 9a, 9b and 9c.

Table 9a: YLD, by age, gender and ethnicity, 1996

Age (years)	All persons			Māori			Non-Māori		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–14	17,628	14,091	31,719	4844	3818	8662	12,784	10,273	23,057
15–24	13,243	18,421	31,663	3016	4005	7021	10,226	14,416	24,642
25–44	22,554	33,454	56,008	4206	5541	9747	18,347	27,913	46,261
45–64	31,338	32,887	64,225	4093	3541	7634	27,245	29,346	56,591
65+	28,585	34,309	62,894	1447	1604	3052	27,138	32,704	59,842
Total	113,347	133,161	246,509	17,607	18,509	36,115	95,741	114,653	210,393

Table 9b: YLD percentage, by age, gender and ethnicity, 1996

Age (years)	All persons			Māori			Non-Māori		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–14	15.6	10.6	12.9	27.5	20.6	24.0	13.4	9.0	11.0
15–24	11.7	13.8	12.8	17.1	21.6	19.4	10.7	12.6	11.7
25–44	19.9	25.1	22.7	23.9	29.9	27.0	19.2	24.3	22.0
45–64	27.6	24.7	26.1	23.2	19.1	21.1	28.5	25.6	26.9
65+	25.2	25.8	25.5	8.2	8.7	8.5	28.3	28.5	28.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 9c: YLD rate, by age, gender and ethnicity, 1996

Age (years)	All persons			Māori			Non-Māori		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–14	40.5	34.3	37.5	46.6	38.8	42.8	38.6	32.9	35.8
15–24	47.7	67.5	57.5	57.7	75.1	66.5	45.4	65.7	55.4
25–44	40.3	57.3	49.0	55.7	67.4	61.8	37.9	55.7	46.9
45–64	84.4	88.4	86.4	127.3	106.8	116.8	80.4	86.6	83.5
65+	154.0	140.5	146.3	196.9	177.3	185.5	152.2	139.1	144.7
Total	58.8	63.7	61.2	77.9	75.8	76.8	56.3	62.0	59.2

Source of base data: compiled from multiple sources
Note: rate per 1000; for 'total' row, rate is age standardised to Segi's world population.

YLDs are distributed more evenly across the lifespan than are YLLs. YLD rates are fairly stable until middle age, when they approximately double, then double again in old age. About 13 percent of the total non-fatal burden is sustained in each of childhood and youth, with young adulthood, mid-life and old age each contributing about 25 percent. The burden of non-fatal disease falls more heavily on females than males, with age standardised rates of 64 per 1000 and 59 per 1000 respectively. Thus in 1996 females lost approximately 133,000 YLDs compared with about 113,000 for males (rounded and discounted at 3 percent per year). Standardising for age, the Māori YLD rate (genders pooled) was 77 per 1000 – 30 percent higher than the non-Māori rate of 59 per 1000.

Causes of the non-fatal disease and injury burden

The pattern of causation of YLD (Table 10) is very different from that of YLL. Across the whole population, mental illness is estimated to account for 25 percent of the total non-fatal disease burden, followed by neurosensory (13 percent), chronic respiratory (12 percent) and cardiovascular (11 percent) diseases. Cancers, endocrine disorders (mainly diabetes) and musculoskeletal conditions each contribute about 7 percent to the burden. These seven cause groups together account for more than four-fifths of total YLD (83 percent).

Injury (intentional and unintentional) appears to account for a smaller share of the burden (8 percent for males and 4 percent for females) than might have been expected on the basis of the 1996–97 New Zealand Disability Surveys data. This may reflect failure of the estimation method to fully capture the disability associated with minor injuries (which have a high incidence although a short duration of disability and a low disability weight), or to adequately account for the late effects of injury.

Cancer contributes relatively little (about 7 percent) to the YLD burden, in contrast to its YLL contribution (29 percent). Most cancers produce relatively little disability until a late, pre-terminal stage (or are cured at an earlier stage of disease). Endocrine and related disorders are estimated to contribute approximately 7 percent of the total YLD burden, of which diabetes accounts for approximately three-quarters. However, this does not capture the macrovascular complications of diabetes (the contribution of diabetes as a risk factor for IHD and stroke). Diabetes as a risk factor rather than a disease is considered later in this report.

Table 10: YLD, by cause group and gender, 1996

Cause group	Male			Female			Total		
	Number	Percentage	Rate	Number	Percentage	Rate	Number	Percentage	Rate
Infection	2857	2.5	1.6	3059	2.3	1.6	5916	2.4	1.6
Infant	4414	3.9	3.6	4343	3.3	3.5	8757	3.6	3.6
Injury	8465	7.5	4.8	4812	3.6	2.5	13,277	5.4	3.7
Cancer	8950	7.9	3.8	8399	6.3	3.3	17,348	7.0	3.5
Endocrine	8615	7.6	4.1	8241	6.2	3.6	16,856	6.8	3.9
CVD	14,354	12.7	6.6	12,209	9.2	4.6	26,563	10.8	5.6
Respiratory	16,015	14.1	9.1	14,771	11.1	8.5	30,786	12.5	8.8
Other chronic	4442	3.9	2.1	10,614	8.0	4.7	15,057	6.1	3.4
Musculoskeletal	6292	5.6	3.0	10,047	7.5	4.6	16,339	6.6	3.8
Neurosensory	15,452	13.6	7.0	17,416	13.1	6.2	32,869	13.3	6.6
Mental	23,491	20.7	13.1	39,249	29.5	20.5	62,740	25.5	16.8
Total	113,347	100.0	58.8	133,161	100.0	63.7	246,509	100.0	61.2

Source of base data: compiled from multiple sources
Note: rate per 1000 age standardised to Segi's world population.

The top 10 specific diseases or injuries generating YLDs for the whole population are shown in Table 11. Mental disorders (depression and anxiety states) occupy first and second places as causes of YLD. Chronic respiratory disorders are also highly placed, with asthma ranking third and CORD fifth overall. Diabetes ranks fourth, but would rank more highly were its macrovascular complications included. Osteoarthritis is a major cause of YLD, ranking sixth overall. The remaining places in the top 10 list are occupied by neurosensory disorders (dementia and hearing loss) and the major cardiovascular diseases (IHD and stroke).

Among males, the causal structure differs from the whole-of-population picture, with chronic respiratory diseases rather than mental disorders occupying first and second places, followed by diabetes. Indeed diabetes rather than asthma would rank first as a cause of YLD among males were its macrovascular complications included. Anxiety and depression still rank highly among males (fourth and fifth respectively), but less so than among females. The causal structure of YLD for females more closely mirrors the whole-of-population pattern. Dementia ranks higher among females than males, reflecting their survival advantage at advanced ages. By contrast, smoking related disorders (CORD and IHD) are relatively more important for males. Hearing loss also ranks higher among males, and osteoarthritis among females.

In summary, the causal structure of YLD is very different from that of YLL. Cancers do not make the top 10 (except for breast cancer among females), and IHD and stroke are less highly ranked. Diabetes also ranks more highly as a contributor to the burden of non-fatal disease, as does CORD. Injuries contribute significantly to the burden of disability, but less than they do to the burden of premature mortality, and none appears among the top 10 causes. The most noticeable difference is the high ranking of mental illness, with depression and anxiety states occupying first and second rank respectively. Asthma, neurological disorders (especially dementia), sensory disorders (hearing loss), and musculoskeletal disorders (especially osteoarthritis) also rank highly as causes of YLD. With the exception of dementia, none of these causes contributes significantly to YLL. Chronic respiratory diseases also rank much more highly as causes of non-fatal than of fatal disease burden. In particular, the very high ranking of asthma (third) reflects a combination of high prevalence and moderate disability weighting.

Table 11: Top 10 causes of YLD, by gender, 1996

Rank	Male		Female		Total	
	Cause	YLD	Cause	YLD	Cause	YLD
1	Asthma	7768	Depression	14,416	Depression	20,497
2	CORD	7570	Anxiety disorders	11,623	Anxiety disorders	17,930
3	Diabetes	7280	Asthma	9291	Asthma	17,059
4	Anxiety disorders	6307	Diabetes	7404	Diabetes	14,684
5	Depression	6081	Dementia	6842	CORD	12,418
6	Hearing disorders	5984	Osteoarthritis	6681	Osteoarthritis	11,126
7	IHD	5412	CORD	4848	Dementia	11,070
8	Osteoarthritis	4444	IHD	4296	IHD	9708
9	Dementia	4228	Stroke	3893	Hearing disorders	9427
10	Stroke	3882	Breast cancer	3547	Stroke	7775
Top 10		58,957		72,841		131,694
Total		113,347		133,161		246,509
Top 10 as % of total		52.0		54.7		53.4

Source of base data: compiled from multiple sources

Collectively, the top 10 specific conditions account for more than half of the total non-fatal disease and injury burden.

The Ratio of Fatal to Non-Fatal Disease Burdens

The relative contribution of fatal (YLL) and non-fatal (YLD) disease and injury outcomes to population health is a matter of great policy interest. However, it should be remembered that the estimates for YLD are less robust than those for YLL because they depend on much more comprehensive epidemiological data than mortality alone, and ideally also should be based on New Zealand specific disability weights (social preferences for the different non-fatal health states). Also, the adjustment of YLD for co-morbidity is only partial.

By population subgroup

For the whole population of New Zealand in 1996, 56 percent of the total burden of disease and injury is estimated to result from fatal outcomes (premature mortality) and 44 percent from non-fatal outcomes (partially adjusted for co-morbidity). How this ratio varies across age, gender and ethnic groups is summarised in Table 12.

Table 12: YLD:YLL ratio, by age, gender and ethnicity, 1996

	Age (years)					Gender		Ethnicity		
	0–14	15–24	25–44	45–64	65+	Male	Female	Māori	Non-Māori	Total
YLD	31,719	31,663	56,008	64,225	62,894	113,347	133,161	36,115	210,393	246,509
YLL	19,101	14,753	32,296	79,808	170,716	168,796	147,879	45,623	271,051	316,674
Ratio	1.7	2.2	1.7	0.8	0.4	0.7	0.9	0.8	0.8	0.8

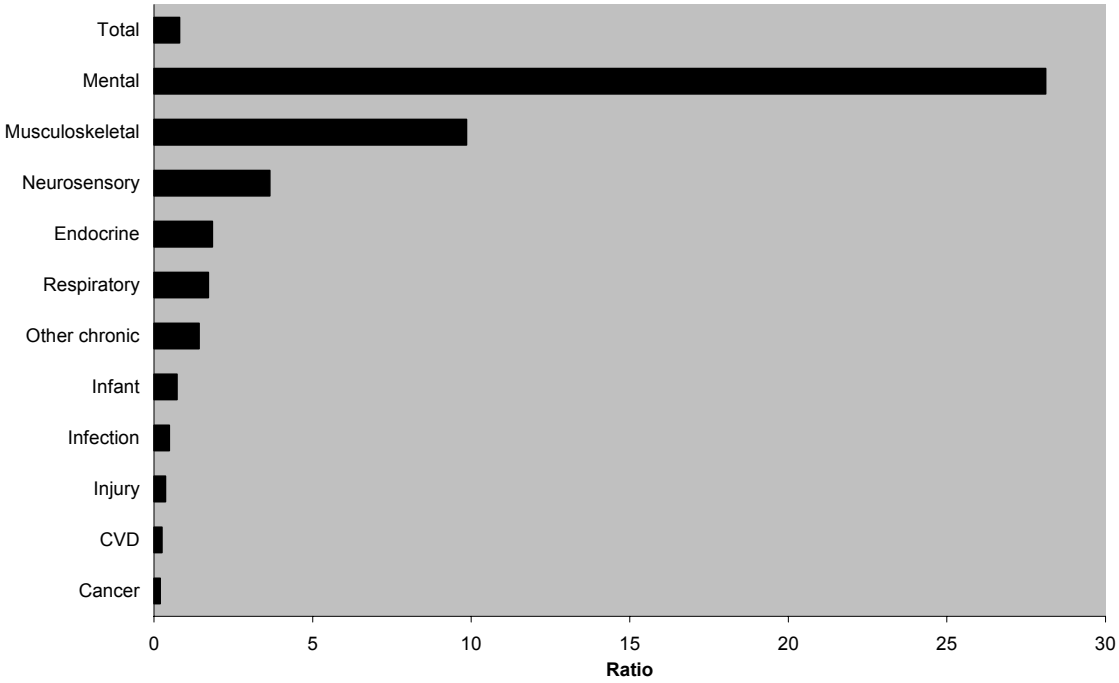
Source of base data: compiled from multiple sources

The burdens imposed by fatal and non-fatal outcomes have very different age structures. In younger age groups, the non-fatal burden is on average about twice as large as the fatal burden. From middle age, the burden of fatal disease predominates. In mid-life, non-fatal diseases account for 45 percent of the total burden, similar to the total population. The non-fatal burden declines to less than a third in old age. For males, a higher proportion of the total burden is accounted for by fatal outcomes than is the case for females. The proportion is about the same for Māori and non-Māori.

By cause group

The differences in YLD:YLL ratios between population subgroups reflect the varying causal structure of both mortality and disability in these groups. Figure 1 summarises YLD:YLL ratios for the major cause groups included in the New Zealand Burden of Disease Study, across the whole population.

Figure 1: YLD:YLL ratios, by cause, whole population, 1996



Source of base data: compiled from multiple sources

The lowest YLD:YLL ratio is for cancers. Relatively low ratios are also found for cardiovascular diseases and – perhaps surprisingly – for injury (however, this may partly reflect a failure to capture data on minor injury for the analysis). By contrast, neuropsychiatric disorders (including sensory disorders) have very high ratios as, except for dementia, these conditions are rarely fatal (although depression is a risk factor for suicide). Musculoskeletal conditions also have very high ratios, being very disabling yet rarely fatal (although some fatalities follow hip fracture in older people secondary to osteoporosis).

The Total Burden of Disease and Injury

The estimates of YLL and YLD presented above can be combined to yield estimates of the total burden of disease and injury in New Zealand in 1996, reflecting both fatal and non-fatal outcomes (that is, integrating both 'quantity of life' and 'quality of life' dimensions of health). This is possible because the preference weighting of YLDs makes the burden of non-fatal outcomes commensurate with that of fatal outcomes, measured in YLLs. Given these additive properties, disability adjusted life years (the integrated unit of health loss) are simply the sum of these two components:

$$DALY = YLL + YLD$$

DALYs can be accumulated for each sociodemographic subgroup and for each cause (disease, injury, risk factor or determinant).

In 1996, a total of 563,183 DALYs were lost by the New Zealand population as a whole, a crude rate of 151 per 1000 and an age standardised rate of 128 per 1000 (standardised to Segi's world population and discounted at 3 percent per year). Males lost 50.1 percent of this total and females 49.9 percent, reflecting a higher non-fatal disease burden among females, largely compensating for their lower burden of fatal outcomes.

Table 13a: DALYs lost, by age, gender and ethnicity, 1996

Age (years)	All persons			Māori			Non-Māori		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–14	28,005	22,815	50,820	8674	7429	16,103	19,332	15,386	34,718
15–24	23,570	22,845	46,415	5703	5048	10,751	17,867	17,797	35,664
25–44	43,369	44,934	88,303	9578	8484	18,062	33,791	36,450	70,241
45–64	77,612	66,421	144,033	13,068	10,753	23,821	64,544	55,668	120,212
65+	109,587	124,025	233,612	6178	6823	13,001	103,409	117,202	220,611
Total	282,144	281,040	563,184	43,201	38,537	81,738	238,943	242,503	481,446

Table 13b: DALY percentage, by age, gender and ethnicity, 1996

Age (years)	All persons			Māori			Non-Māori		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–14	10	8	9	20	19	20	8	6	7
15–24	8	8	8	13	13	13	7	7	7
25–44	15	16	16	22	22	22	14	15	15
45–64	27	24	26	30	28	29	27	23	25
65+	39	44	42	14	18	16	43	48	46
Total	100	100	100	100	100	100	100	100	100

Table 13c: DALY rate, by age, gender and ethnicity, 1996

Age (years)	All persons			Māori			Non-Māori		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–14	64	56	60	83	75	80	58	49	54
15–24	85	84	84	109	94	102	79	81	80
25–44	77	77	77	126	103	114	69	72	71
45–64	209	178	193	405	323	364	190	164	177
65+	590	507	543	840	754	793	579	498	533
Total	136	120	128	217	184	200	127	113	120

Table 13d: Summary of Tables 13a, 13b and 13c

	Age (years)					Gender		Ethnicity		
	0–14	15–24	25–44	45–64	65+	Male	Female	Māori	Non-Māori	All persons
Number	50,820	46,415	88,303	144,033	233,612	282,144	281,040	81,738	481,446	563,184
Percentage	9	8	16	26	41	50	50	15	85	100
Rate	60	84	77	194	543	136	120	200	120	128

Source of base data: compiled from multiple sources
Note: rates are age specific or age standardised (to Segi's world population) per 1000; DALYs are discounted at 3 percent per year.

Tables 13a–13d show that 9 percent of the burden is sustained in childhood, 8 percent in youth, 16 percent in young adulthood, 26 percent in middle age and more than 40 percent in old age. The age distribution of the burden varies between the genders and ethnic groups, reflecting their differing age structures and health risk exposures. Overall, females lose almost as many DALYs as males, but when expressed as a per capita rate and standardised for age, males can be seen to bear a burden 13 percent greater than females (136 per 1000 and 120 per 1000 respectively). Māori currently lose DALYs at approximately 1.7 times the rate of non-Māori (adjusting for age and gender) (200 per 1000 and 120 per 1000 respectively), reflecting a relatively greater burden of both fatal and non-fatal outcomes among Māori.

The causal structure of the burden of disease

Table 14 shows the percentage share of the total burden contributed by each major cause group* (excluding dental disorders and most dermatological diseases), across the population as a whole for each gender. Figure 2 shows how these contributions vary between age groups, and Figure 3 compares Māori and non-Māori patterns of DALY loss.

