Deloitte Access Economics

Updated Dementia Economic Impact Report, 2011, New Zealand

Alzheimers New Zealand

January 2012

Deloitte.

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Glossary

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AWE	average weekly earnings
CCPS	Client Claims Processing System
CPI	consumer price index
DALY	disability adjusted life year
DHB	District Health Boards
DWL	deadweight loss
GDP	gross domestic product
GP	general practitioner
HRC	Health Research Council of New Zealand
ICD-10	International Classification of Disease Tenth Revision
MoH	Ministry of Health, New Zealand
NPV	net present value
NZ	New Zealand
NZHIS	New Zealand Health Information Service
OECD	Organization for Economic Cooperation and Development
PHI	Public Health Intelligence unit of the Ministry of Health
PHO	Primary Health Organisation
R&D	research and development
US	United States
VSL(Y)	value of a statistical life (year)
YLD	year of healthy life lost due to disability
YLL	year of life lost due to premature mortality

Executive summary

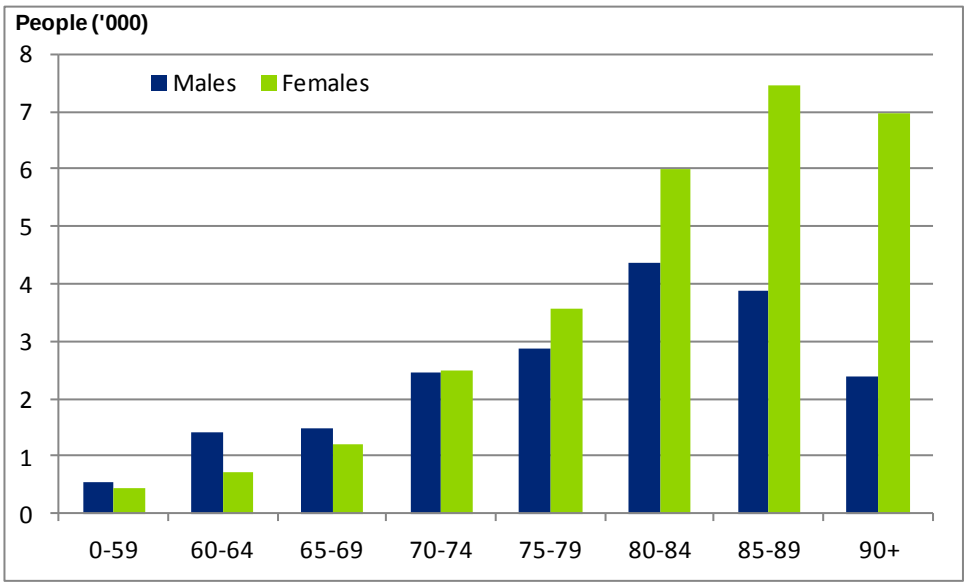
This report provides estimates of dementia prevalence, incidence and costs in 2011. It updates earlier estimates provided in 2008 in a report which contains more detailed background information regarding dementia, its effects and treatments.

Occurrence of dementia

In 2011, 48,182 New Zealanders had dementia – 1.1% of the New Zealand (NZ) population. This has increased over 18% in three years, from 40,746 people in 2008.

The majority (60%) of people with dementia are female – 28,864 NZ women have dementia compared to 19,318 NZ men. This is due to women living longer than men on average, and due to the prevalence rate of dementia being higher for women than men in age groups over 75 years. There were an estimated 13,486 new case of dementia in 2011, with the incident proportions of males and females similar to those for prevalence.

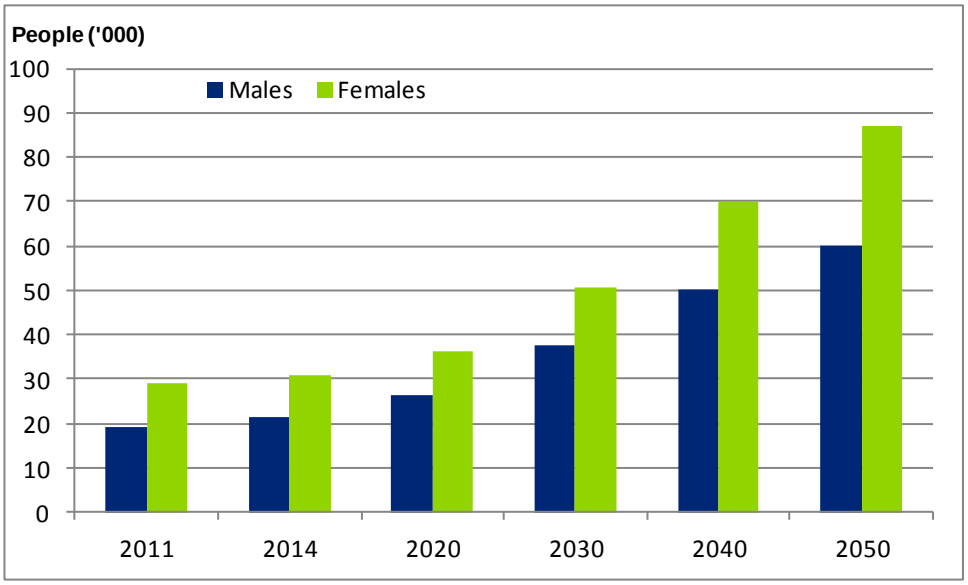
Figure i: Prevalence of dementia by age and gender, NZ, 2011



By 2050, 147,359 New Zealanders will have dementia – over 2.6% of the population, and more than triple current numbers.

Of the total, 87,145 (59%) will be female and 60,214 (41%) male. Annual incidence (onset) of dementia will also more than triple, to 41,088 new cases by the year 2050.