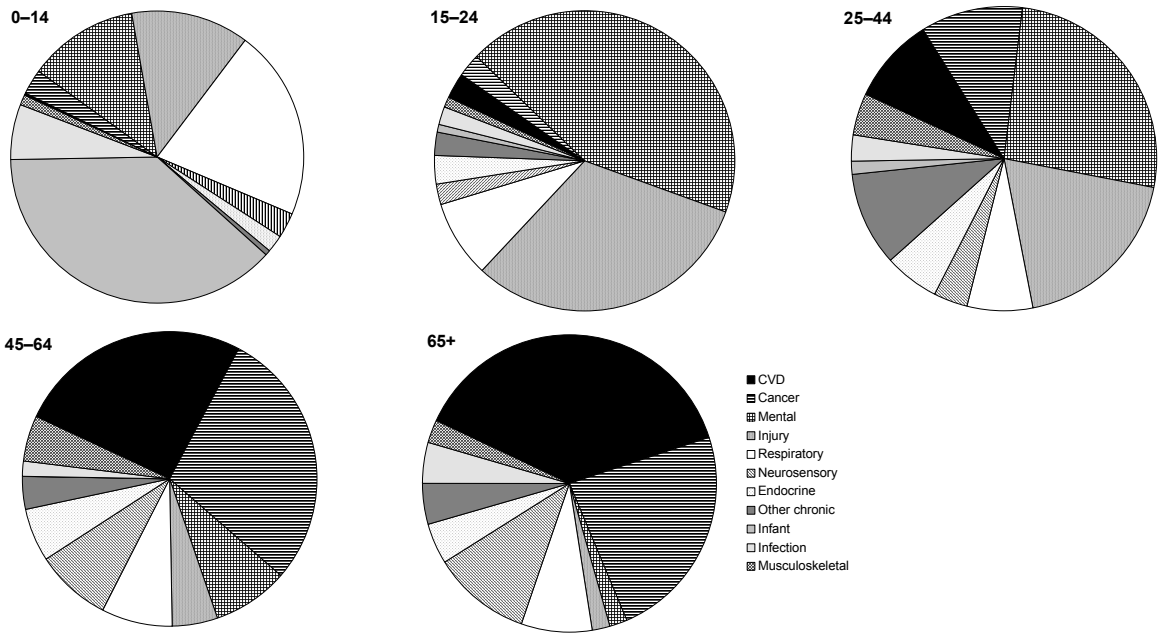
* Cause specific DALYs could be aggregated in other ways. For example, categorical attribution could be used to quantify 'avoidable' DALYs, as is conventionally done for mortality and hospitalisations. However, attribution of the YLD component to 'avoidable and 'unavoidable' categories is problematic at present for some conditions.

Table 14: DALYs lost, by gender and cause group, 1996

Cause group	Male			Female			Persons (all)		
	Number	%	Rate	Number	%	Rate	Number	%	Rate
Infection	8215	3	4	10,055	4	4	18,270	3	4
Infant	11,615	4	9	10,127	4	8	21,743	4	9
Injury	34,905	12	19	14,679	5	8	49,584	9	13
Cancer	54,198	19	24	55,941	20	22	110,138	20	23
Endocrine	13,483	5	6	13,285	5	5	26,767	5	6
CVD	73,444	26	31	62,946	22	19	136,391	24	25
Respiratory	25,999	9	13	23,699	8	11	49,697	9	12
Other chronic	9637	3	4	16,562	6	7	26,199	5	5
Musculoskeletal	6886	2	3	11,361	4	5	18,247	3	4
Neurosensory	19,101	7	9	22,121	8	8	41,223	7	8
Mental	24,665	9	14	40,305	14	21	64,970	12	17
Total	282,148	100	137	281,081	100	118	563,229	100	127

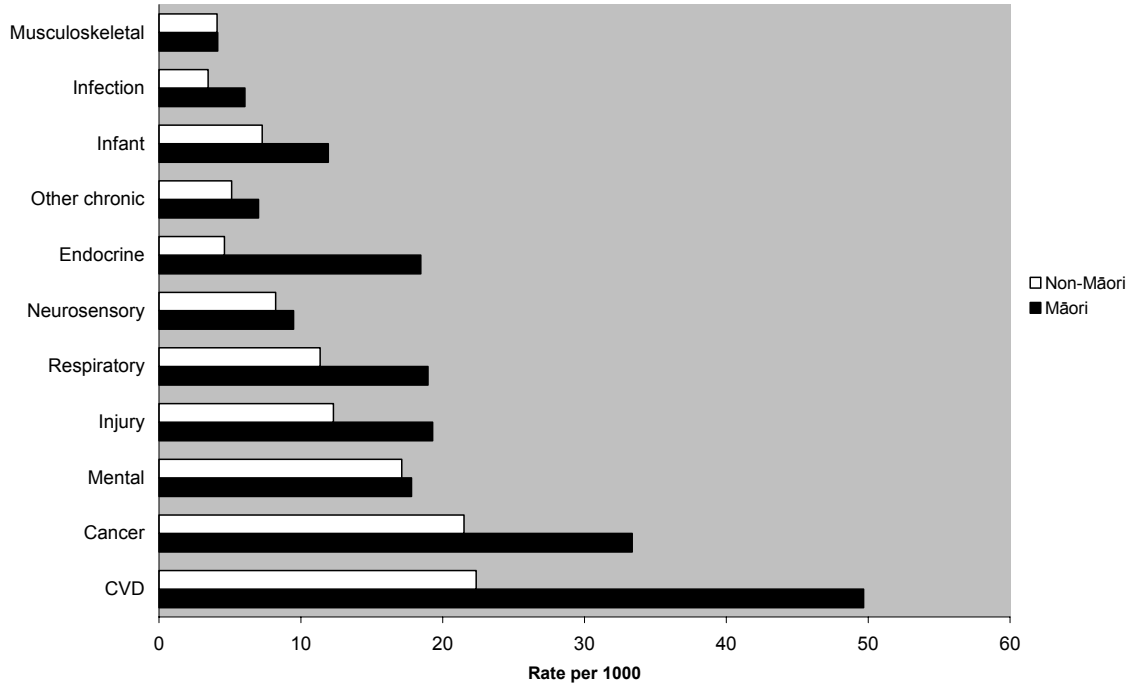
Source of base data: compiled from multiple sources
Note: rate per 1000 age standardised to Segi's world population; total varies because of 'not elsewhere classified' (NEC) categories.

Figure 2: DALYs lost, by age and cause group, 1996



Source of base data: compiled from multiple sources

Figure 3: DALYs lost, by ethnicity and cause group, 1996



Source of base data: compiled from multiple sources
Notes: rates are age standardised to Segi's world population; ethnic difference in musculoskeletal and mental cause groups may be underestimated, due to lack of data.

CVD accounts for the largest share of DALYs lost by the whole population – 24 percent in 1996. The rate for males (31 per 1000) is significantly higher than the rate for females (19 per 1000) once adjusted for age. The health loss to cancer is also large (20 percent of total DALYs) but, unlike CVD, rates for this cause group are similar for both genders (24 per 1000 and 22 per 1000 respectively, when standardised for age). Neuropsychiatric conditions, when considered as a 'supergroup' including all disorders of the mind, brain and sense organs, constitute a third cluster as large as cancer (19 percent of total health lost in 1996 with rates of 23 per 1000 males and 29 per 1000 females). These three cause groups – CVD, cancer and neuropsychiatric disorders – together account for more than three-fifths of total DALYs lost (63 percent overall; 61 percent for males and 64 percent for females).

Injuries are also a major cause group, but here gender differences are marked: injuries (intentional and unintentional combined) account for 12 percent of total DALYs for males, but only 5 percent for females, giving a whole-of-population share of 9 percent. Musculoskeletal disorders, although a significant cause of YLD, account for only 3 percent of DALYs, reflecting the very low mortality associated with these conditions. Infections and infant conditions account for slightly higher proportions of DALYs, in part because of their age distributions. The relatively high proportion of DALYs attributable to chronic respiratory conditions (9 percent of the total) includes major contributions from asthma to YLDs, and from CORD to both YLDs and YLLs. Similarly, the relatively high contribution from endocrine and related disorders (almost 5 percent) largely reflects the impact of diabetes on both mortality and morbidity, but more especially the latter.

Table 15 shows the top 20 individual diseases and injuries contributing to DALYs for males and females of all ages and ethnicities.

Table 15: DALYs lost, by top 20 specific causes and gender, 1996

Rank	Male		Female		All persons	
	Cause	DALY	Cause	DALY	Cause	DALY
1	IHD	43,982	IHD	29,822	IHD	73,804
2	CORD	15,907	Stroke	17,318	Stroke	30,115
3	Road traffic injury	12,827	Depression	14,416	CORD	27,848
4	Stroke	12,797	Breast cancer	13,522	Diabetes	21,263
5	Lung cancer	11,034	CORD	11,941	Depression	20,497
6	Diabetes	10,601	Anxiety disorders	11,623	Asthma	18,800
7	Suicide/self harm	9998	Diabetes	10,662	Anxiety disorders	17,930
8	Asthma	8546	Asthma	10,254	Lung cancer	17,919
9	Colorectal cancer	8259	Dementia	9289	Road traffic injury	17,634
10	Prostate cancer	7362	Colorectal cancer	8003	Colorectal cancer	16,262
11	Anxiety disorders	6307	LRTI	7518	Dementia	14,710
12	Depression	6081	Lung cancer	6885	Breast cancer	13,522
13	Hearing disorders	5984	Osteoarthritis	6791	Suicide/self harm	12,940
14	Dementia	5421	Road traffic injury	4807	LRTI	11,621
15	Osteoarthritis	4469	Hearing disorders	3444	Osteoarthritis	11,260
16	LRTI	4103	Suicide/self harm	2942	Hearing disorders	9428
17	Substance use	3685	Lymphoma/myeloma	2742	Prostate cancer	7362
18	Peripheral arterial disease	3646	Ovary cancer	2650	Substance use	6082
19	Childhood conduct disorders	3081	Falls	2468	Peripheral arterial disease	6021
20	Falls	2827	Substance use	2397	Lymphoma/myeloma	5460
Top 20		186,917		179,494		360,478
Total		282,144		281,040		563,184
Top 20 as % of total		66.2		63.9		64.0

Source of base data: compiled from multiple sources
Note: lymphoma includes Hodgkin's disease and myeloma as well as malignant lymphomas.

IHD accounts for approximately 13 percent of total DALYs (almost 16 percent among males and over 10 percent among females) – the only specific disease cause to exceed 10 percent of total DALYs. Stroke ranks second overall and among females, but slightly lower (fourth) for males; in the whole population, this condition accounts for over 5 percent of total DALYs – the only other condition to exceed 5 percent of the total. Two smoking related diseases – CORD and lung cancer – also rank within the top 10 causes overall (third and eighth respectively), although lung cancer does not rank as highly for females. Among males, smoking is a risk factor for four of the top five causes (IHD, CORD, lung cancer and stroke), the only exception being road traffic injury.

The top 10 rankings are heavily dominated by chronic conditions. These include three cancers – colorectal in both genders, lung cancer in males and breast cancer in females. Two chronic respiratory conditions – CORD and asthma – also rank in the top 10 overall and for both genders separately. Diabetes is ranked fourth overall, but of course also contributes indirectly to both the first (IHD) and second (stroke) ranked causes. Two mental health conditions, depression and anxiety disorders, also rank within the top 10 overall and for females, but rank slightly lower for males.

Injury causes rank highly among males, with road traffic injury (ranked third) accounting for almost 5 percent of DALYs lost by males in 1996, and suicide (ranked seventh) for close to

4 percent. By contrast, no injury cause appears in the top 10 for females and only road traffic injury makes the top 10 overall (ranked ninth in the whole population and accounting for 3 percent of DALYs in 1996).

In the whole population, 15 conditions each accounted for 10,000 DALYs or more lost in 1996. Together, these conditions accounted for at least 50 percent of the total health loss sustained in that year, even allowing for some overestimation in the YLD component of the DALY (Table 16). Eleven of these are major causes of fatal outcomes: IHD, stroke, CORD, diabetes, road traffic injury, lung cancer, colorectal cancer, dementia, breast cancer, LRTI and suicide. Of these, six are also major causes of disability (IHD, stroke, CORD, diabetes, road traffic injury and dementia). Four of the 15 are largely non-fatal conditions (depression, anxiety disorders, asthma and osteoarthritis).

Table 16: Conditions causing at least 10,000 DALYs, 1996

Condition	DALY	Percentage of total DALYs	Major modifiable risk factors
CVD			
IHD	73,804	13.1	Smoking, high blood pressure, high blood cholesterol, physical inactivity, obesity, high fat low vegetable diet, diabetes
Stroke	30,115	5.4	High blood pressure, diabetes, smoking, physical inactivity
Respiratory			
CORD	27,848	4.9	Smoking
Asthma	18,800	3.3	Passive smoking, allergen avoidance
LRTI	11,621	2.1	Lack of vaccination (pneumonia, influenza)
Diabetes	21,263	3.8	Physical inactivity, obesity
Cancers			
Colorectal	16,262	2.9	Low vegetable diet, physical inactivity
Lung	17,919	3.2	Smoking, low vegetable diet, physical inactivity
Breast	13,522	2.4	Lack of mammography screening
Neuropsychiatric			
Depression	20,497	3.6	Stress, physical inactivity
Anxiety disorder	17,930	3.2	Stress
Dementia	14,710	2.6	Physical inactivity, other stroke risk factors
Injury			
Road traffic injury	17,634	3.1	Speed, alcohol, non-seat belt use
Suicide	12,940	2.3	Depression, stress
Osteoarthritis	11,264	2.0	Obesity, physical inactivity

Source of base data: compiled from multiple sources

Sensitivity analysis

The YLL estimates are reasonably robust, but the same cannot be said for the YLD estimates. For some major causes or cause groups – including all cancers, IHD, stroke, diabetes, asthma, birth defects and other perinatal and infant causes, most infections, and some injuries – New Zealand data were available to estimate YLDs. For others, including the major groups of psychiatric and musculoskeletal disorders, Australian data had to be used to estimate YLDs. About 55 percent of DALYs are contributed by YLL, and almost 40 percent of the total YLDs by conditions for which New Zealand specific epidemiological data were available; thus the major area of uncertainty involves approximately 30 percent of the total DALYs.

A sensitivity analysis was done by re-running the DALY calculations with the YLD estimates for the uncertain conditions inflated or deflated by 50 percent, in order to bracket the possible range in which they could realistically fall. This does not have a major effect on the total DALYs (total DALYs vary from approximately 85–115 percent of the estimate presented here) or their distribution across subgroups of the population. However, it does alter the precise rankings of different causes and their relative share of total DALYs.

Although improvements in data feeder systems are clearly needed to close these data gaps, this level of uncertainty probably does not preclude the use of the estimates reported here for several policy applications. Also, one of the purposes of presenting this 'provisional' information is to give policy makers, their advisers and other stakeholders an opportunity to see burden of disease analysis in action: if this sort of information is found to be useful, then further effort to refine the DALY estimates (together with investment in data feeder systems) may be justified.

The Burden Attributable to Major Risk Factors

In epidemiology, relative risk (RR) and similar measures are used to assess the strength of the relationship between a particular exposure (risk factor) and the incidence of a particular disease (or outcome), by comparing the magnitude of risk of exposed individuals to that of unexposed individuals (assuming that the relationship is causal). The public health or societal impact of an exposure, however, depends not only on the magnitude of the relative risk but also on the prevalence of the risk factor in the population.

Population attributable risk (PAR) can be calculated from estimates of the relative risk and the population prevalence of the risk factor to provide an estimate of how much of a particular disease could be prevented if exposure to the risk factor were eliminated (Powell 1994). A measure such as PAR takes into account both the strength of the association (relative risk associated with the exposure) and the prevalence of the exposure. Using this approach, the effect of eliminating various risk factors can be compared.

The population attributable risks (PARs) calculated by the Ministry of Health (Ministry of Health 1999) have been applied to the DALY estimates presented here, allowing the proportion of the burden attributable to each risk factor to be calculated. An explanation of the PAR concept and method is provided in Appendix 2 to this report.

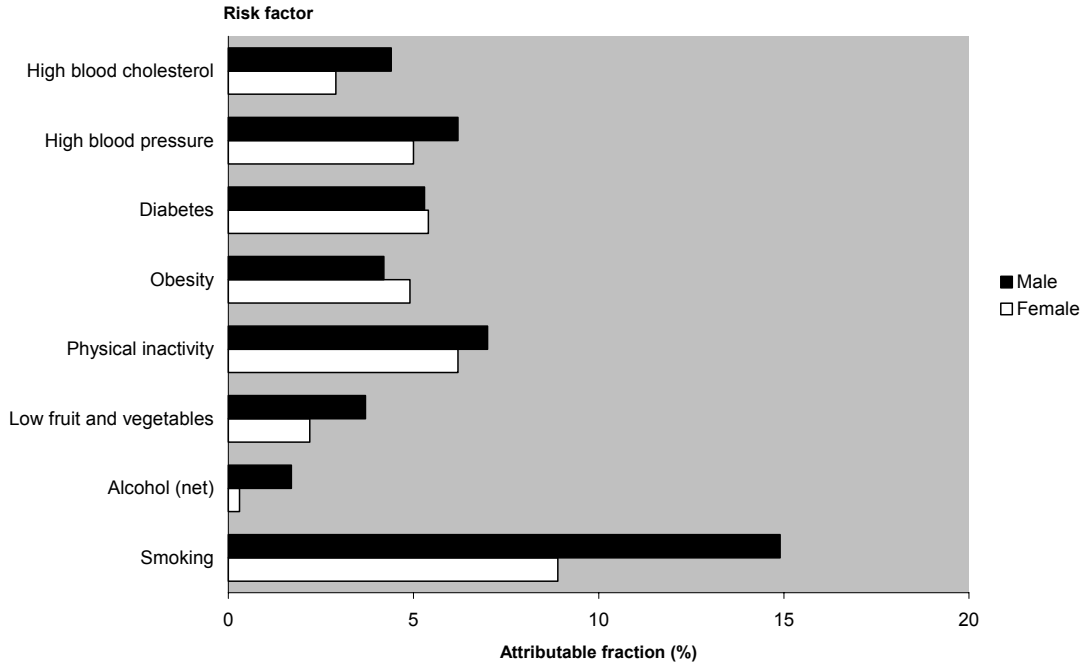
These results should be regarded as approximate only, for the following reasons.