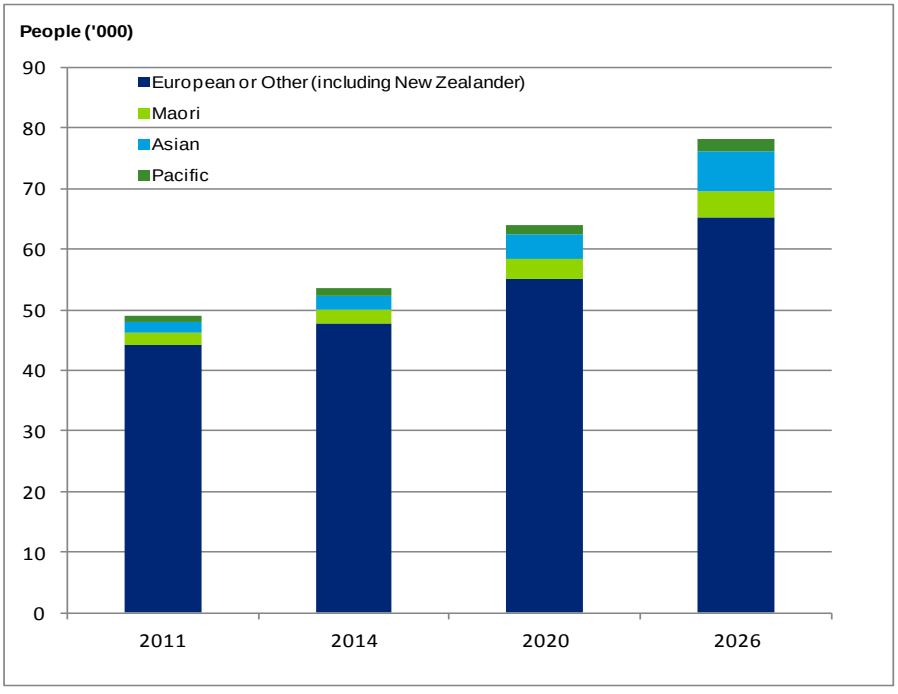
Figure ii: Prevalence projections for dementia by gender, NZ, 2011 to 2050



A greater share of those with dementia will be made up of those with non-European backgrounds.

By 2026, the last year for which ethnic splits are available, there will be a higher share of Maori, Asian and Pacific Islander people with dementia in the total, due to demographic changes in the population. Maori people with dementia will increase from 4.0% of the total in 2011 to 5.7% in 2026; Asians will increase from 3.7% to 8.4%; and Pacific Islander people will increase from 1.9% to 2.6% of all New Zealanders with dementia.

Figure iii: Prevalence projections for dementia by ethnicity, NZ, 2011 to 2026

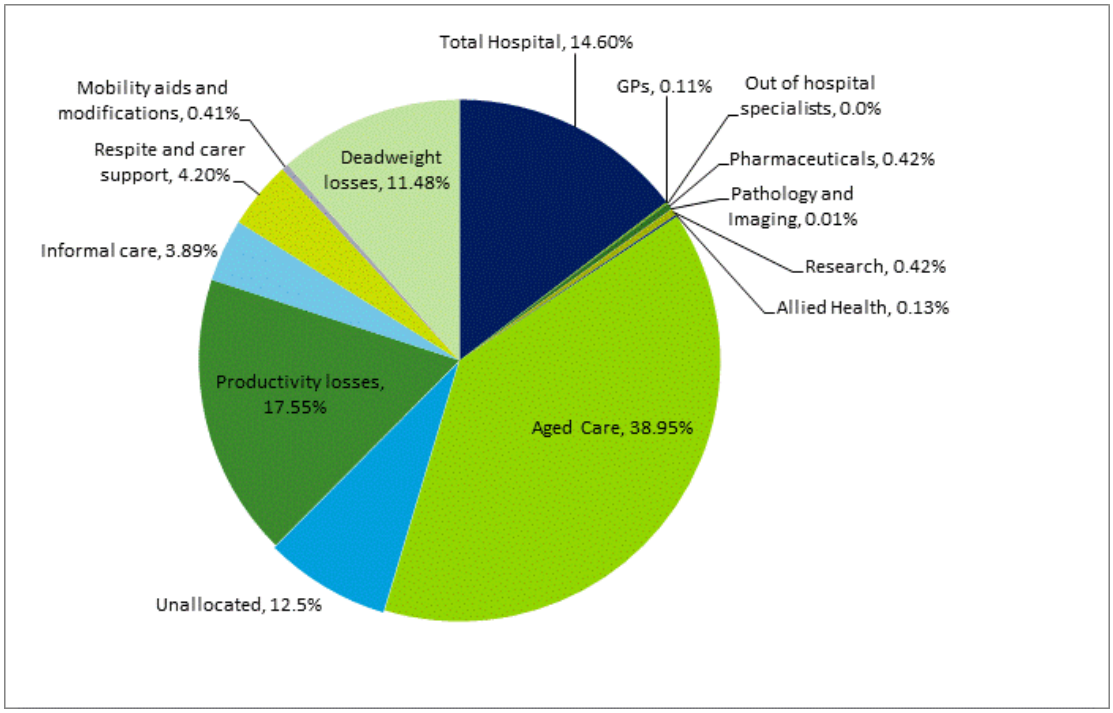


Financial costs

The total financial cost of dementia in 2011 was estimated as $954.8 million.

- Of the total, $596.3 million (62.5%) was for health system expenditures and $358.5 million (37.5%) was for other financial costs.

Figure iv: Distribution of the financial costs of dementia, NZ, 2011



Total health system expenditure ($596.3 million), which is paid for by government, individuals and others, is dominated by the cost of residential aged care at $371.9 million in 2011 (62.4% of health expenditure). Hospital costs were also substantial, totalling $139.4 million (21.4%), comprising $127.3 million of inpatient costs and around $12.1 million in outpatient costs. Pharmaceuticals and health research were each around $4.0 million. Overhead costs of administering health systems, capital expenditures, and public health programs were an estimated $74.6 million, with GPs, allied health, pathology and imaging each around $1 million per annum. These costs only include the additional expenditure on people with dementia over and above that of people of the same age and gender.

Productivity losses due to dementia comprise the lower employment participation of people with dementia ($157.7 million), higher rates of absenteeism ($2.9 million) and the loss of human capital as a result of premature mortality ($6.9 million). In addition, carers also participate less in the workforce, and the opportunity cost of their informal care is thus valued at $37.2 million. Other real costs are the cost of respite and support services ($40.1 million), the cost of mobility aids and home modifications ($4.0 million) and the deadweight efficiency losses from welfare transfers, government expenditures and taxation revenues forgone ($109.6 million).