- Associations between the causes considered and the diseases included in the New Zealand Burden of Disease Study have not been fully investigated in all cases.
- The relative risks used to calculate the PARs have mostly been extracted from the international literature and may differ from those pertaining in New Zealand in 1996.
- The relative risks used here relate mainly to mortality rather than to incidence; for conditions with both fatal and non-fatal outcomes, it is assumed that the relative risk for YLL is the same as that for YLD. This assumption may not be warranted in all cases.
- The relative risks are not fully adjusted for important co-variates (confounders) in all cases.
- The univariate PARs calculated do not allow for clustering and interaction of risk factors.

The attributable burden estimates should therefore be considered approximate only. Furthermore, interpretation of the attributable fraction as the proportion of the current burden attributable to the risk factor concerned is problematic, since exposure of the population to the risk factor may have differed in the past. Instead, the attributable fraction should be interpreted as the proportion of the current burden potentially avoided in the future, were exposure to the risk factor to be eliminated – this has been called the "avoidable burden" (Murray and Lopez 1999).

PARs cannot be added across risk factors; however, burdens attributable to one risk factor may be added across outcomes to give an estimate for the total burden attributable to that risk factor. This is done in Figure 4 below, which shows the percentage of total DALYs lost in New Zealand in 1996 estimated to be attributable to each of eight risk factors, summing across all conditions included in the New Zealand Burden of Disease Study and all population subgroups.

Figure 4: DALYs attributable to major risk factors, 1996



Source of base data: compiled from multiple sources

Tobacco accounts for approximately 15 percent of DALYs lost among males, but only about 9 percent among females. Physical inactivity is the second leading risk factor among both genders, accounting for approximately 7 percent and 6 percent of total DALYs respectively. For both genders, obesity, high blood cholesterol and high blood pressure are significant risk factors, accounting for approximately 3–6 percent of total DALYs each. Alcohol causes significant harm among males, accounting for almost 5 percent of DALYs, but this is offset by the benefits of moderate alcohol consumption on IHD, reducing health loss by approximately 3 percent; the net impact of alcohol on DALYs is thus relatively small. Diabetes emerges as a significant risk factor, accounting for over 5 percent of total DALYs. This may be compared with the estimate of less than 4 percent of total DALYs as the direct burden of diabetes as a disease – an estimate approximately 30 percent lower than the total diabetes attributable burden.

This analysis examines the impact of behavioural and other risk factors in a decontextualised way. Yet these risk factors are generated, or at least shaped, by the social context in which they exist. A more complete and policy relevant analysis would include the social, economic and cultural determinants of health, operating over the life course and at multiple levels (individual, family, community). The data and models required to do this are not yet available; future iterations of the Burden of Disease Study should aim to include these variables.

Nevertheless, even this limited analysis provides some indication of the health gains that could be made from further efforts to reduce the exposure of the population, and key subgroups within it, to the well known behavioural and biological risk factors for chronic diseases. Other risk factors (for example, injury risk factors except for alcohol) could not be included in the analysis because of lack of data.

Summary and Conclusions

Initially promoted by the World Bank, national burden of disease studies are now being strongly encouraged and supported by WHO. More than 40 nations, including most of the OECD countries, are currently undertaking such assessments (Alan Lopez, personal communication 1999). WHO is planning to update the Global Burden of Disease Study (1990) for the year 2000 (scheduled for publication in 2003).

Nevertheless, the usefulness of burden of disease assessments for policy makers and health planners remains to be fully evaluated. Familiarisation with the concepts and methods underlying this measure of health gap will be needed before applications can be developed and judgements made as to the added value of burden of disease analysis. Nevertheless, the Ministry of Health has already successfully applied the results of this study to assist with the selection of priority health objectives for the New Zealand Health Strategy (King 2000).

The usefulness of this sort of data for both health policy and health service planning will be enhanced as a time series develops, and as the quality of the data used to generate the YLD component of the DALY improves. The DALYs reported here are reasonably robust for those diseases dominated by mortality (ie, where YLL is much greater than YLD) and for those diseases for which comprehensive epidemiological data are already available to enable reasonably precise estimation of YLDs. The latter group includes such major chronic diseases as cancer, IHD, stroke, diabetes and asthma, as well as some injuries and infectious diseases. For many other diseases, however, Australian data had to be used to fill data gaps. The major data gaps are in the areas of musculoskeletal and mental disorders. The need for data on the prevalence of musculoskeletal disorders could be met by inclusion of appropriate questions in future waves of the national health and disability surveys; a national mental health survey similar to that conducted recently in Australia (Andrews et al 1999) is currently (mid-2000) being piloted by the Ministry of Health.

Given comprehensive epidemiological data, New Zealand specific disability weights, and regular (for example, five yearly) iteration, burden of disease assessment could potentially develop into a major tool for policy analysis in health. Yet the methodology has inherent limitations arising from its disease-by-disease base and consequential failure to utilise population level data from national health and disability surveys. In addition, its negative orientation – as a measure of health loss rather than health gain – may make it less attractive to some potential users. For both these reasons, it will be necessary to supplement burden of disease assessment with positive measures of health expectancy or health adjusted life expectancy, derived from national health, disability or health-related quality of life surveys.

In principle, these two families of summary measures of population health – health expectancy and health gap – could be measured in such a way as to make them not only conceptually but also quantitatively complementary (by using consistent health state descriptors and valuations for both indicators, if not actually deriving both measures from the same dataset). Health adjusted life expectancy (disability adjusted life expectancy) would provide a whole-of-population measure at the strategic level, allowing the health of the population to be monitored over time and compared with that of other countries, and enabling trends in equity of outcomes across sociodemographic groups to be monitored and priority groups to be identified for targeting. DALYs would elaborate this description of population health status, and identify the shares or contributions made by different causes (diseases and risk factors) to the level of health experienced by the population or sociodemographic group. Such assessments could then be linked to economic evaluations of specific health interventions (marginal cost utility analyses) to complete the priority setting and

outcome evaluation framework. This concept, summarised in Table 17, is similar to that proposed more recently by the World Health Organization (WHO 2000).

Table 17: A possible framework for application of integrated measures of health to policy analysis

Outcome measure	Level of application	Purpose	Example
HALE (DALE)	Macro	Strategic	Are we achieving our equity objectives?
DALY	Meso	Funding	Do we have the right balance between funding for mental health versus other services?
QALY	Micro	Service delivery	Should we subsidise immunisation of children against chickenpox?

Source of base data: compiled from multiple sources
Notes: HALE = health adjusted life expectancy; DALE = disability adjusted life expectancy; DALY = disability adjusted life year; QALY = quality adjusted life year.

Yet before such applications can be contemplated, a number of ethical issues surrounding the use of DALYs remain to be debated and resolved. As a QALY type measure, the DALY has been criticised for discriminating against older people and those with disabilities, although this claim has been refuted (Murray and Acharya 1997). For some, the concept of quality adjusting survival is fundamentally flawed from an ethical point of view, or considered to be technically impossible. However, it could be argued that trade-offs of quality for quantity of life are inevitable under any policy setting, whether done implicitly or explicitly. According to this argument, the advantage of tools such as the DALY is that they allow the policy maker's value judgements to be made explicit and transparent, and so subject to rational debate.

This is clearly reflected in a comparison of condition rankings based on YLLs, YLDs, and DALYs (Table 18). Rankings based on the impacts on fatal and non-fatal outcomes are very different. If such rankings are to be used for priority setting, for example, these differences need to be reconciled. The ranking by DALYs achieves this, by using a common metric to integrate both sets of outcomes.

Table 18: Top 10 conditions, ranked by YLL, YLD and DALYs, males and females, 1996

Rank	YLL	YLD	DALY
Male			
1	IHD	Asthma	IHD
2	Road traffic injury	CORD	CORD
3	Lung cancer	Diabetes	Road traffic injury
4	Suicide	Anxiety disorders	Stroke
5	Stroke	Depression	Lung cancer
6	CORD	Hearing loss	Diabetes
7	Colorectal cancer	IHD	Suicide and self harm
8	Prostate cancer	Osteoarthritis	Asthma
9	Diabetes	Dementia	Colorectal cancer
10	LRTI	Stroke	Prostate cancer
Female			
1	IHD	Depression	IHD
2	Stroke	Anxiety disorders	Stroke

3	Breast cancer	Asthma	Depression
4	CORD	Diabetes	Breast cancer
5	Colorectal cancer	Dementia	CORD
6	Lung cancer	Osteoarthritis	Anxiety disorders
7	LRTI	CORD	Diabetes
8	Road traffic injury	IHD	Asthma
9	Diabetes	Stroke	Dementia
10	Suicide	Breast cancer	Colorectal cancer

Source of base data: compiled from multiple sources
Note: all indicators are discounted at 3 percent; YLL are calculated by the RLE method.

Although the above table of rankings illustrates the integrative power of burden of disease analysis, the method presents a number of challenges. First, epidemiological data for YLD estimation are lacking for many conditions. Sensitivity analysis does suggest that the resulting errors may not be excessively large, but data feeder systems need to be strengthened if the potential of this approach to population health measurement and monitoring is to be fully exploited. Second, the methods used here do not fully adjust for co-morbidity (co-disability) and so may overestimate the burden of non-fatal disease, especially in older age groups. However, improved methods for co-morbidity adjustment are being developed (Mathers et al 1999). Finally, the results reported here (for YLD and hence DALYs) assume that the disability weights derived in one culture may be applied to another. Although there is some evidence to support this (Murray and Lopez 1996), burden of disease analysis would gain in validity were a valuation exercise to be undertaken in New Zealand, allowing locally derived disability weights (social preferences for different states of health) to be used in future burden of disease studies (WHO 2000).

Glossary and Abbreviations

Abbreviations

CORD	chronic obstructive respiratory disease
CVD	cardiovascular disease
IHD	ischaemic heart disease
LRTI	lower respiratory tract infection
NNS	National Nutrition Survey 1997
NZDS	New Zealand Disability Surveys 1996–97
NZHIS	New Zealand Health Information Service
NZHS	New Zealand Health Survey 1996–97
RTI	road traffic injury
SIDS	sudden infant death syndrome
SNZ	Statistics New Zealand

Glossary

Age standardised rate	rate that has been statistically adjusted to enable valid comparison despite differences in the age structures of the populations being compared. In this report, Segi's World Population (a model population) is used as the reference population for age standardisation by the direct method.
Attributable fraction	the maximum proportion by which the incidence or mortality of a specified disease or other health outcome in a specified population could theoretically be reduced if a given risk factor of the outcome of interest were eliminated.
Burden of disease	a measure of the social impact of a disease (or injury) on a population, including both fatal and non-fatal outcomes of the disease (or injury).
Co-morbidity (co-disability)	co-existence of more than one disease (disability) in the same individual at a given time.
Disability	functional, activity or role limitation resulting from a health condition and lasting (or expected to last) for six months or more.

Disability adjusted life expectancy (DALE)	the average number of years an individual of a given age is expected to live, with the years of life weighted on a 0-1 scale according to the social preferences for the different states of disability into which the population is distributed, if current mortality and disability rates, and current disability state valuations, continue to apply.
Disability adjusted life year (DALY)	a health gap measure derived by adding YLD to YLL. One DALY thus represents the loss of one year of *healthy* life.
Disability weight	social preference for a specified health (disability) state, measured on a 0-1 scale using a person trade-off or similar valuation method.
Discounting	a mathematical method for reducing the value of future health losses so as to reflect their present value.
Health gap	the difference between the observed health status of a population and some standard or reference level of health.
Model life table	a standard or reference life table used to estimate life expectancy remaining at age of death (ie the health loss function) for calculation of YLL.
Morbidity	any departure (subjective or objective) from a state of physiological or psychological wellbeing.
Mortality	death.
Population attributable risk (PAR)	the difference between the incidence (or mortality) rate of a specified disease in the total population and in those not exposed to a given risk factor for the disease.
Population health status	the level of health experienced by a population at a given time.
Premature mortality	the social burden of fatal health outcomes, measured in terms of years of life lost.
Quality of life	an individual's perception of their position in life in the context of the culture in which they live, and in relation to their goals, expectations and standards. The term incorporates concepts of physical and psychological wellbeing, levels of independence and autonomy, social relationships and support, and spirituality.
Relative risk	the ratio of the risk (or rate, or odds) of a disease (or other health event or condition) among those exposed to a given risk factor to that among those unexposed.
Summary measure of population health (SMPH)	A population health indicator that integrates both quantity of life (mortality) and quality of life (morbidity or disability) dimensions of health into a composite index. May be a health expectancy or a health gap measure.

Years of life lost (YLL)	an indicator of the social burden of fatal health outcomes, calculated by subtracting the age at death from the life expectancy remaining at that age (as determined from a suitable standard or reference life table).
YLD	a measure of the burden of non-fatal health outcomes, used in the construction of the DALY. YLD represents the equivalent of years of life lost to severity adjusted disability.

Appendix 1: New Zealand Burden of Disease Study: Conditions, Stages and Disability Weights

Level 1

Condition group	Description
A	Infectious diseases
B	Maternal conditions
C	Perinatal and infant disorders
D	Birth defects, chromosomal disorders and hereditary conditions
E	Unintentional injuries and adverse effects of health care
F	Intentional injuries including self harm
G	Cancers (benign and malignant neoplasms)
H	Endocrine, metabolic, haematologic and immunological conditions
I	Cardiovascular disorders
J	Chronic respiratory disorders
K	Digestive disorders (gastrointestinal and hepatic disorders)
L	Genitourinary disorders (disorders of the kidney and urinary tract and the reproductive system)
M	Musculoskeletal disorders (disorders of bones, muscles, tendons, joints and connective tissue)
N	Neurological disorders (including the dementias)
O	Sense organ disorders (vision and hearing loss)
P	Psychiatric conditions

Note: for certain analyses, several of the above categories have been combined to create a smaller number of 'supercategories'.

Level 2

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
A1	Upper respiratory tract infection/otitis media	460–465, 381–382	Acute nasopharyngitis	0.014	EQ-5D+
			Acute sinusitis	0.061	EQ-5D+
			Pharyngitis/tonsillitis	0.061	EQ-5D+
			Otitis media – acute episode	0.090	Dutch
			Otitis media – chronic (glue ear)	0.110	Dutch
			Otitis media – deafness	0.233	Dutch
A2	Lower respiratory tract infection (pneumonia and influenza)	466, 480–487	Influenza episode	0.047	EQ-5D+
			Acute bronchitis episode	0.132	EQ-5D+
			Pneumonia episode	0.373	EQ-5D+
A3	Tuberculosis	010–018, 137	Case	0.295	GBD
A4	STDs/PID/ectopic	090–099, 614–616, 633	Case (uncomplicated)	0.067	GBD weight for urethritis
			PID	0.420	GBD
			Chronic pelvic pain	0.122	GBD
			Ectopic pregnancy	0.549	GBD

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
A5	HIV/AIDS	042	HIV infection	0.200	Dutch
			AIDS	0.560	Dutch
			AIDS – terminal phase	0.950	Dutch
A6	Hepatitis	070	Acute hepatitis	0.210	Dutch
			Chronic hepatitis (B or C)	0.360	Dutch
			Cirrhosis	0.310	Dutch
			Hepatic failure	0.840	Dutch
A7	Meningitis/ septicaemia	036, 320–323, 038	Acute episode	0.894	EQ-5D+
			Deafness	0.370	Dutch
			Seizure disorder	0.110	Dutch
			Motor deficit	0.170	Dutch
			Cognitive deficit	0.250	Dutch
			Combined neurological deficit	0.760	Dutch
A8	Infectious diseases NEC	Rest of 001–139, 680–686, 390–392	Cases	*	
B1	Maternal haemorrhage	640 641, 666	Case	0.011	GBD
B2	Maternal hypertensive disorders	642	Episode	0.117	EQ-5D+
			Neurological sequelae	0.388	GBD
B3	Obstructed labour	660	Episode	0.108	ABDS
B4	Obstetric conditions NEC	Rest of 630–677		*	
C1	Birth trauma and asphyxia	767–768	Cerebral palsy without intellectual disability	0.170	Dutch
			Intellectual disability (ID)		
			– mild	0.290	Dutch
			– moderate	0.430	Dutch
			– severe	0.820	Dutch
C2	Low birth weight	764–765, 769	Hearing loss		
			– mild	0.110	Dutch
			– severe	0.370	Dutch
			Vision loss	0.170	Dutch
			Seizure disorder	0.110	Dutch
			Cerebral palsy without ID	0.170	Dutch
			ID		
			– mild	0.290	Dutch
			– moderate	0.430	Dutch
			– severe	0.820	Dutch
C3	SIDS	SIDS indicator	Case	Not applicable	Fatal only
C4	Perinatal conditions NEC	Rest of 760–779		*	
D1	Spina bifida	741	Low level	0.160	Dutch
			Medium level	0.500	Dutch
			High level	0.680	Dutch

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
D2	Congenital heart defects	745–746	Surgically corrected	0.030	Dutch
			Permanent stage after partial surgical correction	0.200	Dutch
			Complex not surgically correctable	0.720	Dutch
D3	Down's syndrome	7580	Child without other malformations	0.510	Dutch
			Child with other malformations		
			Young adult	0.690	Dutch
			Adult > 40 years	0.350	Dutch
				0.650	Dutch
D4	Other chromosomal defects	7581–7589	Mild ID	0.290	Dutch
			Moderate ID	0.430	Dutch
			Severe ID	0.820	Dutch
D5	Facial clefts	749	Cleft palate – corrected	0.015	GBD
			Cleft palate – uncorrected	0.231	GBD
			Cleft lip – corrected	0.016	GBD
			Cleft lip – uncorrected	0.098	GBD
D6	Digestive defects	750–751	Case – not correctable	0.850	GBD
			Case – partially correctable	0.037	ABDS
D7	Urogenital tract defects	752–753	Case – not correctable	0.850	GBD
			Case – partially correctable	0.037	GBD
			Renal failure	0.294	Dutch
D9	Abdominal wall defects	7567	Case – not correctable (or prior to surgery)	0.850	GBD
			Case – long-term disability after correction	0.200	Dutch
D10	Birth defects NEC	rest of 740–759		*	
E1	Road traffic injuries/ other transport injuries	E810–829, E929.0, E800–807, E830–848, E929.1	Case	0.149	GBD**
E2	Suffocation	E911–915	Case	0.162	GBD**
E3	Sports injuries	E886.0, E917.0, E927	Case	0.118	GBD**
E4	Falls	E880–885, E886.9, E887–888, E929.3	Case	0.141	GBD**
E5	Burns/fires/scalds	E890–899, E924.0, E924.8–E924.9, E929.4	Case	0.172	GBD**
E6	Drowning	E910	Case	0.211	GBD**
E7	Poisoning	E850–869, E929.2	Case	0.593	GBD**
E8	Adverse effects (surgical, medical, pharmaceutical)	E870–879, 996–999 (not E), 429.4	Case	0.433	GBD**

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
E9	Unintentional injuries NEC	rest of E80–869, E880–949, rest of 800–995 (not E)		*	
F1	Attempted suicide and self harm	E950–959, E980–989 (unspecified intent)	Case	0.477	GBD**
F2	Assault and abuse	E960–979, E990–999	Case	0.166	GBD**
G1	Lung cancer	162	Treated weight	0.680	All cancers: ABDS standard model (based on Dutch weights)
			Untreated weight	0.470	
			Terminal phase weight	0.910	
G2	Colorectal cancer	153–154	Treated weight	0.430	
			Untreated weight	0.200	
			Terminal phase weight	0.830	
G3	Breast cancer	174	Treated weight	0.690	
			Untreated weight	0.260	
			Terminal phase weight	0.790	
G4	Prostate cancer	185	Primary therapy	0.270	
			Disease free	0.180	
			Disseminated	0.640	
G5	Lymphoma/ myeloma	200–202, 203	Treated weight	0.057	
			Untreated weight	0.089	
			Terminal phase weight	0.809	
G6	Leukaemia	204 208	Treated weight	0.830	
			Untreated weight	0.098	
			Terminal phase weight	0.809	
G7	Pancreas	157	Treated weight	0.237	
			Untreated weight	0.301	
			Terminal phase weight	0.809	
G8	Liver	155	Treated weight	0.239	
			Untreated weight	0.239	
			Terminal phase weight	0.809	
G9	Melanoma	172	No metastasis	0.190	
			Lymph node metastasis	0.430	
			Distant metastatsis	0.809	
G10	Non-melanotic skin cancer	173	No metastasis	0.050	
			Metastasis	0.400	
G11	Brain cancer	191, 225	Treated weight	0.730	
			Untreated weight	0.370	
			Terminal phase weight	0.809	
G12	Cervix	180	Treated weight	0.066	
			Untreated weight	0.075	
			Terminal phase weight	0.809	

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
G13	Stomach	151	Treated weight	0.530	
			Untreated weight	0.380	
			Terminal phase weight	0.730	
G14	Mouth and oropharynx	140–149	Treated weight	0.090	
			Untreated weight	0.145	
			Terminal phase weight	0.809	
G15	Oesophagus	150	Treated weight	0.560	
			Untreated weight	0.370	
			Terminal phase weight	0.730	
G16	Gallbladder	156	Treated weight	0.217	
			Untreated weight	0.217	
			Terminal phase weight	0.809	
G17	Bone and connective tissue	170–171	Treated weight	0.217	
			Untreated weight	0.217	
			Terminal phase weight	0.809	
G18	Uterus	179, 181–182	Treated weight	0.079	
			Untreated weight	0.066	
			Terminal phase weight	0.809	
G19	Ovary	183	Treated weight	0.097	
			Untreated weight	0.066	
			Terminal phase weight	0.809	
G20	Bladder	188	Treated weight	0.087	
			Untreated weight	0.085	
			Terminal phase weight	0.809	
G21	Kidney	189	Treated weight	0.217	
			Untreated weight	0.217	
			Terminal phase weight	0.809	
G22	Thyroid	193	Treated weight	0.217	
			Untreated weight	0.217	
			Terminal phase weight	0.809	
G23	Cancer of other sites or unknown primary, NEC	Rest of 140–224, 226–239	Case	*	
H1	Diabetes mellitus	250	Case (weighted average)	0.175	NZ model (weights based on Dutch weights where available, otherwise GBD or ABDS)
			Uncomplicated diabetes	0.070	
			Diabetic IHD	0.330	
			Diabetic stroke	0.630	
			Diabetic foot	0.210	
			Diabetic neuropathy	0.140	
			Diabetic nephropathy	0.290	
			Diabetic retinopathy	0.430	
H2	Endocrine disorders NEC	Rest of 240–279 (excluding 250, 227.0)	Case	0.164	ABDS

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
I1	IHD	410–414, 427.1, 427.4, 427.5, 440.9, 429.1, 429.2, 429.9	Angina	0.178	Dutch
			Acute myocardial infarction	0.395	GBD (treated)
			Heart failure	0.353	Dutch
I2	Hypertensive heart disease	401–402	Case	0.352	Dutch (heart failure)
I3	Rheumatic heart disease	393–398	Rheumatic fever	0.047	EQ-5D+
			Rheumatic heart disease		
			– treated	0.171	GBD
			– untreated	0.323	GBD
I4	Valvular heart disease (non-rheumatic)	424	Case	0.060	Dutch (mild heart failure)
I5	Stroke	430–438	Case (weighted average including no sequelae)	0.285	NZ model (based on Dutch weights)
			Mild	0.360	
			Moderate	0.630	
			Severe	0.920	
I6	Aortic aneurysm	441	Case	0.430	ABDS
I7	Peripheral arterial disease	440.0–440.8, 442–444	Case	0.600	EQ-5D+
			Amputation	0.209	EQ-5D+
I8	Cardiovascular diseases NEC	rest of 400–459 (excluding 416)	Case	*	
J1	CORD	416, 490–492, 494–496	Mild to moderate	0.170	Dutch
			Severe	0.530	Dutch
J2	Asthma	493	Case (weighted average)	0.057	NZ model (based on Dutch weights)
			Mild to moderate	0.030	
			Severe	0.360	
J3	Chronic respiratory diseases NEC	470–479, 500–519	Case	*	
K1	Peptic ulcer disease	531–533, 578	Case	0.066	Dutch
K2	Inflammatory bowel disease	555–556	Case	0.244	Dutch
K3	Cholecystitis/ calculi	574–576	Case	0.463	ABDS (GBD weight for appendicitis)
K4	Pancreatitis	540–543, 550.0, 550.1, 551–552, 560, 577	Case	0.463	GBD
K5	Acute abdomen	557	Case	0.463	GBD weight for acute appendicitis
K6	Cirrhosis/other chronic liver disease	571–572	Case	0.339	Dutch
K7	Digestive diseases NEC	Rest of 520–579	Case	*	

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
L1	Glomerulonephritis/ nephrotic syndrome	403, 580–586	Renal failure	0.290	Dutch (dialysis)
			Transplant	0.110	GBD (treated renal failure)
L2	BPH	600	Case	0.038	GBD
L3	Genitourinary disorders NEC	592, 594, 788.3, 625.6, 587–589, 591, 593, 596–599, 617, 610–611, 601–608, rest of 618–629	Case	*	
M1	Rheumatoid arthritis	714	Mild	0.210	Dutch
			Moderate	0.370	Dutch
			Severe	0.940	Dutch
M2	Osteoarthritis	715	Grade 2	0.140	Dutch
			Grade 3–4	0.420	Dutch
M3	Chronic back pain	720–721, 723, 724.5–724.9	Episode	0.060	Dutch
M4	Slipped disc	722, 724.3–724.4	Episode	0.060	Dutch
			Excision or destruction of disc	0.060	Dutch
			Chronic pain	0.125	EQ-5D+
M5	OOS	–	Mild	0.056	EQ-5D+
			Moderate	0.293	EQ-5D+
			Severe	0.516	EQ-5D+
M6	Osteoporosis	733	Case	0.009	EQ-5D+
M7	Musculoskeletal disorders NEC	Rest of 710–739	Case	*	
N1	Dementias	290, 330–331	Mild	0.270	Dutch
			Moderate	0.630	Dutch
			Severe	0.940	Dutch
N2	Epilepsy	345	Episode	0.110	Dutch
N3	Parkinson's disease and other movement disorders	332	Early stage	0.480	Dutch
			Intermediate stage	0.790	Dutch
			End stage	0.920	Dutch
N4	MS and other demyelinating conditions	340	Relapsing – remitting phase	0.330	Dutch
			Progressive phase	0.670	Dutch
			Progressive from onset	0.670	Dutch
N5	Motor neuron disease	335.2	Case	0.670	Dutch
N6	Neurological conditions NEC	324–329, rest of 333–339, 341–344, 347–358, 359.2–359.9	Case	*	

NZBDS Code	Condition description	ICD 9 CM A codes	Stage	Disability weight	Source of weight
O1	Glaucoma	365	Mild vision loss	0.020	Dutch
			Moderate vision loss	0.170	Dutch
			Severe vision loss	0.430	Dutch
O2	Cataract	366	Mild vision loss	0.020	Dutch
			Moderate vision loss	0.170	Dutch
			Severe vision loss	0.430	Dutch
O3	Other causes of low vision, NEC	360–364, 367–379	Case	*	
O4	Hearing disorders	380–389	Mild hearing loss	0.020	Dutch
			Moderate hearing loss	0.120	Dutch
			Severe hearing loss	0.370	Dutch
P1	Anxiety disorders	300	Mild to moderate	0.170	Dutch (for GAD)
			Severe	0.600	Dutch (for GAD)
P2	Mood disorders	296.2, 296.3, 296.9, 300.4, 311	Dysthymia case	0.140	Dutch
			Major depressive episode – mild	0.140	Dutch
			Major depressive episode – moderate	0.350	Dutch
			Major depressive episode – severe	0.760	Dutch
P3	Bipolar affective disorders	296.0, 296.1, 296.4–296.8	Case	0.176	Dutch (weighted average severity)
P4	Schizophrenia	295	Case	0.434	GBD (weighted average severity)
P5	Childhood conduct disorders	314	Mild	0.020	Dutch (for ADHD)
			Moderate to severe	0.150	Dutch (ADHD)
P6	Eating disorders	307.1, 307.5	Case	0.280	Dutch (weighted average severity)
P7	Substance use disorders	291, 303–305	Harmful drinking or other drug use	0.110	Dutch
			Drug dependence	0.330	Dutch
			Manifest alcoholism	0.550	Dutch
P8	Psychiatric syndromes NEC	Rest of 292–319	Case	*	

Note: dental disorders and dermatological conditions other than infections and cancers are excluded
* YLD estimates for NEC categories derived from group average or average YLD:YLL ratio
** average of age and severity specific GBD weights shown here.

KEY
Dutch = Stouthard et al 1997
GBD = Global Burden of Disease Study (Murray and Lopez 1996)
ABDS = Australian Burden of Disease Study, not based on EQ-5D+ regression model (Mathers et al 1999)
EQ-5D+ = ABDS, derived by regressing EQ-5D+ score against Dutch weights (Mathers et al 1999)

(Full references are in the 'References' section of the main text.)

Appendix 2: Attributable Risk Method and Data Sources

Population attributable risks (PARs): concepts and methods

The usual measure of effect in epidemiology is the relative risk (risk or rate ratio):

$$RR = \frac{I_e}{I_u}$$

where I_e is the incidence of the disease of interest in the people exposed to the risk factor, I_u is the incidence in those not exposed (that is, the baseline risk or rate), and RR is the relative risk.

Yet relative measures are inadequate for policy makers. A high relative risk may be associated with a low baseline risk, and so the risk among the exposed may still be low in absolute terms. Also, the proportion of the total population exposed may be low, making the impact of exposure on the whole population small despite a high relative risk. Therefore absolute measures are needed, and indicators that take account of not only the strength of the association between cause and effect (the RR) but also the extent of exposure of the population to the risk (the prevalence).

Population attributable risk (PAR) is the absolute risk experienced by the population, derived by determining the difference in risk (or rate of disease) in the whole population compared with those in the population not exposed to an identified risk factor:

$$PAR = I_t - I_u$$

where I_t is the incidence in the total population, including both exposed and unexposed subgroups. However, I_t is simply the sum of the incidence in each of these two population subgroups (exposed and unexposed), weighted by the relative size of each in the population (the prevalence of the risk exposure):

$$I_t = pI_e + (1-p)I_u$$

where p is the proportion of the population exposed to the risk factor (the prevalence).

Combining the above provides an expression for PAR in terms of the prevalence of the risk factor and its relative risk for the outcome of interest:

$$PAR = p(RR-1)I_u$$

Relating this to the incidence of the outcome in the total population gives the attributable fraction:

$$AF = \frac{p(RR-1)I_u}{I_t}$$

or

$$AF = \frac{p(RR-1)}{p(RR-1)+1}$$

which can be extended to cover multiple exposure levels of the risk factor.

The attributable fraction (AF) is conventionally interpreted as the proportion of current disease (or mortality) attributable to the risk factor concerned. But this is not strictly correct: it would only be the case if the prevalence used to calculate the attributable fraction reflected the prevalence of the risk factor at an appropriate period in the past (for chronic diseases, many years may elapse between onset of exposure and disease). However, another interpretation is possible if current prevalence is used: the attributable fraction indicates the proportion of current disease or mortality that would be prevented in the *future* if exposure to the risk factor were eliminated. This second interpretation* is more useful for policy and is the interpretation favoured for this report.

Population attributable risks: data sources

Prevalence estimates

Smoking	1996/97 NZHS, 1996 Census
Alcohol	1996/97 NZHS, 1998 National Drug Survey
Physical activity	1996/97 NZHS, 1997 Sport and Physical Activity Survey*
Fruit and vegetable consumption	1997 NNS
Diabetes (type 2)	1996/97 NZHS
Obesity	1997 NNS
High blood pressure	1997 NNS
High blood total cholesterol	1997 NNS

NZHS = New Zealand Health Survey, NNS = National Nutrition Survey
* Hillary Commission

Relative risk estimates

An extensive review of New Zealand and international literature was carried out. Relative risk estimates were selected from published meta-analyses where possible or, alternatively, from major cohort studies. To the extent possible, the relative risk estimates selected had been adjusted (deconfounded) for other risk factors, in order to represent the independent effect of the risk factor concerned in the absence of other risk factors. The relative risk estimates used are therefore conservative, leading to under-estimation of the corresponding attributable fractions.

* Referred to by Murray and Lopez (1999) as the 'avoidable' fraction.

Although some studies provided gender and age specific relative risks, the desired level of data differentiation was not always available; in these cases, modelling techniques were used to further differentiate the relative risk estimates by gender and age group. In the absence of data to the contrary, it had to be assumed that relative risks for both Māori and non-Māori ethnic groups were similar. Differences in attributable fractions between these ethnic groups are thus driven by differences in exposure to risk factors (prevalence) rather than by differences in biological responses to such exposures.