Burden of disease

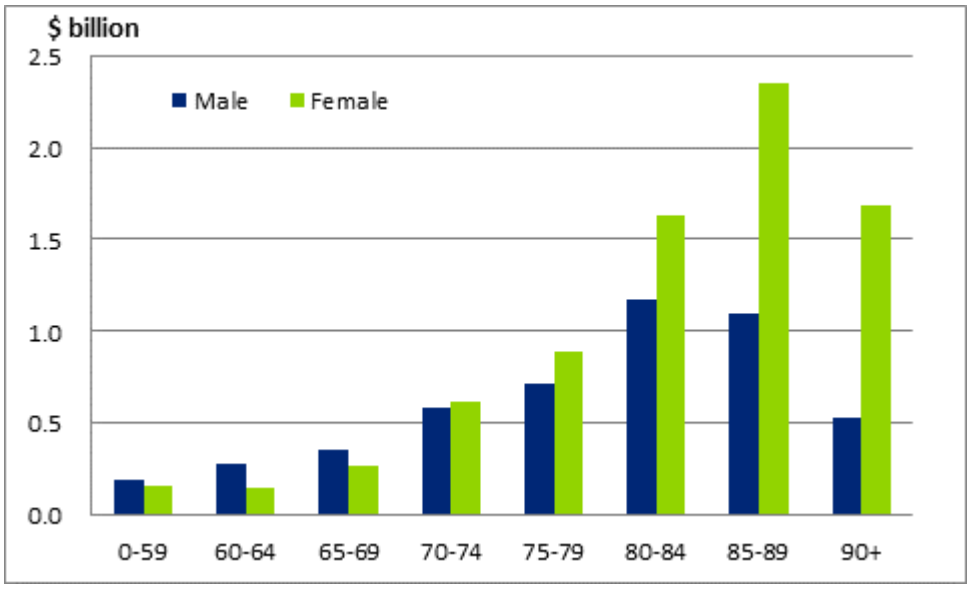
In addition to the financial cost of dementia, there is also the cost of the loss of wellbeing and quality of life. This is measured using disability adjusted life years (DALYs), an international system for measuring the mortality and morbidity impact of disease and injury.

In 2011, 32,649 years of healthy life were lost due to dementia across New Zealand. The majority of the burden was due to morbidity (lost wellbeing and quality of life), comprising 23,017 DALYs or 70% of the total. The remaining 30% of the burden was due to the estimated 9,633 DALYs caused by premature death from dementia.

- The burden of disease from dementia is disproportionately carried by women. While the burden for males was 12,689 DALYs (39% of total), the female burden was 19,960 DALYs (61% of total).

The burden of disease from dementia is converted into a dollar value, by multiplying the total DALYs from dementia by the value of a statistical life year (VSLY), which was estimated from meta-analysis of the literature as $387,674 in 2011.

Figure v: Value of gross burden of disease from dementia, 2011



After subtracting costs borne by the individual already calculated and included in the financial cost estimates, the **net value of the burden of disease was estimated as $12.4 billion in 2011**, more than 12 times the financial costs.

Individuals with dementia and their carers bore 33% of the financial costs of dementia in 2011, the Government bore 55% of the costs, and the remaining 12% of financial costs were borne by other payers in society. These shares change to 95%, 4% and 1% if the value of healthy life lost is included.

Deloitte Access Economics

1 Prevalence, incidence and mortality estimates and projections

1.1 Dementia prevalence and incidence rates for New Zealand

Epidemiological studies of the prevalence and incidence of dementia give slightly varying results depending on the methods used in the study although all studies show a sharp rise in prevalence rates with age. While dementia can occur at any age, it is rare below the age of 60 years. Because of demographic ageing, in the future there will be relatively more people in the age groups at most risk for dementia. In the absence of effective prevention or treatment, the increase in the numbers of people with dementia will come about as a consequence of an increase in the size of the population most at risk i.e. those in the older age groups.

No epidemiological studies of dementia incidence or prevalence in the New Zealand population or in specific ethnic groups within the population were identified in researching this report. We reiterate our statement in the 2008 report that it would be worthwhile collecting such information, particularly in ethnic groups such as Maori and Pacific Island people, since it is possible that dementia prevalence rates differ by ethnicity. While there is anecdotal evidence that the incidence of dementia may be higher in these (non-white) groups in New Zealand, due to a higher prevalence of cardiovascular risk factors for example, no data were available to enable modelling of the extent of this difference.

As such, and because these ethnic groups are relatively small as a proportion of the total New Zealand elderly population, these estimates are conservatively based on the best available rates from a meta-analysis of international studies, largely from countries in Europe and Australia. The various prevalence estimates are presented in Table 1.1 and Table 1.2, with greater background analysis provided in a recent report for Alzheimer's Australia (Deloitte Access Economics, 2011).

The estimates of prevalence rates used in this report (Table 1.4) are corroborated by the recent World Alzheimer Report 2010 (Wimo and Prince, 2010) which based prevalence estimates for 2010 on a previous systematic review of the global prevalence of dementia (Prince and Jackson, 2009), identifying 147 studies in 21 Global Burden of Disease world regions. Applying prevalence proportions to the United Nations estimates of the total older population, the results showed that estimates for those aged 60 years and over did not vary much between world regions. In Australasia, dementia prevalence in 2009 was estimated to be 6.4% in people aged 60 or older. As there are no data on the trends in age-gender dementia prevalence rates in New Zealand over time, it is problematic to determine

whether such rates in the future are likely to change, and therefore we assume that there is no change.

Table 1.1: Dementia prevalence rates from Australian studies and European meta-analyses

Age	Australian MMSE studies (Anstey et al, 2010)			European studies: clinical diagnoses					
	DYNOPTA	NSMH 1997	NSMH 2007	Jorm	Lobo - Female	Lobo - Male	Ritchie	Hofman - Female	Hofman - Male
	%	%	%	%	%	%	%	%	%
60-64	-	-	-	0.7	-	-	-	-	-
65-69	3.78	6.22	4.00	1.4	1.0	1.6	1.5	-	-
70-74	5.16	9.09	5.02	2.8	3.1	2.9	3.5	3.9	4.6
75-79	10.63	-	7.53	5.6	6.0	5.6	6.8	6.7	5.0
80-84	16.32	-	5.26	10.5	12.6	11.0	13.6	13.5	12.1
85-89	22.36	-	-	20.8	20.2	12.8	22.3	22.8	18.5
90-94	32.43	-	-	38.6	30.8	22.1	31.5	32.2	32.1
90+	41.41	-	-	-	-	-	-	-	-
95+	67.42	-	-	-	-	-	44.5	36.0	31.6

Source: Anstey et al (2010), Jorm et al (2005), Hofman et al (1991), Lobo et al (2000) and Ritchie and Kildea (1995).

Recently there has been a focus on the incidence and prevalence of dementia among older groups (80 years and over). Earlier studies assumed the same prevalence rates in the oldest aged groups e.g. the Australian Institute of Health and Welfare (AIHW 2007) used 22.1% for males and 30.8% for females in both the 90-94 and 95+ cohorts (Table 1.2). Two epidemiological studies have shown that dementia rates do not flatten or decrease after the age of 90 years but, instead, dementia rates continue to rise (Lucca et al 2009; Corrada et al 2008). One study focuses on a large Italian population while the other uses a population from the United States. Although both come to the same general conclusion, absolute levels of prevalence differ substantially between the two studies and also with Anstey (2009, 2010), most likely due to different methods used to diagnose individuals. Prevalence rates of dementia for those 80 years and older from the two studies (Lucca et al 2009; Corrada et al 2008), are shown in Table 1.3.

Table 1.2: Alternative dementia prevalence rate estimates used in previous Australian studies

Age	Access Economics (2003) [a]		Jorm et al (2005) [b]		Access Economics (2005) [c]		Begg et al (2007), AIHW (2007) [d]		Anstey et al (2009)		Anstey et al (2010)	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
<60	0.2	0.1	na	na	0.1	0.1	0.1	0	na	na	na	na
60-64	0.2	0.1	1.2	0.6	1.2	0.6	0.1	0	na	Na	na	Na
65-69	1.9	1.1	1.7	1.3	1.7	1.3	1.6	1.0	2.2	2.5	3.0	4.5
70-74	1.9	1.1	3.5	3.3	3.5	3.3	2.9	3.1	4.9	5.6	6.2	4.3
75-79	5.7	6.8	5.8	6.3	5.8	6.3	5.6	6.0	8.2	9.2	10.7	10.6
80-84	5.7	6.8	11.8	12.6	11.8	12.6	11.0	12.6	12.3	17.0	16.9	16.0
85-89	22.8	33.6	18.6	21.5	18.6	21.5	12.8	20.2	18.8	22.8	25.1	21.0
90-94	22.8	33.6	31.1	33.3	31.1	33.3	22.1	30.8	41.2	32.7	41.3	29.9
95+	22.8	33.6	38.1	40.3	38.1	40.3	22.1	30.8	53.9	73.8	52.8	69.4

Note: (a) Prevalence for those under 25 years was considered zero. (b) Uses an average of four meta analyses including Jorm et al (1987), Hofman et al (1991), Richie and Kildea (1995) and Lobo et al (2000). (c) Estimates were derived from Jorm et al (2005). (d) Based on Harvey et al (2003) for those <65 years old and Lobo et al (2000) for all other age groups.
Source: Access Economics (2003, 2005), Jorm et al (2005), Begg et al (2007), AIHW (2007), Anstey et al (2009), Anstey et al (2010).

Table 1.3: Estimated dementia prevalence rates for those aged 80 years and over

Age	Lucca et al (2009) [a]		Corrada et al (2008) [b]	Corrada et al (2008) [c]	
years	All (%)	Male (%)	Female (%)	Male (%)	Female (%)
80-84	13.5	Na	na	na	na
85-89	30.8	Na	na	na	na
90-94	39.5	17.3	31.1	40.4	42.6
95+	52.8	20.6	50.0	37.2	58.7

Note: (a) Participants were diagnosed based on DSM-IV criteria. (b) Includes participants diagnosed from a neurological examination or a Mini-Mental State Examination administered in person. (c) Includes participants diagnosed from a Cognitive Assessment Screening Instrument-Short Version, a Dementia Questionnaire, or the Informant Questionnaire that combines information from the Dementia Severity Rating Scale, Functional Activities, and Activities of Daily Living.

For this report, prevalence rates were estimated using a combination of published epidemiological studies and the meta-analyses outlined above. As there have not been any significant studies since Access Economics (2009) that warrant a change in dementia prevalence rates, and as the World Alzheimer Reports suggest similar rates across Australasia, these prevalence rates were applied to the New Zealand population estimates. The methodology is outlined below.

- **Age bracket 0 to 59 years:** A weighted average for the entire population was calculated using five year age bracket prevalence rates derived from Harvey et al (2003).
- **Age brackets between 60 and 79 years:** Previous prevalence rates used in Access Economics (2005) were used.
- **Age brackets between 80 and 89 years:** A weighted average of prevalence rates found in Access Economics (2005) and Lucca et al (2009) were used, with the former receiving three times as much weight as the latter.
- **Age brackets 90 years and above:** A weighted average of prevalence rates was calculated using rates found in Access Economics (2005), Lucca et al (2009), and Corrada et al (2008). An average prevalence rate was calculated using the latter two studies and this average was given an equal weighting with the prevalence rates from Access Economics (2005).

There are relatively few sources of data estimating the age-gender incidence of dementia, as there may be problems with diagnosing dementia (e.g., differential diagnosis of early mild dementia from other cognitive conditions) and the progressive onset of the condition means that a specific date of onset is frequently difficult to determine. This suggests that, in any given period, there may be a significant number of cases that are missed due to delayed diagnosis. The specificity of diagnostic tools may also be an issue (Begg et al, 2007). A US study found that around 22% of adults aged 71 years or older had cognitive impairment where the level of impairment did not reach the dementia threshold (Plassman et al, 2008). The study suggests the number of individuals with chronic impairment without dementia is about 70% higher than the number of individuals with dementia.

For this report, incidence rates used in the previous Alzheimers New Zealand report, based on Wancata et al (2003), are used again. Studies included in Wancata et al's meta-analysis were Jorm et al (1987), Hofman et al (1991), Ritchie and Kildea (1995) and Lobo et al (2000), with Table 1.4 presenting the average incidence rates derived. These rates triangulate well with (i.e. fall within the ranges estimated by) Ferri et al (2005) for the Western Pacific and Southeast Asian regions. Whilst most reports focus on prevalence rather than incidence, the similarity of age-gender prevalence rates across country studies where age-gender mortality rates are similar (e.g. Prince and Jackson, 2009, for Australasia) suggests that age-gender incidence rates may also be similar, and hence the rates presented are credible for NZ.