Appendix 3: DALY Summary Data Tables

Table A1: DALYs by cause categories A–P, ethnicity and age group

0–14

DALY (d)	Māori (0-14)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	483	4.6	5.7	649	6.6	9.1	1132	5.6	7.2
B	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
C	2960	28.5	35.0	2298	23.3	32.0	5258	26.0	33.6
D	831	8.0	9.8	795	8.1	11.1	1626	8.0	10.4
E	1229	11.8	14.5	810	8.2	11.3	2039	10.1	13.0
F	71	0.7	0.8	155	1.6	2.2	226	1.1	1.4
G	122	1.2	1.4	187	1.9	2.6	309	1.5	2.0
H	142	1.4	1.7	90	0.9	1.3	232	1.1	1.5
I	0	0.0	0.0	0	0.0	0.0	1	0.0	0.0
J	1458	14.0	17.2	1305	13.3	18.2	2763	13.7	17.7
K	67	0.6	0.8	55	0.6	0.8	122	0.6	0.8
L	1	0.0	0.0	1	0.0	0.0	2	0.0	0.0
M	39	0.4	0.5	66	0.7	0.9	105	0.5	0.7
N	158	1.5	1.9	191	1.9	2.7	349	1.7	2.2
O	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
P	899	8.7	10.6	568	5.8	7.9	1467	7.3	9.4
Total	8459	81.4	100.0	7170	72.9	100.0	15,629	77.3	100.0

DALY (d)	Non-Māori (0–14)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	1121	3.4	5.9	912	2.9	6.0	2033	3.2	5.9
B	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
C	3674	11.1	19.3	2620	8.4	17.2	6294	9.8	18.4
D	2993	9.0	15.7	2733	8.7	17.9	5726	8.9	16.7
E	2587	7.8	13.6	1511	4.8	9.9	4098	6.4	11.9
F	136	0.4	0.7	128	0.4	0.8	265	0.4	0.8
G	562	1.7	2.9	526	1.7	3.5	1088	1.7	3.2
H	360	1.1	1.9	397	1.3	2.6	757	1.2	2.2
I	30	0.1	0.2	150	0.5	1.0	180	0.3	0.6
J	4003	12.1	21.0	3662	11.7	24.0	7665	11.9	22.4
K	145	0.4	0.8	81	0.3	0.5	226	0.4	0.7
L	3	0.0	0.0	4	0.0	0.0	7	0.0	0.0
M	149	0.4	0.8	240	0.8	1.6	389	0.6	1.1
N	582	1.8	3.1	455	1.5	3.0	1037	1.6	3.0
O	0	0.0	0.0	0	0.0	0.0	1	0.0	0.0
P	2720	8.2	14.3	1810	5.8	11.9	4530	6.9	13.2
Total	19,066	57.6	100.0	15,228	48.7	100.0	34,295	53.1	100.0

DALY (d)	Persons (0–14)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	1603	3.7	5.8	1561	3.8	7.0	3164	3.7	6.3
B	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
C	6634	15.3	24.1	4917	12.0	22.0	11,552	13.7	23.1
D	3824	8.8	13.9	3528	8.6	15.8	7352	8.7	14.7
E	3816	8.8	13.9	2320	5.6	10.4	6136	7.3	12.3
F	207	0.5	0.8	283	0.7	1.3	490	0.6	1.0
G	684	1.6	2.5	712	1.7	3.2	1396	1.7	2.8
H	502	1.2	1.8	487	1.2	2.2	989	1.2	2.0
I	30	0.1	0.1	150	0.4	0.7	180	0.2	0.4
J	5461	12.6	19.8	4966	12.1	22.2	10,428	12.3	20.9
K	211	0.5	0.8	136	0.3	0.6	348	0.4	0.7
L	4	0.0	0.0	5	0.0	0.0	9	0.0	0.0
M	188	0.4	0.7	306	0.7	1.4	494	0.6	1.0
N	740	1.7	2.7	646	1.6	2.9	1387	1.6	2.8
O	1	0.0	0.0	0	0.0	0.0	1	0.0	0.0
P	3618	8.3	13.1	2378	5.8	10.6	5997	7.1	12.0
Total	27,525	63.3	100.0	22,399	54.5	100.0	49,924	59.0	100.0

15-24

DALY (d)	Māori (15–24)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	129	2.5	2.3	141	2.6	2.8	270	2.6	2.5
B	0	0.0	0.0	17	0.3	0.3	17	0.2	0.2
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	28	0.5	0.5	28	0.5	0.6	56	0.5	0.5
E	1811	34.7	31.9	529	9.9	10.5	2341	22.2	21.8
F	1053	20.1	18.5	413	7.7	8.2	1466	13.9	13.7
G	146	2.8	2.6	117	2.2	2.3	262	2.5	2.4
H	234	4.5	4.1	230	4.3	4.6	464	4.4	4.3
I	199	3.8	3.5	120	2.2	2.4	319	3.0	3.0
J	221	4.2	3.9	582	10.9	11.6	803	7.6	7.5
K	58	1.1	1.0	76	1.4	1.5	134	1.3	1.2
L	2	0.0	0.0	67	1.3	1.3	69	0.7	0.6
M	31	0.6	0.5	37	0.7	0.7	68	0.6	0.6
N	28	0.5	0.5	32	0.6	0.6	60	0.6	0.6
O	79	1.5	1.4	11	0.2	0.2	90	0.8	0.8
P	1667	31.9	29.3	2632	49.3	52.3	4299	40.7	40.1
Total	5684	108.8	100.0	5032	94.3	100.0	10,716	101.4	100.0

DALY (d)	Non-Māori (15–24)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	238	1.1	1.3	365	1.7	2.1	603	1.4	1.7
B	0	0.0	0.0	35	0.2	0.2	35	0.1	0.1

C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	223	1.0	1.3	85	0.4	0.5	308	0.7	0.9
E	5509	24.4	31.0	1772	8.1	10.0	7281	16.4	20.5
F	2485	11.0	14.0	1030	4.7	5.8	3515	7.9	9.9
G	576	2.6	3.2	327	1.5	1.8	903	2.0	2.5
H	559	2.5	3.1	471	2.1	2.7	1031	2.3	2.9
I	496	2.2	2.8	371	1.7	2.1	867	1.9	2.4
J	712	3.2	4.0	2311	10.5	13.0	3023	6.8	8.5
K	276	1.2	1.6	342	1.6	1.9	618	1.4	1.7
L	7	0.0	0.0	304	1.4	1.7	311	0.7	0.9
M	224	1.0	1.3	208	0.9	1.2	432	1.0	1.2
N	233	1.0	1.3	358	1.6	2.0	591	1.3	1.7
O	227	1.0	1.3	30	0.1	0.2	257	0.6	0.7
P	6031	26.8	33.9	9710	44.2	54.8	15,740	35.5	44.3
Total	17,796	79.0	100.0	17,720	80.7	100.0	35,516	79.5	100.0

DALY (d)	Persons (15–24)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	367	1.3	1.6	506	1.9	2.2	873	1.6	1.9
B	0	0.0	0.0	52	0.2	0.2	52	0.1	0.1
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	251	0.9	1.1	113	0.4	0.5	364	0.7	0.8
E	7321	26.4	31.2	2302	8.4	10.1	9622	17.5	20.8
F	3538	12.7	15.1	1443	5.3	6.3	4981	9.0	10.8
G	721	2.6	3.1	444	1.6	1.9	1165	2.1	2.5
H	794	2.9	3.4	701	2.6	3.1	1495	2.7	3.2
I	695	2.5	3.0	491	1.8	2.2	1186	2.2	2.6
J	934	3.4	4.0	2893	10.6	12.7	3826	7.0	8.3
K	334	1.2	1.4	418	1.5	1.8	752	1.4	1.6
L	8	0.0	0.0	372	1.4	1.6	380	0.7	0.8
M	254	0.9	1.1	246	0.9	1.1	500	0.9	1.1
N	261	0.9	1.1	390	1.4	1.7	651	1.2	1.4
O	306	1.1	1.3	40	0.1	0.2	347	0.6	0.7
P	7697	27.7	32.8	12,342	45.2	54.2	20,039	36.4	43.3
Total	23,481	84.6	100.0	22,752	83.4	100.0	46,233	84.0	100.0

25-44

DALY (d)	Māori (25–44)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	340	4.5	3.5	234	2.9	2.8	574	3.6	3.2
B	0	0.0	0.0	211	2.6	2.5	211	1.3	1.2
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	50	0.7	0.5	24	0.3	0.3	74	0.5	0.4
E	1590	21.0	16.6	525	6.4	6.2	2115	13.4	11.7
F	1203	15.9	12.5	332	4.0	3.9	1535	9.7	8.5
G	845	11.2	8.8	1070	13.0	12.7	1915	12.1	10.6
H	918	12.2	9.6	975	11.9	11.6	1894	12.0	10.5

I	1454	19.2	15.2	681	8.3	8.1	2134	13.5	11.8
J	819	10.8	8.5	682	8.3	8.1	1501	9.5	8.3
K	300	4.0	3.1	212	2.6	2.5	512	3.2	2.8
L	38	0.5	0.4	751	9.1	8.9	789	5.0	4.4
M	214	2.8	2.2	335	4.1	4.0	549	3.5	3.0
N	343	4.5	3.6	230	2.8	2.7	572	3.6	3.2
O	122	1.6	1.3	42	0.5	0.5	164	1.0	0.9
P	1359	18.0	14.2	2140	26.0	25.3	3499	22.2	19.4
Total	9594	127.0	100.0	8444	102.7	74.7	18,038	114.3	100.0

DALY (d)	Non-Māori (25–44)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	1133	2.3	3.4	816	1.6	2.2	1950	2.0	2.8
B	0	0.0	0.0	534	1.1	1.5	534	0.5	0.8
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	123	0.3	0.4	155	0.3	0.4	277	0.3	0.4
E	5632	11.6	16.7	2002	4.0	5.5	7634	7.7	10.9
F	4438	9.2	13.2	934	1.9	2.6	5371	5.4	7.7
G	2777	5.7	8.2	4816	9.6	13.3	7594	7.7	10.8
H	1857	3.8	5.5	1487	3.0	4.1	3344	3.4	4.8
I	3686	7.6	10.9	2013	4.0	5.5	5699	5.8	8.1
J	2485	5.1	7.4	2318	4.6	6.4	4803	4.9	6.9
K	1208	2.5	3.6	1728	3.4	4.8	2936	3.0	4.2
L	177	0.4	0.5	4385	8.8	12.1	4562	4.6	6.5
M	1371	2.8	4.1	2056	4.1	5.7	3427	3.5	4.9
N	822	1.7	2.4	813	1.6	2.2	1634	1.7	2.3
O	515	1.1	1.5	181	0.4	0.5	696	0.7	1.0
P	7451	15.4	22.1	12,086	24.1	33.3	19,537	19.8	27.9
Total	33,676	69.5	100.0	36,324	72.5	100.0	70,001	71.0	100.0

DALY (d)	Persons (25–44)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	1473	2.6	3.4	1051	1.8	2.3	2524	2.2	2.9
B	0	0.0	0.0	745	1.3	1.7	745	0.7	0.8
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	172	0.3	0.4	179	0.3	0.4	351	0.3	0.4
E	7223	12.9	16.7	2527	4.3	5.6	9749	8.5	11.1
F	5641	10.1	13.0	1266	2.2	2.8	6907	6.0	7.8
G	3622	6.5	8.4	5886	10.1	13.1	9508	8.3	10.8
H	2775	5.0	6.4	2463	4.2	5.5	5238	4.6	5.9
I	5140	9.2	11.9	2694	4.6	6.0	7834	6.8	8.9
J	3304	5.9	7.6	3000	5.1	6.7	6304	5.5	7.2
K	1508	2.7	3.5	1940	3.3	4.3	3448	3.0	3.9
L	215	0.4	0.5	5136	8.8	11.5	5351	4.7	6.1
M	1585	2.8	3.7	2391	4.1	5.3	3976	3.5	4.5
N	1164	2.1	2.7	1042	1.8	2.3	2207	1.9	2.5
O	637	1.1	1.5	223	0.4	0.5	860	0.8	1.0

P	8810	15.7	20.4	14,226	24.4	31.8	23,036	20.1	26.2
Total	43,270	77.2	100.0	44,768	76.7	100.0	88,038	77.0	100.0

45-64

DALY (d)	Māori (45–64)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	203	6.3	1.5	242	7.3	2.2	445	6.8	1.9
B	0	0.0	0.0	4	0.1	0.0	4	0.1	0.0
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	40	1.3	0.3	0	0.0	0.0	40	0.6	0.2
E	505	15.7	3.8	151	4.6	1.4	656	10.0	2.7
F	175	5.5	1.3	66	2.0	0.6	241	3.7	1.0
G	2642	82.2	20.0	3142	94.8	29.2	5785	88.5	24.2
H	1496	46.5	11.4	1433	43.2	13.3	2929	44.8	12.2
I	5270	163.9	40.0	3123	94.2	29.0	8393	128.4	35.1
J	1155	35.9	8.8	825	24.9	7.7	1980	30.3	8.3
K	313	9.7	2.4	165	5.0	1.5	478	7.3	2.0
L	108	3.4	0.8	158	4.8	1.5	266	4.1	1.1
M	226	7.0	1.7	446	13.5	4.1	672	10.3	2.8
N	316	9.8	2.4	260	7.9	2.4	576	8.8	2.4
O	418	13.0	3.2	168	5.1	1.6	585	9.0	2.4
P	311	9.7	2.4	579	17.5	5.4	890	13.6	3.7
Total	13,179	409.9	100.0	10,762	324.6	100.0	23,941	366.3	100.0

DALY (d)	Non-Māori (45–64)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	1028	3.0	1.6	631	1.9	1.1	1659	2.4	1.4
B	0	0.0	0.0	20	0.1	0.0	20	0.0	0.0
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	89	0.3	0.1	78	0.2	0.1	166	0.2	0.1
E	2960	8.7	4.6	1438	4.2	2.6	4398	6.5	3.6
F	1564	4.6	2.4	480	1.4	0.9	2044	3.0	1.7
G	17,149	50.6	26.4	18,738	55.3	33.6	35,887	53.0	29.7
H	3129	9.2	4.8	2423	7.2	4.3	5552	8.2	4.6
I	20,096	59.3	30.9	8593	25.4	15.4	28,690	42.3	23.7
J	5784	17.1	8.9	3471	10.2	6.2	9,255	13.7	7.7
K	1373	4.0	2.1	1467	4.3	2.6	2,839	4.2	2.4
L	450	1.3	0.7	1134	3.3	2.0	1,584	2.3	1.3
M	2466	7.3	3.8	4204	12.4	7.5	6,670	9.8	5.5
N	3115	9.2	4.8	3374	10.0	6.1	6,489	9.6	5.4
O	3106	9.2	4.8	1231	3.6	2.2	4,337	6.4	3.6
P	2722	8.0	4.2	8483	25.0	15.2	11,205	16.5	9.3
Total	65,030	191.8	100.0	55,766	164.6	100.0	120,795	178.2	100.0

DALY (d)	Persons (45–64)

	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	1231	3.3	1.6	872	2.3	1.3	2103	2.8	1.5
B	0	0.0	0.0	24	0.1	0.0	24	0.0	0.0
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	129	0.3	0.2	78	0.2	0.1	207	0.3	0.1
E	3465	9.3	4.4	1589	4.3	2.4	5054	6.8	3.5
F	1739	4.7	2.2	546	1.5	0.8	2285	3.1	1.6
G	19,791	53.3	25.3	21,880	58.8	32.9	41,671	56.1	28.8
H	4625	12.5	5.9	3856	10.4	5.8	8481	11.4	5.9
I	25,367	68.3	32.4	11,716	31.5	17.6	37,083	49.9	25.6
J	6939	18.7	8.9	4296	11.6	6.5	11,235	15.1	7.8
K	1686	4.5	2.2	1632	4.4	2.5	3318	4.5	2.3
L	558	1.5	0.7	1292	3.5	1.9	1850	2.5	1.3
M	2691	7.3	3.4	4650	12.5	7.0	7342	9.9	5.1
N	3431	9.2	4.4	3634	9.8	5.5	7065	9.5	4.9
O	3524	9.5	4.5	1398	3.8	2.1	4922	6.6	3.4
P	3033	8.2	3.9	9062	24.4	13.6	12,096	16.3	8.4
Total	78,209	210.7	100.0	66,528	178.9	100.0	144,737	194.8	100.0

65+

DALY (d)	Māori (65+)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	181	24.6	3.0	197	21.8	3.0	378	23.0	3.0
B	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
E	149	20.2	2.5	103	11.4	1.6	252	15.3	2.0
F	12	1.6	0.2	13	1.4	0.2	25	1.5	0.2
G	1453	197.7	24.3	1483	163.9	22.4	2937	178.5	23.3
H	579	78.8	9.7	712	78.6	10.8	1291	78.5	10.2
I	2307	313.9	38.5	2503	276.6	37.8	4810	292.4	38.2
J	608	82.7	10.2	579	64.0	8.8	1188	72.2	9.4
K	91	12.4	1.5	141	15.6	2.1	232	14.1	1.8
L	122	16.6	2.0	156	17.2	2.4	278	16.9	2.2
M	76	10.3	1.3	148	16.4	2.2	224	13.6	1.8
N	282	38.3	4.7	360	39.8	5.4	641	39.0	5.1
O	114	15.5	1.9	160	17.7	2.4	274	16.7	2.2
P	16	2.2	0.3	61	6.7	0.9	77	4.7	0.6
Total	5990	814.9	100.0	6616	731.1	100.0	12,606	766.3	100.0

DALY (d)	Non-Māori (65+)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	3290	18.5	3.3	6011	25.6	5.2	9300	22.5	4.3
B	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0

D	67	0.4	0.1	52	0.2	0.0	118	0.3	0.1
E	1667	9.4	1.7	2264	9.6	2.0	3931	9.5	1.8
F	517	2.9	0.5	157	0.7	0.1	674	1.6	0.3
G	26,734	150.0	27.0	24,546	104.4	21.4	51,279	124.0	23.9
H	3919	22.0	4.0	4762	20.2	4.1	8680	21.0	4.0
I	37,322	209.4	37.6	43,955	186.9	38.2	81,277	196.6	37.9
J	8493	47.6	8.6	7724	32.8	6.7	16,217	39.2	7.6
K	2690	15.1	2.7	3316	14.1	2.9	6006	14.5	2.9
L	1953	11.0	2.0	1864	7.9	1.6	3817	9.2	1.9
M	1984	11.1	2.0	3490	14.8	3.0	5474	13.2	2.5
N	7171	40.2	7.2	11,947	50.8	10.4	19,119	46.2	8.9
O	1872	10.5	1.9	2630	11.2	2.3	4502	10.9	2.1
P	1488	8.3	1.5	2238	9.5	1.9	3726	9.0	1.7
Total	99,166	556.3	100.0	114,955	488.8	100.0	214,121	517.5	100.0

DALY (d)	Persons (65+)								
	Male			Female			Persons		
	No.	Rate	%	No.	Rate	%	No.	Rate	%
A	3471	18.7	3.3	6208	25.4	5.1	9678	22.5	4.3
B	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
C	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
D	67	0.4	0.1	52	0.2	0.0	118	0.3	0.1
E	1816	9.8	1.7	2367	9.7	1.9	4183	9.7	1.8
F	529	2.8	0.5	170	0.7	0.1	698	1.6	0.3
G	28,187	151.9	26.8	26,029	106.6	21.4	54,216	126.1	23.9
H	4498	24.2	4.3	5473	22.4	4.5	9971	23.2	4.4
I	39,629	213.5	37.7	46,458	190.2	38.2	86,088	200.2	38.0
J	9102	49.0	8.7	8303	34.0	6.8	17,405	40.5	7.7
K	2781	15.0	2.6	3458	14.2	2.8	6238	14.5	2.8
L	2075	11.2	2.0	2019	8.3	1.7	4094	9.5	1.8
M	2060	11.1	2.0	3638	14.9	3.0	5697	13.3	2.5
N	7453	40.2	7.1	12,307	50.4	10.1	19,760	46.0	8.7
O	1986	10.7	1.9	2791	11.4	2.3	4776	11.1	2.1
P	1504	8.1	1.4	2299	9.4	1.9	3803	8.8	1.7
Total	105,156	566.5	100.0	121,572	497.8	100.0	226,728	527.4	100.0

Note: 1. For explanation of cause group codes (A to P), see Appendix 1.
2. Rates per 1000 standardised to Segi's world population.
3. Totals may differ from those reported in the text, because of NEC categories.