Table 1.4: Dementia prevalence and incidence rates used, by age and gender, %

	Prevalence		Incidence	
Age	**Male**	**Female**	**Male**	**Female**
0-59	0.03	0.02	0.01	0.01
60-64	1.2	0.6	0.1	0.1
65-69	1.7	1.3	0.4	0.4
70-74	3.5	3.3	0.9	0.9
75-79	5.8	6.3	2.0	2.1
80-84	12.1	12.9	3.8	3.9
85-89	21.1	24.4	6.2	6.6
90+	34.4	41.5	9.4	10.1

Source: Access Economics (2005), Corrada et al (2008), Harvey et al (2003), Lucca et al (2009), Wancata et al (2003).

1.1.2 Population data and prevalence projections

The prevalence and incidence projections presented in this report are derived by applying the rates derived in the previous section to population projections. As such, the findings reflect demographic ageing trends only, with a 'status quo' approach to other factors (e.g. trends in cardiovascular risk factors such as obesity) that may influence the incidence and prevalence rates of dementia over the future forecast horizon.

Population projections for the New Zealand population, as well as for the four ethnic groups (European, Maori, Asian and Pacific Island) were sourced from Statistics New Zealand. Projections for the total population were available by age and gender out to 2061. Population projections for ethnic sub-groups were available out to 2026.

In 2011, there were an estimated 48,182 New Zealanders with dementia – 1.1% of the total NZ population. Of the total, 40.1% were male, 59.9% were female (Table 1.5) and 13,486 were new incident cases (0.3% of the population). By 2050, there will be an estimated 147,359 New Zealanders with dementia (2.6% of the population) and an estimated 41,008 new cases each year (0.7% of the population), with the proportion of males to females remaining very similar to the 2011 ratio.

Table 1.5: Prevalence and incidence, by gender and age, NZ, 2011-2050 (people)

Number of people	2011	2014	2020	2030	2040	2050
Prevalence						
Males						
0-59	535	544	554	568	590	603
60-64	1,396	1,417	1,622	1,668	1,511	1,900
65-69	1,493	1,770	1,953	2,387	2,220	2,373
70-74	2,436	2,713	3,518	4,274	4,452	4,081
75-79	2,854	3,132	4,048	5,562	6,937	6,566
80-84	4,373	4,531	5,464	8,783	11,085	11,908
85-89	3,860	4,451	5,147	7,994	11,791	15,525
90+	2,372	2,922	4,229	6,532	11,724	17,259
Total males	19,318	21,479	26,535	37,768	50,309	60,214
Females						
0-59	442	448	454	458	468	475
60-64	725	743	862	925	830	955
65-69	1,200	1,424	1,593	2,009	1,937	1,933
70-74	2,492	2,746	3,571	4,412	4,778	4,336
75-79	3,566	3,881	4,908	6,785	8,700	8,518
80-84	6,002	6,080	7,102	11,138	14,190	15,782
85-89	7,461	7,778	8,217	12,191	17,823	23,919
90+	6,977	7,932	9,510	12,624	21,387	31,229
Total females	28,864	31,030	36,215	50,541	70,114	87,145
Total with dementia	48,182	52,509	62,750	88,309	120,423	147,359
% of total population	1.1%	1.2%	1.3%	1.7%	2.2%	2.6%
Incidence						
Males						
0-59	179	182	185	190	197	202
60-64	116	118	135	139	126	158
65-69	351	416	460	562	522	558
70-74	626	698	905	1,099	1,145	1,049
75-79	984	1,080	1,396	1,918	2,392	2,264
80-84	1,372	1,421	1,714	2,755	3,477	3,735
85-89	1,135	1,308	1,513	2,350	3,466	4,563
90+	649	800	1,158	1,788	3,210	4,725
Total males	5,413	6,023	7,465	10,801	14,535	17,255
Females						
0-59	181	184	186	188	192	195
60-64	121	124	144	154	138	159
65-69	369	438	490	618	596	595
70-74	680	749	974	1,203	1,303	1,183
75-79	1,189	1,294	1,636	2,262	2,900	2,839
80-84	1,810	1,833	2,141	3,358	4,278	4,758
85-89	2,020	2,105	2,224	3,300	4,825	6,475
90+	1,704	1,938	2,323	3,084	5,225	7,630
Total females	8,073	8,664	10,118	14,167	19,457	23,832
Total with dementia	13,486	14,687	17,583	24,968	33,992	41,088
% of total population	0.3%	0.3%	0.4%	0.5%	0.6%	0.7%

As ethnicity is not a mutually exclusive concept, the sum of the four ethnic sub-populations is greater than the whole New Zealand population. This holds true also for the prevalence and incidence projections (as one person can be part of two groups and therefore summation would result in overstatement). For the reasons noted in the previous section, the incidence and prevalence rates from Table 1.4 were used for all ethnic groups.

In 2011, there were an estimated 49,022 New Zealanders with dementia classified in at least one ethnic category, of whom 1,970 (4.0%) were Maori, 1,838 (3.7%) were Asian, 930 (1.9%) were Pacific Islanders and 44,284 (90.3%) were European/other (Table 1.6). The ethnicity proportions were approximately the same for incident as for prevalent cases.

By 2026, the last year for which ethnic splits are available, the ratios expected to change, with a smaller share of people with dementia (down from 90.3% to 83.2%) in the European/other group (65,154 of 78,267). The shares for all other ethnicities are projected to increase, to 4,493 (5.7%) Maori, a much higher 6,568 (8.4%) Asian, and 2,051 (2.6%) Pacific Islanders. Again, incidence shares closely mirror prevalence shares.

Dementia prevalence is projected to increase from 1.1% of the total population in 2011 to 1.6% by 2026, with higher prevalence in females (due primarily to longer life). For the European/other group, prevalence increases from 1.0% to 1.3%, while for the minority ethnicities prevalence rates are much lower (around 0.02% to 0.04% currently, rising to 0.04% to 0.13% by 2026), due to shorter life expectancy (Table 1.7).

Table 1.6: Prevalence and incidence, by ethnicity and gender, NZ, 2011-2026 (people)

Number of people	2011	2014	2020	2026
Prevalence				
Pacific Total	**930**	**1,115**	**1,514**	**2,051**
Male	417	486	647	893
Female	512	629	867	1,159
Asian Total	**1,838**	**2,440**	**4,141**	**6,568**
Male	862	1,140	1,901	2,950
Female	976	1,300	2,240	3,618
Maori Total	**1,970**	**2,282**	**3,268**	**4,493**
Male	868	1,001	1,430	1,909
Female	1,102	1,282	1,839	2,584
European/Other Total	**44,284**	**47,664**	**55,146**	**65,154**
Male	17,514	19,244	23,040	27,644
Female	26,770	28,421	32,107	37,511
All Groups Total	**49,022**	**53,501**	**64,070**	**78,267**
Male	19,661	21,870	27,017	33,395
Female	29,360	31,632	37,053	44,872
Incidence				
Pacific Total	**264**	**315**	**427**	**579**
Male	113	132	177	245
Female	151	183	250	334
Asian Total	**518**	**689**	**1,165**	**1,845**
Male	236	314	527	824
Female	283	375	638	1,021
Maori Total	**556**	**646**	**918**	**1,264**
Male	234	271	389	524
Female	322	375	529	739
European/Other Total	**12,386**	**13,317**	**15,443**	**18,403**
Male	4,928	5,416	6,506	7,898
Female	7,458	7,902	8,936	10,505
All Groups Total	**13,724**	**14,967**	**17,953**	**22,091**
Male	5,510	6,133	7,599	9,492
Female	8,214	8,834	10,354	12,598

Source: Deloitte Access Economics based on New Zealand population data and Table 1.4.

Table 1.7: Prevalence and incidence, by ethnicity and gender, NZ, 2011-2026 (% total population)

% Group Total	2011	2014	2020	2026
Prevalence				
Pacific Total	**0.02%**	**0.02%**	**0.03%**	**0.04%**
Male	0.02%	0.02%	0.03%	0.04%
Female	0.02%	0.03%	0.04%	0.05%
Asian Total	**0.04%**	**0.05%**	**0.09%**	**0.13%**
Male	0.04%	0.05%	0.08%	0.12%
Female	0.04%	0.06%	0.09%	0.14%
Maori Total	**0.04%**	**0.05%**	**0.07%**	**0.09%**
Male	0.04%	0.04%	0.06%	0.08%
Female	0.05%	0.06%	0.08%	0.10%
European/Other Total	**1.00%**	**1.05%**	**1.15%**	**1.31%**
Male	0.81%	0.86%	0.98%	1.12%
Female	1.19%	1.23%	1.32%	1.48%
All Groups Total	**1.11%**	**1.18%**	**1.34%**	**1.57%**
Male	0.90%	0.98%	1.15%	1.36%
Female	1.30%	1.37%	1.53%	1.77%
Incidence				
Pacific Total	**0.01%**	**0.01%**	**0.01%**	**0.01%**
Male	0.01%	0.01%	0.01%	0.01%
Female	0.01%	0.01%	0.01%	0.01%
Asian Total	**0.01%**	**0.02%**	**0.02%**	**0.04%**
Male	0.01%	0.01%	0.02%	0.03%
Female	0.01%	0.02%	0.03%	0.04%
Maori Total	**0.01%**	**0.01%**	**0.02%**	**0.03%**
Male	0.01%	0.01%	0.02%	0.02%
Female	0.01%	0.02%	0.02%	0.03%
European/Other Total	**0.28%**	**0.29%**	**0.32%**	**0.37%**
Male	0.23%	0.24%	0.28%	0.32%
Female	0.33%	0.34%	0.37%	0.42%
All Groups Total	**0.31%**	**0.33%**	**0.38%**	**0.44%**
Male	0.25%	0.27%	0.32%	0.39%
Female	0.36%	0.38%	0.43%	0.50%

Source: Deloitte Access Economics based on New Zealand population data and Table 1.6.

Figure 1.1 highlights the greater number of women with dementia in the older cohorts. In the younger cohorts dementia is more prevalent in men.

Figure 1.1: Prevalence by age and gender, NZ, 2011 (number of people)

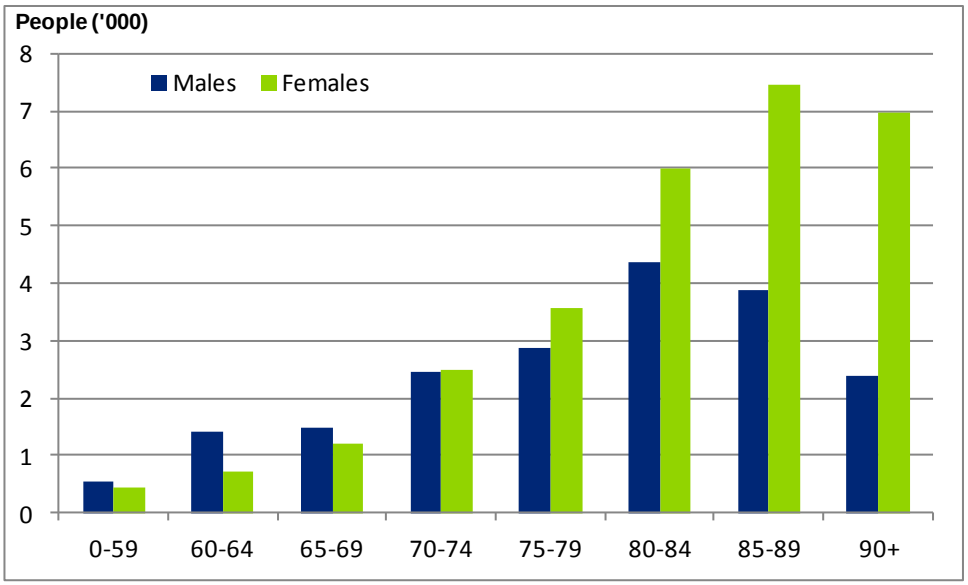


Figure 1.2 highlights the growth rates in dementia for males and females. These rates do not taper (flatten) by 2050.