Table A2: DALYs by individual cause (total number and age standardised rate), by ethnicity

Māori

DALY (d)		Māori											
		Male				Female				Persons			
		No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total
A	A1	334	1.1	25.0	0.8	350	1.2	23.9	0.9	684	1.1	24.4	0.8
	A2	520	3.0	38.9	1.2	466	2.2	31.9	1.2	986	2.5	35.2	1.2
	A3	45	0.3	3.4	0.1	147	1.0	10.1	0.4	192	0.6	6.9	0.2
	A4	3	0.0	0.2	0.0	117	0.4	8.0	0.3	119	0.2	4.3	0.1
	A5	117	0.4	8.7	0.3	2	0.0	0.1	0.0	118	0.2	4.2	0.1
	A6	72	0.4	5.4	0.2	98	0.4	6.7	0.3	170	0.4	6.1	0.2
	A7	145	0.6	10.9	0.3	177	0.6	12.1	0.5	323	0.6	11.5	0.4
	A8	100	0.5	7.5	0.2	106	0.5	7.2	0.3	206	0.5	7.4	0.3
B	B1	0	0.0	0.0	0.0	7	0.0	2.8	0.0	7	0.0	2.8	0.0
	B2	0	0.0	0.0	0.0	46	0.1	19.6	0.1	46	0.1	19.6	0.1
	B3	0	0.0	0.0	0.0	3	0.0	1.5	0.0	3	0.0	1.5	0.0
	B4	0	0.0	0.0	0.0	177	0.6	76.1	0.5	177	0.3	76.1	0.2
C	C1	336	1.1	11.4	0.8	281	1.0	12.2	0.7	617	1.0	11.7	0.8
	C2	871	2.7	29.4	2.0	644	2.2	28.0	1.7	1515	2.5	28.8	1.9
	C3	1264	4.0	42.7	2.9	940	3.2	40.9	2.5	2204	3.6	41.9	2.7
	C4	490	1.5	16.5	1.1	433	1.5	18.8	1.1	922	1.5	17.5	1.1
D	D1	161	0.5	17.0	0.4	152	0.5	18.0	0.4	314	0.5	17.5	0.4
	D2	189	0.7	20.0	0.4	164	0.6	19.3	0.4	353	0.6	19.7	0.4
	D3	84	0.3	8.8	0.2	22	0.1	2.6	0.1	106	0.2	5.9	0.1
	D4	403	1.3	42.4	0.9	434	1.5	51.3	1.1	837	1.4	46.6	1.0
	D5	5	0.0	0.5	0.0	4	0.0	0.4	0.0	9	0.0	0.5	0.0
	D6	2	0.0	0.2	0.0	1	0.0	0.1	0.0	3	0.0	0.2	0.0
	D7	6	0.0	0.7	0.0	3	0.0	0.4	0.0	10	0.0	0.5	0.0
	D8	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
	D9	2	0.0	0.2	0.0	3	0.0	0.3	0.0	5	0.0	0.3	0.0
	D10	96	0.3	10.1	0.2	64	0.2	7.6	0.2	160	0.3	8.9	0.2
E	E1	3224	11.8	61.0	7.5	1201	4.0	56.7	3.2	4425	7.8	59.8	5.5
	E2	90	0.4	1.7	0.2	27	0.1	1.3	0.1	117	0.3	1.6	0.1
	E3	217	0.8	4.1	0.5	51	0.2	2.4	0.1	269	0.5	3.6	0.3
	E4	384	1.6	7.3	0.9	204	0.9	9.7	0.5	589	1.2	8.0	0.7
	E5	341	1.2	6.5	0.8	61	0.3	2.9	0.2	402	0.7	5.4	0.5
	E6	452	1.5	8.5	1.1	154	0.5	7.3	0.4	606	1.0	8.2	0.7
	E7	25	0.1	0.5	0.1	49	0.2	2.3	0.1	74	0.2	1.0	0.1
	E8	14	0.1	0.3	0.0	18	0.1	0.9	0.0	32	0.1	0.4	0.0
	E9	537	2.1	10.2	1.3	352	1.3	16.6	0.9	889	1.7	12.0	1.1
F	F1	1901	6.6	75.6	4.4	673	2.3	68.7	1.8	2573	4.4	73.7	3.2
	F2	613	2.2	24.4	1.4	306	1.0	31.3	0.8	919	1.6	26.3	1.1
G	G1	1665	12.1	32.0	3.9	1403	9.0	23.4	3.7	3068	10.4	27.4	3.8
	G2	395	2.7	7.6	0.9	301	1.8	5.0	0.8	696	2.2	6.2	0.9
	G3	0	0.0	0.0	0.0	1311	6.9	21.9	3.4	1311	3.6	11.7	1.6
	G4	270	2.2	5.2	0.6	0	0.0	0.0	0.0	270	1.0	2.4	0.3
	G5	159	0.9	3.1	0.4	170	0.8	2.8	0.4	329	0.9	2.9	0.4
	G6	236	1.0	4.5	0.5	280	1.4	4.7	0.7	516	1.2	4.6	0.6
	G7	174	0.8	3.3	0.4	229	1.5	3.8	0.6	403	1.2	3.6	0.5
	G8	246	1.4	4.7	0.6	64	0.3	1.1	0.2	309	0.8	2.8	0.4
	G9	6	0.0	0.1	0.0	41	0.3	0.7	0.1	47	0.2	0.4	0.1
	G10	14	0.1	0.3	0.0	11	0.1	0.2	0.0	25	0.1	0.2	0.0
	G11	196	1.0	3.8	0.5	275	1.2	4.6	0.7	471	1.1	4.2	0.6
	G12	0	0.0	0.0	0.0	455	2.2	7.6	1.2	455	1.1	4.1	0.6
	G13	628	3.6	12.1	1.5	290	1.7	4.8	0.8	919	2.6	8.2	1.1
	G14	121	0.8	2.3	0.3	1	0.0	0.0	0.0	123	0.4	1.1	0.2
	G15	96	0.6	1.8	0.2	123	0.7	2.1	0.3	220	0.7	2.0	0.3
	G16	76	0.6	1.5	0.2	39	0.2	0.6	0.1	115	0.4	1.0	0.1
	G17	136	0.6	2.6	0.3	43	0.2	0.7	0.1	179	0.4	1.6	0.2

DALY (d)		Māori											
		Male				Female				Persons			
		No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total
	G18	0	0.0	0.0	0.0	110	0.7	1.8	0.3	110	0.4	1.0	0.1
	G19	0	0.0	0.0	0.0	236	1.3	3.9	0.6	236	0.7	2.1	0.3
	G20	20	0.2	0.4	0.0	48	0.3	0.8	0.1	68	0.2	0.6	0.1
	G21	147	0.8	2.8	0.3	49	0.2	0.8	0.1	196	0.5	1.7	0.2
	G22	27	0.1	0.5	0.1	71	0.5	1.2	0.2	98	0.3	0.9	0.1
	G23	594	3.9	11.4	1.4	450	2.8	7.5	1.2	1044	3.3	9.3	1.3
	G24	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
H	H1	3018	17.2	89.6	7.0	2968	16.0	86.3	7.8	5987	16.6	87.9	7.4
	H2	352	1.9	10.4	0.8	471	2.2	13.7	1.2	823	2.0	12.1	1.0
I	I1	5491	36.5	59.5	12.8	3461	22.7	53.8	9.1	8951	29.4	57.2	11.1
	I2	267	1.5	2.9	0.6	130	0.9	2.0	0.3	397	1.2	2.5	0.5
	I3	269	1.5	2.9	0.6	303	1.4	4.7	0.8	572	1.4	3.7	0.7
	I4	194	1.2	2.1	0.5	126	0.9	2.0	0.3	319	1.0	2.0	0.4
	I5	991	6.9	10.7	2.3	1018	6.6	15.8	2.7	2009	6.7	12.8	2.5
	I6	199	1.6	2.2	0.5	317	2.1	4.9	0.8	516	1.8	3.3	0.6
	I7	436	2.6	4.7	1.0	277	1.6	4.3	0.7	713	2.1	4.6	0.9
	I8	1384	8.3	15.0	3.2	795	4.3	12.4	2.1	2179	6.2	13.9	2.7
J	J1	2238	13.5	52.5	5.2	1671	9.4	42.1	4.4	3909	11.3	47.5	4.8
	J2	1870	6.6	43.9	4.4	2131	7.4	53.7	5.6	4001	7.1	48.6	4.9
	J3	154	0.7	3.6	0.4	170	0.8	4.3	0.4	324	0.7	3.9	0.4
K	K1	175	1.0	21.2	0.4	166	0.7	25.5	0.4	341	0.9	23.1	0.4
	K2	125	0.4	15.0	0.3	146	0.5	22.4	0.4	270	0.5	18.3	0.3
	K3	44	0.3	5.4	0.1	75	0.5	11.5	0.2	119	0.4	8.1	0.1
	K4	70	0.4	8.5	0.2	51	0.3	7.8	0.1	121	0.3	8.2	0.1
	K5	102	0.5	12.3	0.2	94	0.5	14.4	0.2	195	0.5	13.2	0.2
	K6	153	0.9	18.5	0.4	89	0.5	13.7	0.2	242	0.7	16.4	0.3
	K7	159	0.6	19.2	0.4	30	0.1	4.7	0.1	189	0.4	12.8	0.2
L	L1	174	1.3	64.3	0.4	236	1.4	20.8	0.6	410	1.3	29.2	0.5
	L2	38	0.3	14.1	0.1	0	0.0	0.0	0.0	38	0.1	2.7	0.0
	L3	58	0.4	21.6	0.1	897	3.4	79.2	2.4	955	2.0	68.1	1.2
M	M1	85	0.3	14.5	0.2	181	0.7	17.6	0.5	266	0.5	16.4	0.3
	M2	350	2.0	59.8	0.8	543	3.1	52.5	1.4	892	2.6	55.2	1.1
	M3	41	0.2	7.0	0.1	39	0.2	3.8	0.1	80	0.2	5.0	0.1
	M4	25	0.1	4.3	0.1	17	0.1	1.6	0.0	42	0.1	2.6	0.1
	M5	2	0.0	0.4	0.0	82	0.3	7.9	0.2	84	0.2	5.2	0.1
	M6	5	0.0	0.8	0.0	31	0.2	3.0	0.1	35	0.1	2.2	0.0
	M7	77	0.3	13.2	0.2	141	0.7	13.6	0.4	218	0.5	13.5	0.3
N	N1	301	2.4	26.7	0.7	376	2.7	35.1	1.0	677	2.6	30.8	0.8
	N2	334	1.2	29.6	0.8	230	0.8	21.4	0.6	563	1.0	25.6	0.7
	N3	79	0.6	7.0	0.2	76	0.5	7.0	0.2	155	0.6	7.0	0.2
	N4	23	0.1	2.1	0.1	57	0.2	5.3	0.2	81	0.1	3.7	0.1
	N5	85	0.7	7.6	0.2	57	0.4	5.3	0.1	142	0.5	6.5	0.2
	N6	304	1.6	27.0	0.7	278	1.1	25.9	0.7	582	1.3	26.4	0.7
O	O1	7	0.1	1.0	0.0	13	0.1	3.3	0.0	20	0.1	1.8	0.0
	O2	7	0.1	1.0	0.0	19	0.1	5.1	0.1	27	0.1	2.4	0.0
	O3	3	0.0	0.4	0.0	4	0.0	1.1	0.0	7	0.0	0.6	0.0
	O4	715	4.3	97.6	1.7	345	2.2	90.5	0.9	1060	3.2	95.2	1.3
P	P1	899	3.3	21.2	2.1	1612	5.8	27.0	4.2	2511	4.6	24.5	3.1
	P2	836	3.1	19.7	1.9	2159	7.5	36.1	5.7	2995	5.4	29.3	3.7
	P3	324	1.1	7.6	0.8	346	1.1	5.8	0.9	670	1.1	6.6	0.8
	P4	596	2.0	14.0	1.4	581	1.9	9.7	1.5	1177	2.0	11.5	1.5
	P5	775	2.4	18.2	1.8	255	0.8	4.3	0.7	1030	1.6	10.1	1.3
	P6	20	0.1	0.5	0.0	422	1.3	7.1	1.1	442	0.7	4.3	0.5
	P7	800	2.8	18.8	1.9	585	2.0	9.8	1.5	1385	2.4	13.5	1.7
	P8	0	0.0	0.0	0.0	19	0.1	0.3	0.1	19	0.1	0.2	0.0
Total		42,906	215.2		100.0	38,025	181.0		100.0	80,931	197.3		100.0

Non-Māori

DALY (d)		Non-Māori											
		Male				Female				Persons			
		No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total
A	A1	745	0.6	10.9	0.3	794	0.6	9.1	0.3	1539	0.6	9.9	0.3
	A2	3552	1.5	52.2	1.5	6019	1.6	68.9	2.5	9571	1.5	61.6	2.0
	A3	169	0.1	2.5	0.1	86	0.0	1.0	0.0	255	0.1	1.6	0.1
	A4	6	0.0	0.1	0.0	323	0.2	3.7	0.1	329	0.1	2.1	0.1
	A5	807	0.4	11.9	0.3	33	0.0	0.4	0.0	840	0.2	5.4	0.2
	A6	210	0.1	3.1	0.1	142	0.1	1.6	0.1	352	0.1	2.3	0.1
	A7	573	0.4	8.4	0.2	708	0.4	8.1	0.3	1281	0.4	8.2	0.3
	A8	747	0.4	11.0	0.3	631	0.3	7.2	0.3	1378	0.4	8.9	0.3
B	B1	0	0.0	0.0	0.0	43	0.0	7.4	0.0	43	0.0	7.4	0.0
	B2	0	0.0	0.0	0.0	118	0.1	20.0	0.0	118	0.0	20.0	0.0
	B3	0	0.0	0.0	0.0	9	0.0	1.5	0.0	9	0.0	1.5	0.0
	B4	0	0.0	0.0	0.0	419	0.2	71.1	0.2	419	0.1	71.1	0.1
C	C1	535	0.6	14.6	0.2	480	0.6	18.3	0.2	1015	0.6	16.1	0.2
	C2	1216	1.4	33.1	0.5	931	1.1	35.5	0.4	2147	1.2	34.1	0.5
	C3	662	0.7	18.0	0.3	425	0.5	16.2	0.2	1087	0.6	17.3	0.2
	C4	1261	1.4	34.3	0.5	785	0.9	29.9	0.3	2045	1.2	32.5	0.4
D	D1	517	0.5	14.8	0.2	404	0.4	13.0	0.2	920	0.5	13.9	0.2
	D2	893	0.9	25.6	0.4	694	0.7	22.4	0.3	1588	0.8	24.1	0.3
	D3	358	0.3	10.3	0.2	436	0.5	14.1	0.2	795	0.4	12.0	0.2
	D4	1171	1.3	33.5	0.5	1034	1.2	33.3	0.4	2206	1.3	33.4	0.5
	D5	14	0.0	0.4	0.0	11	0.0	0.4	0.0	24	0.0	0.4	0.0
	D6	72	0.1	2.1	0.0	64	0.1	2.0	0.0	135	0.1	2.1	0.0
	D7	160	0.2	4.6	0.1	94	0.1	3.0	0.0	254	0.1	3.8	0.1
	D8	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
	D9	6	0.0	0.2	0.0	38	0.0	1.2	0.0	44	0.0	0.7	0.0
	D10	304	0.3	8.7	0.1	327	0.4	10.5	0.1	631	0.3	9.6	0.1
E	E1	9544	6.3	52.0	4.1	3573	2.4	39.8	1.5	13,117	4.3	48.0	2.8
	E2	438	0.3	2.4	0.2	133	0.1	1.5	0.1	570	0.2	2.1	0.1
	E3	650	0.5	3.5	0.3	172	0.1	1.9	0.1	822	0.3	3.0	0.2
	E4	2424	1.4	13.2	1.0	2314	1.0	25.8	1.0	4738	1.2	17.3	1.0
	E5	605	0.4	3.3	0.3	266	0.2	3.0	0.1	871	0.3	3.2	0.2
	E6	608	0.4	3.3	0.3	347	0.3	3.9	0.1	956	0.4	3.5	0.2
	E7	304	0.2	1.7	0.1	207	0.2	2.3	0.1	511	0.2	1.9	0.1
	E8	166	0.1	0.9	0.1	125	0.1	1.4	0.1	290	0.1	1.1	0.1
	E9	3617	2.3	19.7	1.5	1850	1.1	20.6	0.8	5467	1.7	20.0	1.2
F	F1	8080	4.8	88.4	3.4	2267	1.4	83.1	0.9	10,346	3.1	87.2	2.2
	F2	1061	0.7	11.6	0.5	462	0.3	16.9	0.2	1523	0.5	12.8	0.3
G	G1	9215	4.3	19.3	3.9	5361	2.2	11.0	2.2	14,576	3.2	15.1	3.1
	G2	7507	3.6	15.7	3.2	7519	3.1	15.4	3.1	15,026	3.3	15.5	3.2
	G3	0	0.0	0.0	0.0	12,113	5.5	24.7	5.0	12,113	2.8	12.5	2.6
	G4	6929	2.9	14.5	3.0	0	0.0	0.0	0.0	6929	1.3	7.2	1.5
	G5	2513	1.2	5.3	1.1	2526	1.1	5.2	1.1	5039	1.2	5.2	1.1
	G6	1787	1.0	3.7	0.8	1356	0.7	2.8	0.6	3143	0.8	3.2	0.7
	G7	1381	0.7	2.9	0.6	1716	0.7	3.5	0.7	3097	0.7	3.2	0.7
	G8	659	0.3	1.4	0.3	481	0.2	1.0	0.2	1140	0.3	1.2	0.2
	G9	2162	1.1	4.5	0.9	1852	0.9	3.8	0.8	4014	1.0	4.1	0.8
	G10	625	0.3	1.3	0.3	325	0.1	0.7	0.1	950	0.2	1.0	0.2
	G11	1645	0.9	3.4	0.7	1481	0.8	3.0	0.6	3126	0.8	3.2	0.7
	G12	0	0.0	0.0	0.0	1051	0.5	2.1	0.4	1051	0.3	1.1	0.2
	G13	1647	0.8	3.4	0.7	1208	0.5	2.5	0.5	2854	0.6	2.9	0.6
	G14	1106	0.6	2.3	0.5	368	0.2	0.8	0.2	1474	0.3	1.5	0.3
	G15	1362	0.6	2.9	0.6	682	0.3	1.4	0.3	2045	0.4	2.1	0.4
	G16	194	0.1	0.4	0.1	251	0.1	0.5	0.1	446	0.1	0.5	0.1
	G17	396	0.2	0.8	0.2	371	0.2	0.8	0.2	766	0.2	0.8	0.2
	G18	0	0.0	0.0	0.0	794	0.3	1.6	0.3	794	0.2	0.8	0.2
	G19	0	0.0	0.0	0.0	2374	1.1	4.8	1.0	2374	0.6	2.5	0.5
	G20	1170	0.5	2.4	0.5	776	0.3	1.6	0.3	1946	0.4	2.0	0.4
	G21	1044	0.5	2.2	0.4	792	0.3	1.6	0.3	1836	0.4	1.9	0.4
	G22	105	0.1	0.2	0.0	161	0.1	0.3	0.1	266	0.1	0.3	0.1