Figure 1.2: Prevalence projections by gender, NZ, 2011 to 2050

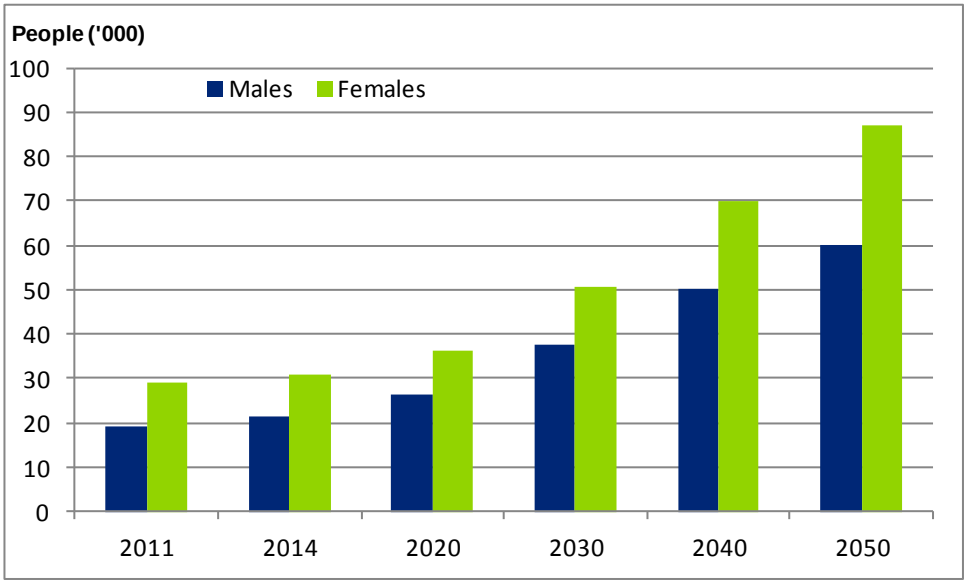
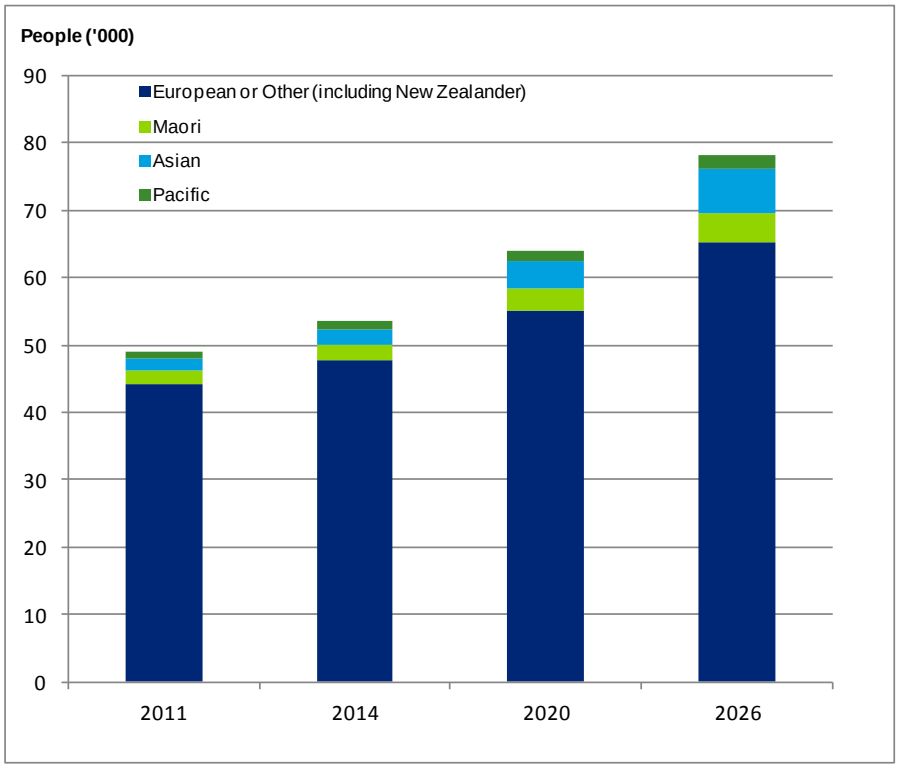


Figure 1.3 underscores the projected growth in ethnic diversity among New Zealanders with dementia.

Figure 1.3: Prevalence projections by ethnicity, NZ, 2011 to 2026



1.2 Mortality

The dementia specific mortality rate for people with dementia is twice the rate of people without dementia, controlling for co-morbidities and socio-demographic factors. Of people over 75 years with dementia, 70% die within five years (Wimo et al, 1998:24). On average, people with dementia have a life expectancy of seven to ten years after diagnosis (Warner and Butler, 2000).

Death certificates grossly under-report dementia as the cause of death, often citing instead respiratory infection.

Cause of death data for New Zealand are available for 2008 (the most recent year available, being released 30 August 2011) from the Ministry of Health (MoH, 2011a)[1]. Table 1.8 reports the number of deaths with an underlying cause of dementia in 2004.

There were a total of 1,432 deaths in 2008 where dementia was the underlying cause (467 males, 965 females), with 61% of these deaths occurring for people aged 85 years and

[1] http://www.health.govt.nz/publication/mortality-and-demographic-data-2008

over (98% of dementia deaths were in people aged 65 and older, 92% were in people aged 75 and older).[2]

Table 1.8: Deaths with an underlying cause of dementia, 2008

Age	Males	Females	People
0-59	5	5	10
60-64	4	8	12
65-69	10	14	24
70-74	36	38	74
75-79	52	70	122
80-84	136	174	310
85+	224	656	880
Total	**467**	**965**	**1,432**

Source: MoH (2011a).

Table 1.9 shows the death rates from dementia used in this report, calculated using cause of death, and population data for 2008.

Table 1.9: Death rates per 100,000 people, with dementia the underlying cause, NZ, 2008

Age	Males	Females	People
0-59	0	0	1
60-64	4	7	11
65-69	12	16	29
70-74	60	58	118
75-79	108	124	232
80-84	416	387	802
85+	1,075	1,528	2,604
Total	**22**	**44**	**67**

Source: MoH (2011a).

Mortality rate data for the general population were available for 2008 (the most recent year available) from Statistics New Zealand. Underlying population mortality rates used in the modelling for this report were based on these data.

[2] Counts all deaths for the ICD-10 codes: F01, F03, G30 and G31. Dementia ICD-10 codes in totality comprise F00-01, 020-1, 023, 03; G30, 310-1, 318-9.