DALY (d)		Non-Māori											
		Male				Female				Persons			
		No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total
	G23	6348	3.1	13.3	2.7	5396	2.1	11.0	2.2	11,744	2.6	12.1	2.5
	G24	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
H	H1	7499	3.8	76.3	3.2	7621	3.4	79.9	3.2	15,120	3.6	78.1	3.2
	H2	2325	1.2	23.7	1.0	1920	0.9	20.1	0.8	4245	1.0	21.9	0.9
I	I1	38,489	17.4	62.5	16.4	28,076	8.5	51.0	11.7	66,565	12.8	57.0	14.0
	I2	675	0.3	1.1	0.3	1140	0.3	2.1	0.5	1815	0.3	1.6	0.4
	I3	478	0.2	0.8	0.2	618	0.2	1.1	0.3	1097	0.2	0.9	0.2
	I4	886	0.4	1.4	0.4	1261	0.3	2.3	0.5	2147	0.4	1.8	0.5
	I5	11,571	4.9	18.8	4.9	16,161	4.8	29.3	6.7	27,732	4.9	23.8	5.8
	I6	2091	0.9	3.4	0.9	1571	0.5	2.9	0.7	3663	0.7	3.1	0.8
	I7	3195	1.6	5.2	1.4	2092	0.8	3.8	0.9	5287	1.2	4.5	1.1
	I8	4244	2.1	6.9	1.8	4164	1.7	7.6	1.7	8408	1.9	7.2	1.8
J	J1	13,433	6.2	62.5	5.7	10,009	3.9	51.4	4.2	23,442	5.0	57.2	4.9
	J2	6668	5.3	31.0	2.8	8130	6.2	41.7	3.4	14,799	5.8	36.1	3.1
	J3	1377	0.8	6.4	0.6	1346	0.6	6.9	0.6	2723	0.7	6.6	0.6
K	K1	1537	0.7	27.0	0.7	1960	0.7	28.3	0.8	3497	0.7	27.7	0.7
	K2	773	0.5	13.6	0.3	837	0.5	12.1	0.3	1610	0.5	12.8	0.3
	K3	236	0.1	4.2	0.1	333	0.1	4.8	0.1	569	0.1	4.5	0.1
	K4	464	0.2	8.2	0.2	540	0.2	7.8	0.2	1004	0.2	8.0	0.2
	K5	717	0.3	12.6	0.3	928	0.3	13.4	0.4	1645	0.3	13.0	0.3
	K6	1215	0.6	21.3	0.5	902	0.4	13.0	0.4	2117	0.5	16.8	0.4
	K7	749	0.3	13.2	0.3	1433	0.5	20.7	0.6	2182	0.4	17.3	0.5
L	L1	942	0.4	36.4	0.4	1259	0.4	16.4	0.5	2201	0.4	21.4	0.5
	L2	790	0.3	30.5	0.3	0	0.0	0.0	0.0	790	0.2	7.7	0.2
	L3	857	0.4	33.1	0.4	6433	3.1	83.6	2.7	7290	1.8	70.9	1.5
M	M1	627	0.4	10.1	0.3	1484	0.8	14.6	0.6	2112	0.6	12.9	0.4
	M2	4117	2.1	66.5	1.8	6253	2.9	61.3	2.6	10,370	2.5	63.3	2.2
	M3	436	0.2	7.0	0.2	374	0.2	3.7	0.2	810	0.2	4.9	0.2
	M4	205	0.1	3.3	0.1	167	0.1	1.6	0.1	372	0.1	2.3	0.1
	M5	19	0.0	0.3	0.0	590	0.3	5.8	0.2	610	0.2	3.7	0.1
	M6	47	0.0	0.8	0.0	374	0.2	3.7	0.2	421	0.1	2.6	0.1
	M7	743	0.4	12.0	0.3	955	0.5	9.4	0.4	1698	0.4	10.4	0.4
N	N1	5083	2.0	42.6	2.2	8940	2.5	52.8	3.7	14,023	2.3	48.6	3.0
	N2	1067	0.7	9.0	0.5	926	0.6	5.5	0.4	1993	0.6	6.9	0.4
	N3	1603	0.7	13.4	0.7	2180	0.6	12.9	0.9	3784	0.7	13.1	0.8
	N4	239	0.1	2.0	0.1	578	0.3	3.4	0.2	817	0.2	2.8	0.2
	N5	446	0.2	3.7	0.2	295	0.1	1.7	0.1	740	0.2	2.6	0.2
	N6	3485	1.8	29.2	1.5	4028	2.0	23.8	1.7	7513	1.9	26.0	1.6
O	O1	202	0.1	3.5	0.1	395	0.1	9.7	0.2	597	0.1	6.1	0.1
	O2	175	0.1	3.1	0.1	451	0.1	11.1	0.2	625	0.1	6.4	0.1
	O3	75	0.0	1.3	0.0	127	0.0	3.1	0.1	202	0.0	2.1	0.0
	O4	5269	2.8	92.1	2.2	3099	1.5	76.1	1.3	8367	2.1	85.4	1.8
P	P1	5408	3.3	26.5	2.3	10,011	5.8	29.2	4.2	15,419	4.6	28.2	3.2
	P2	5244	3.1	25.7	2.2	12,257	7.5	35.7	5.1	17,501	5.3	32.0	3.7
	P3	1467	1.1	7.2	0.6	1507	1.1	4.4	0.6	2973	1.1	5.4	0.6
	P4	1490	1.0	7.3	0.6	1485	1.0	4.3	0.6	2974	1.0	5.4	0.6
	P5	2306	2.4	11.3	1.0	771	0.8	2.2	0.3	3077	1.6	5.6	0.6
	P6	109	0.1	0.5	0.0	1758	1.3	5.1	0.7	1867	0.7	3.4	0.4
	P7	2870	1.8	14.1	1.2	1804	1.2	5.3	0.8	4674	1.5	8.5	1.0
	P8	1517	0.6	7.4	0.6	4735	2.1	13.8	2.0	6253	1.3	11.4	1.3
Total		234,735	125.7		100.0	239,994	110.5		100.0	474,729	117.8		100.0

Persons

DALY (d)	Persons		
	Male	Female	Persons

		No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group
A	A1	1079	0.7	13.2	0.4	1144	0.8	11.2	0.4	2223	0.7	12.1
	A2	4072	1.6	50.0	1.5	6485	1.7	63.6	2.3	10,557	1.7	57.6
	A3	214	0.1	2.6	0.1	233	0.1	2.3	0.1	447	0.1	2.4
	A4	9	0.0	0.1	0.0	439	0.2	4.3	0.2	448	0.1	2.4
	A5	924	0.4	11.3	0.3	35	0.0	0.3	0.0	959	0.2	5.2
	A6	282	0.1	3.5	0.1	240	0.1	2.3	0.1	522	0.1	2.8
	A7	718	0.4	8.8	0.3	885	0.5	8.7	0.3	1603	0.5	8.7
	A8	848	0.4	10.4	0.3	736	0.4	7.2	0.3	1584	0.4	8.6
B	B1	0	0.0	0.0	0.0	50	0.0	6.1	0.0	50	0.0	6.1
	B2	0	0.0	0.0	0.0	163	0.1	19.9	0.1	163	0.0	19.9
	B3	0	0.0	0.0	0.0	13	0.0	1.5	0.0	13	0.0	1.5
	B4	0	0.0	0.0	0.0	597	0.3	72.5	0.2	597	0.1	72.5
C	C1	871	0.7	13.1	0.3	760	0.7	15.5	0.3	1631	0.7	14.1
	C2	2087	1.7	31.5	0.8	1575	1.4	32.0	0.6	3662	1.6	31.7
	C3	1926	1.6	29.0	0.7	1365	1.2	27.8	0.5	3291	1.4	28.5
	C4	1751	1.4	26.4	0.6	1217	1.1	24.8	0.4	2968	1.3	25.7
D	D1	678	0.5	15.3	0.2	556	0.5	14.1	0.2	1234	0.5	14.7
	D2	1083	0.8	24.4	0.4	858	0.7	21.7	0.3	1941	0.7	23.1
	D3	442	0.3	10.0	0.2	459	0.4	11.6	0.2	901	0.4	10.7
	D4	1574	1.3	35.4	0.6	1469	1.3	37.2	0.5	3043	1.3	36.3
	D5	18	0.0	0.4	0.0	15	0.0	0.4	0.0	33	0.0	0.4
	D6	74	0.1	1.7	0.0	65	0.1	1.6	0.0	139	0.1	1.7
	D7	166	0.1	3.7	0.1	97	0.1	2.5	0.0	264	0.1	3.1
	D8	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0
	D9	8	0.0	0.2	0.0	41	0.0	1.0	0.0	49	0.0	0.6
	D10	400	0.3	9.0	0.1	391	0.3	9.9	0.1	791	0.3	9.4
E	E1	12,768	7.1	54.0	4.6	4774	2.7	43.0	1.7	17,542	4.9	50.5
	E2	527	0.3	2.2	0.2	160	0.1	1.4	0.1	688	0.2	2.0
	E3	868	0.5	3.7	0.3	223	0.1	2.0	0.1	1091	0.3	3.1
	E4	2808	1.5	11.9	1.0	2519	0.9	22.7	0.9	5327	1.2	15.3
	E5	946	0.6	4.0	0.3	327	0.2	2.9	0.1	1273	0.4	3.7
	E6	1060	0.7	4.5	0.4	501	0.3	4.5	0.2	1561	0.5	4.5
	E7	329	0.2	1.4	0.1	256	0.1	2.3	0.1	585	0.2	1.7
	E8	180	0.1	0.8	0.1	143	0.1	1.3	0.1	323	0.1	0.9
	E9	4153	2.3	17.6	1.5	2202	1.2	19.8	0.8	6355	1.7	18.3
F	F1	9980	5.2	85.6	3.6	2939	1.6	79.3	1.1	12,919	3.4	84.1
	F2	1674	0.9	14.4	0.6	768	0.4	20.7	0.3	2442	0.7	15.9
G	G1	10,880	4.8	20.5	3.9	6764	2.7	12.3	2.4	17,644	3.7	16.3
	G2	7903	3.5	14.9	2.8	7819	3.0	14.2	2.8	15,722	3.3	14.6
	G3	0	0.0	0.0	0.0	13,424	5.7	24.4	4.8	13,424	2.9	12.4
	G4	7200	2.9	13.6	2.6	0	0.0	0.0	0.0	7200	1.3	6.7
	G5	2672	1.2	5.0	1.0	2696	1.1	4.9	1.0	5368	1.1	5.0
	G6	2023	1.0	3.8	0.7	1636	0.7	3.0	0.6	3659	0.8	3.4
	G7	1555	0.7	2.9	0.6	1945	0.7	3.5	0.7	3500	0.7	3.2
	G8	905	0.4	1.7	0.3	545	0.2	1.0	0.2	1450	0.3	1.3
	G9	2168	1.0	4.1	0.8	1893	0.8	3.4	0.7	4062	0.9	3.8
	G10	639	0.3	1.2	0.2	336	0.1	0.6	0.1	975	0.2	0.9
	G11	1841	0.9	3.5	0.7	1756	0.8	3.2	0.6	3597	0.9	3.3
	G12	0	0.0	0.0	0.0	1506	0.7	2.7	0.5	1506	0.3	1.4
	G13	2275	1.0	4.3	0.8	1498	0.6	2.7	0.5	3773	0.8	3.5
	G14	1228	0.6	2.3	0.4	369	0.1	0.7	0.1	1597	0.4	1.5
	G15	1459	0.7	2.8	0.5	806	0.3	1.5	0.3	2265	0.5	2.1
	G16	270	0.1	0.5	0.1	290	0.1	0.5	0.1	560	0.1	0.5
	G17	532	0.3	1.0	0.2	414	0.2	0.8	0.1	946	0.2	0.9
	G18	0	0.0	0.0	0.0	904	0.4	1.6	0.3	904	0.2	0.8
	G19	0	0.0	0.0	0.0	2609	1.1	4.7	0.9	2609	0.6	2.4
	G20	1190	0.5	2.2	0.4	824	0.3	1.5	0.3	2014	0.4	1.9
	G21	1191	0.5	2.2	0.4	841	0.3	1.5	0.3	2032	0.4	1.9
	G22	132	0.1	0.2	0.0	233	0.1	0.4	0.1	364	0.1	0.3
	G23	6942	3.1	13.1	2.5	5846	2.2	10.6	2.1	12,788	2.6	11.8
	G24	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0
H	H1	10,517	4.9	79.7	3.8	10,590	4.4	81.6	3.8	21,107	4.6	80.6
	H2	2677	1.3	20.3	1.0	2391	1.0	18.4	0.9	5068	1.2	19.4

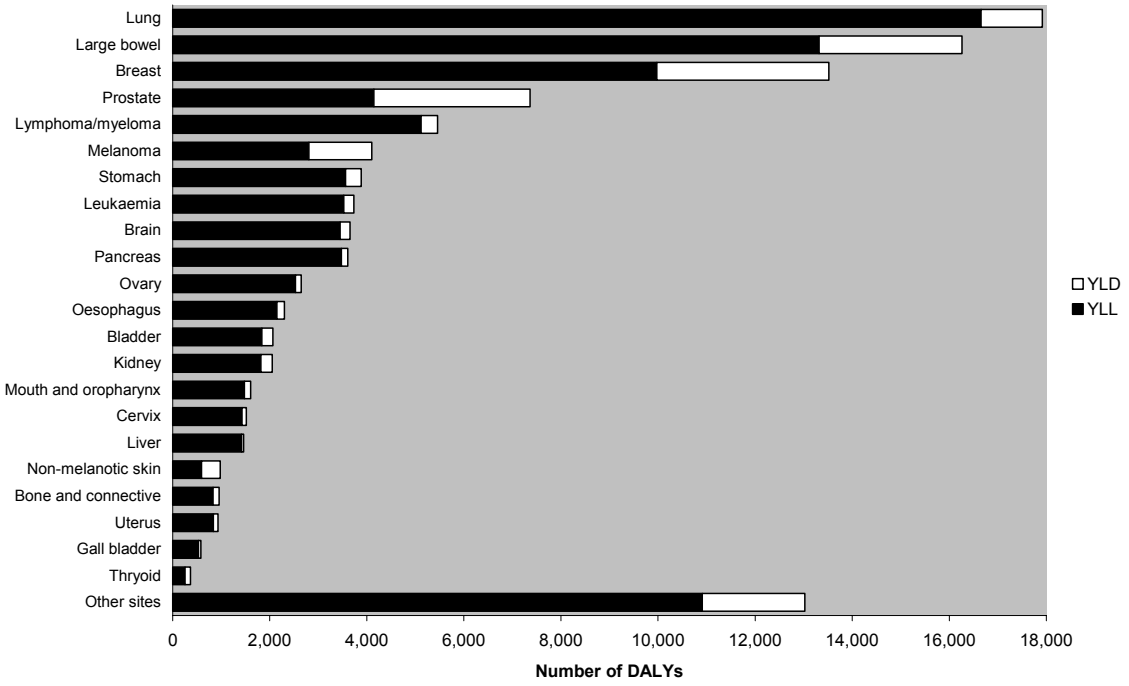
DALY (d)		Persons										
		Male				Female				Persons		
		No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group	Percentage of Total	No.	Rate	Percentage of Group
I	I1	43,980	18.9	62.1	15.8	31,536	9.5	51.3	11.3	75,516	14.1	57.0
	I2	942	0.4	1.3	0.3	1270	0.3	2.1	0.5	2212	0.4	1.7
	I3	748	0.3	1.1	0.3	921	0.3	1.5	0.3	1668	0.4	1.3
	I4	1080	0.5	1.5	0.4	1387	0.4	2.3	0.5	2466	0.4	1.9
	I5	12,562	5.1	17.7	4.5	17,180	4.9	27.9	6.2	29,742	5.0	22.5
	I6	2290	1.0	3.2	0.8	1888	0.6	3.1	0.7	4179	0.8	3.2
	I7	3631	1.7	5.1	1.3	2369	0.8	3.9	0.9	6000	1.2	4.5
	I8	5628	2.6	7.9	2.0	4959	1.9	8.1	1.8	10,587	2.2	8.0
J	J1	15,671	6.8	60.9	5.6	11,680	4.4	49.8	4.2	27,351	5.5	55.6
	J2	8538	5.5	33.2	3.1	10,262	6.4	43.7	3.7	18,800	5.9	38.2
	J3	1531	0.8	5.9	0.6	1516	0.7	6.5	0.5	3047	0.7	6.2
K	K1	1712	0.7	26.3	0.6	2126	0.7	28.0	0.8	3838	0.7	27.2
	K2	898	0.5	13.8	0.3	983	0.5	13.0	0.4	1881	0.5	13.3
	K3	281	0.1	4.3	0.1	407	0.2	5.4	0.1	688	0.1	4.9
	K4	534	0.2	8.2	0.2	591	0.2	7.8	0.2	1126	0.2	8.0
	K5	819	0.4	12.6	0.3	1022	0.3	13.5	0.4	1841	0.3	13.1
	K6	1368	0.6	21.0	0.5	991	0.4	13.1	0.4	2359	0.5	16.7
	K7	908	0.4	13.9	0.3	1463	0.5	19.3	0.5	2372	0.4	16.8
L	L1	1116	0.4	39.0	0.4	1495	0.5	16.9	0.5	2611	0.5	22.3
	L2	828	0.3	29.0	0.3	0	0.0	0.0	0.0	828	0.2	7.1
	L3	916	0.4	32.0	0.3	7330	3.1	83.1	2.6	8246	1.8	70.6
M	M1	712	0.4	10.5	0.3	1666	0.8	14.8	0.6	2377	0.6	13.2
	M2	4466	2.0	65.9	1.6	6795	3.0	60.5	2.4	11,262	2.5	62.5
	M3	477	0.2	7.0	0.2	413	0.2	3.7	0.1	890	0.2	4.9
	M4	231	0.1	3.4	0.1	184	0.1	1.6	0.1	414	0.1	2.3
	M5	22	0.0	0.3	0.0	672	0.3	6.0	0.2	694	0.2	3.9
	M6	51	0.0	0.8	0.0	405	0.2	3.6	0.1	456	0.1	2.5
	M7	820	0.4	12.1	0.3	1096	0.5	9.8	0.4	1916	0.4	10.6
N	N1	5384	2.1	41.3	1.9	9316	2.5	51.7	3.4	14,700	2.3	47.3
	N2	1401	0.8	10.7	0.5	1155	0.6	6.4	0.4	2556	0.7	8.2
	N3	1682	0.7	12.9	0.6	2256	0.6	12.5	0.8	3938	0.7	12.7
	N4	262	0.1	2.0	0.1	635	0.3	3.5	0.2	898	0.2	2.9
	N5	531	0.2	4.1	0.2	352	0.1	2.0	0.1	882	0.2	2.8
	N6	3789	1.8	29.0	1.4	4305	2.0	23.9	1.5	8094	1.9	26.1
O	O1	209	0.1	3.2	0.1	408	0.1	9.2	0.1	617	0.1	5.7
	O2	182	0.1	2.8	0.1	470	0.1	10.6	0.2	652	0.1	6.0
	O3	78	0.0	1.2	0.0	131	0.0	2.9	0.0	209	0.0	1.9
	O4	5984	3.0	92.7	2.2	3444	1.5	77.3	1.2	9427	2.2	86.4
P	P1	6307	3.3	25.6	2.3	11,623	5.8	28.8	4.2	17,930	4.6	27.6
	P2	6081	3.1	24.7	2.2	14,416	7.5	35.8	5.2	20,497	5.3	31.5
	P3	1791	1.1	7.3	0.6	1853	1.1	4.6	0.7	3644	1.1	5.6
	P4	2085	1.2	8.5	0.8	2066	1.1	5.1	0.7	4151	1.1	6.4
	P5	3081	2.4	12.5	1.1	1026	0.8	2.5	0.4	4107	1.6	6.3
	P6	129	0.1	0.5	0.0	2180	1.3	5.4	0.8	2309	0.7	3.6
	P7	3670	2.0	14.9	1.3	2389	1.3	5.9	0.9	6060	1.6	9.3
	P8	1517	0.5	6.2	0.5	4755	1.9	11.8	1.7	6272	1.2	9.7
Total		277,641	134.9		100.0	278,019	117.7		100.0	555,660	126.0	

Note: 1. Rate = rate per 1000 standardised to Segi's world population.
2. For explanation of A–P categories, see Appendix 1.
3. Totals may differ from those reported in the body of the text because of NEC categories.

Appendix 4: Cancer DALYs

Estimation of YLLs for cancer was based on the NZHIS mortality database. YLDs were estimated based on incidence data (registrations) from the New Zealand Cancer Registry (latest available data were for 1995), and stage specific survival data from the South Australian Cancer Registry (in the absence of New Zealand survival data). Methods for staging cancers were those used in the Australian Burden of Disease Study. Stage specific cancer disability weights were extracted from the Dutch valuation exercise (Stouthard et al 1997). The models for calculating cancer YLDs based on the above datasets were those developed by Vos and Stephenson for the Australian Burden of Disease Study (Mathers et al 1999). Figure 5 summarises the DALY estimates for cancers in New Zealand in 1996 for the whole population, showing the contributions of YLLs and YLDs separately.

Figure 5: Cancer DALYs, by site, 1996



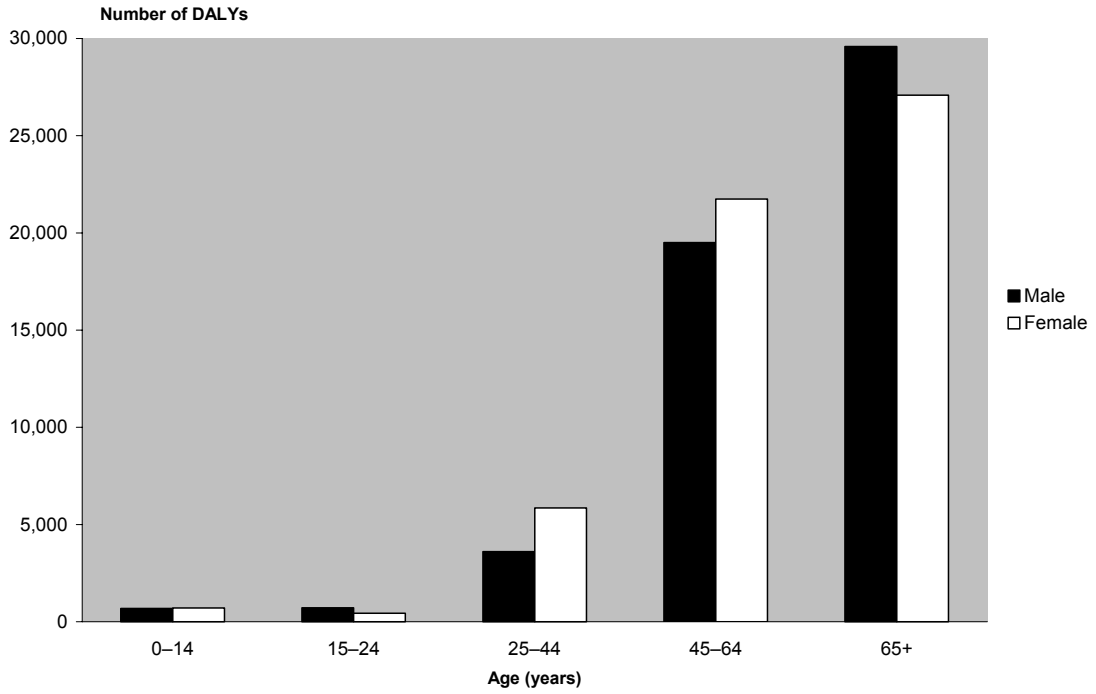
Source of base data: New Zealand Cancer Registry, NZHIS and ABDS

For all cancers combined, 84 percent of DALYs are due to YLL (Figure 5). Of the 23 cancer sites, only six have lower than average YLL contributions (that is, for cancers at these sites, disability is significant in relation to premature mortality): cancers of the large bowel, thyroid, breast and prostate, and melanoma and non-melanotic skin cancers. These sites account for 39 percent of the total cancer burden.

Age and gender

The cancer burden is approximately equally split between males and females across all age groups with the exception of the young adult (25–44 years) age group: in this age group over three-fifths of the burden falls on females, the result mainly of breast cancer (Figure 6). Only approximately 1 percent of the total cancer burden occurs in childhood (0–14 years), and a similar proportion involves youth (15–24 years). The share then rises exponentially, with approximately 9 percent in young adults (25–44 years), 38 percent in mid-life (45–64 years), and the remaining 52 percent in old age (65 years and older, with 31 percent of the burden being sustained by the 65–74 age group and 21 percent by those aged 75 and older) (Figure 6).

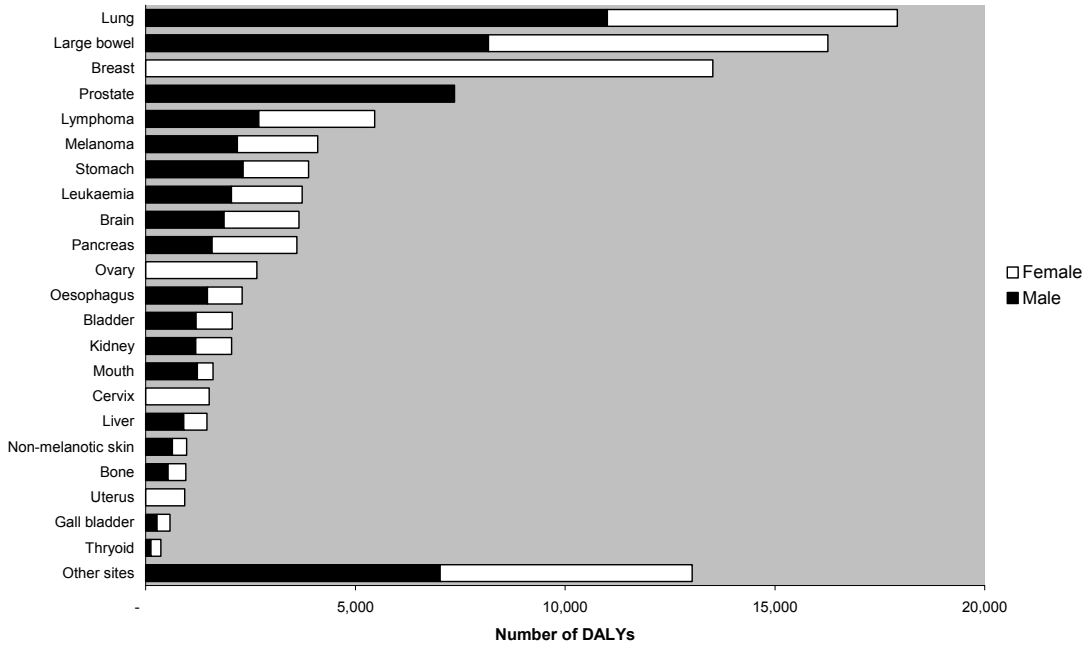
Figure 6: Cancer DALYs, by age and gender, all sites, 1996



Source of base data: NZCR, NZHIS and ABDS

The gender distribution of cancer DALYs by site in 1996 (Figure 7) shows the higher impact of smoking related cancers on males. Stomach, liver and skin cancers also impact more heavily on males, perhaps reflecting higher exposures to alcohol and sunlight.

Figure 7: Cancer DALYs, by site and gender, all ages, 1996

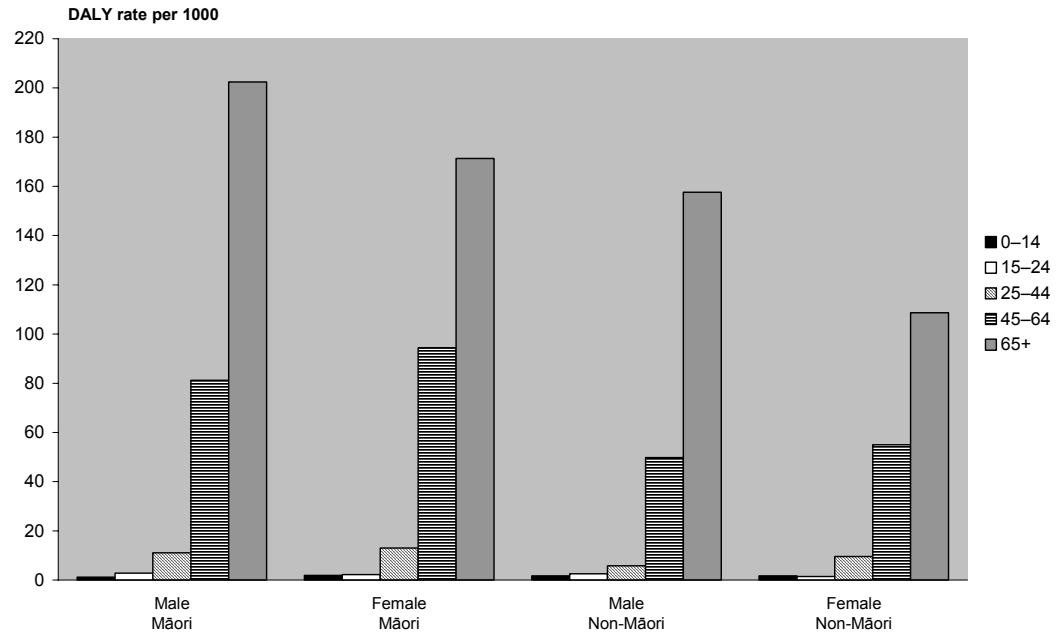


Source of base data: NZCR, NZHIS and ABDS

Ethnicity

Māori rates of DALYs lost to cancer exceed non-Māori rates in all age groups (except children) and both genders, but the excess is relatively greater for males (Figure 8).

Figure 8: Cancer DALYs, by age, gender and ethnicity, all sites, 1996

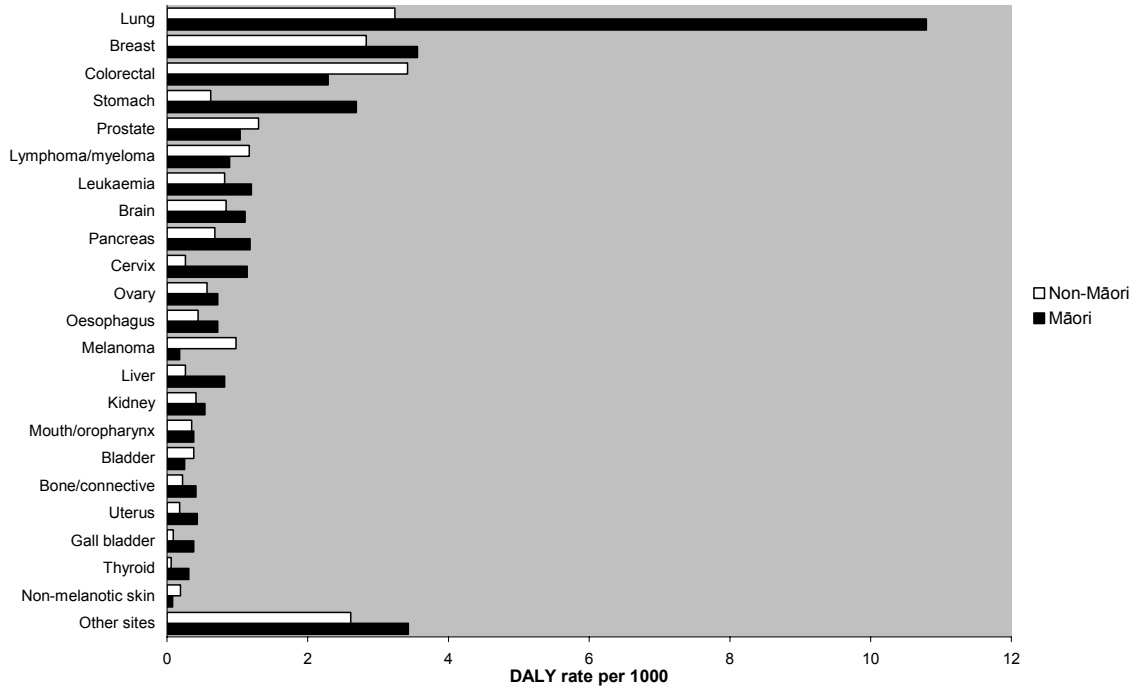


Source of base data: NZCR, NZHIS and ABDS

For Māori the largest cancer burden is from cancer of the lung (27 percent of total Māori cancer burden, compared with 15 percent for non-Māori), whereas for non-Māori the burden is greatest from large bowel cancer (16 percent compared with 6 percent for Māori).

Figure 9 shows age standardised DALY rates by site for Māori and non-Māori. The sites are sorted from the highest total population burden (lung cancer) to the smallest (thyroid cancer) with the 'other sites' depicted last.

Figure 9: Age standardised cancer DALY rates, by ethnicity and site, 1996



Non-Māori age standardised rates are higher than Māori rates for six cancers: prostate, lymphoma/myeloma, colorectal, bladder, non-melanotic skin and melanoma. For most other sites, Māori rates are significantly higher than non-Māori, with the largest differences occurring in smoking-related cancers (eg, lung cancer), stomach cancer, cervical cancer and primary liver cancer.

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