2 Health system costs[3]

2.1 Hospital costs

2.1.1 Public hospital inpatient costs

In the previous report, the total public inpatients costs associated with dementia were estimated to be around $92.1 million in 2008, from New Zealand Health Information Service (NZHIS) data for International Classification of Disease Tenth Revision (ICD-10) codes F00-01, F02.0-3, F03, G30, G31.0-1,8-9.

To estimate public hospital inpatient costs for 2011, $92.1 million was multiplied by hospital cost inflation and prevalence growth, which together totalled 35.2% over the period between 2008 and 2011.

- Inflation in the price of hospital services averaged 5.4% per annum between 2008 and 2011, calculated from the consumer price index (CPI) published by Statistics New Zealand; and
- growth in the prevalence of dementia was 18.3% over the same period (using the prevalence estimation methods from the previous chapter).

The implicit assumption over the reasonably short period is that services expanded in line with prevalence rather than waiting lists lengthening.

Table 2.1: Dementia public inpatient costs by ICD-10 codes, 2011

ICD-10 code	Description	Total $'000	% of Total
F01	Vascular dementia	20,374	16%
F03	Unspecified dementia	68,762	54%
G30	Alzheimer's disease	34,381	27%
G31.8	Other specified degenerative diseases of nervous system	2,547	2%
G31.9	Degenerative disease of nervous system, unspecified	1,273	1%
Total		**127,337**	**100%**

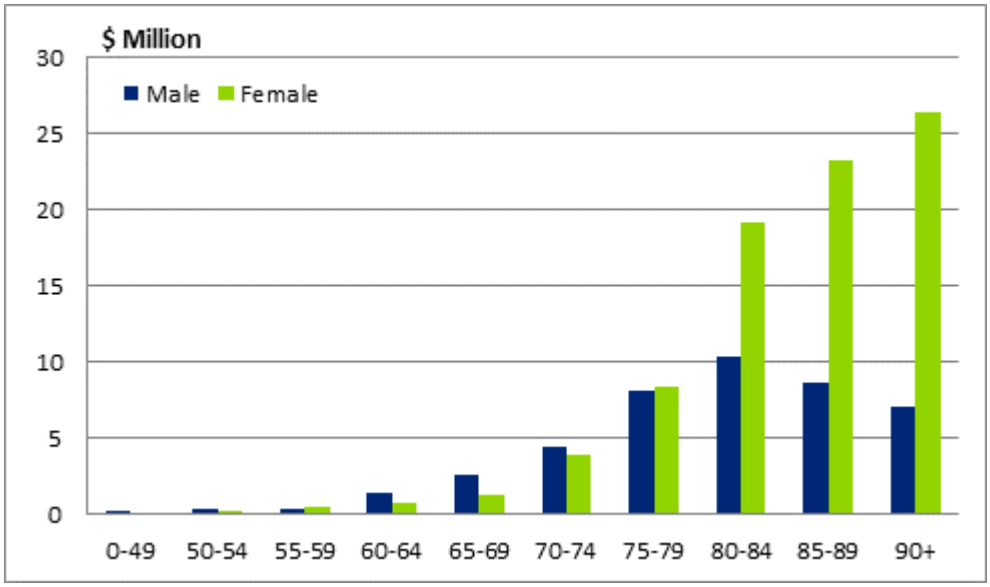
Source: New Zealand Health Information Service (NZHIS) data[4], Deloitte Access Economics. The following codes were estimated as zero, or close to zero: F00 Dementia in Alzheimer's disease; F02.0 Dementia in Pick's disease; F02.1 Dementia in Creutzfeldt-Jakob disease; F02.3 Dementia in Parkinson's disease; G31.0 Circumscribed brain atrophy; and G31.1 Senile degeneration of brain, not elsewhere classified.

Public inpatient costs were thus estimated to be $127.3 million in 2011.

[3] All discussion on data sources and the methodologies in relation to each cost element can be found in the Access Economics report for Alzheimers New Zealand on Dementia Economic Impact 2008.

[4] NZHIS was de-established in July 2008. Its role and responsibilities are spread across Ministry of Health, National Health Board and the National Health IT Board (http://www.nzhis.govt.nz/).

Figure 2.1: Public inpatient costs by age and gender, 2011



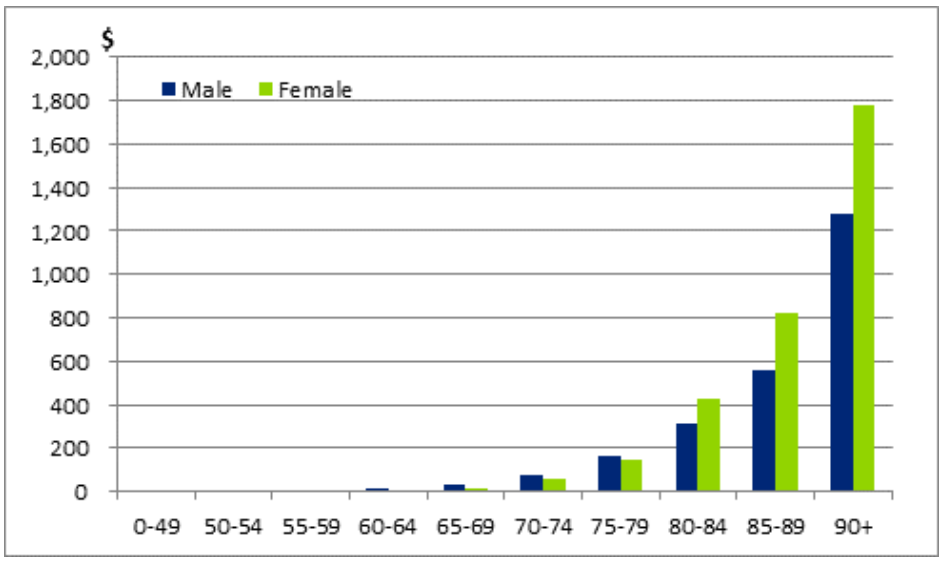
Source: NZHIS data, Deloitte Access Economics.

Figure 2.1 presents public inpatient data by age and gender for 2011.

- Of public inpatient costs, 65.8% were for women and 34.2% for men.
- Over half of public inpatient costs are associated with people aged 85 years and above.

Figure 2.2 shows that some, but not all of the disproportionate spread of hospital costs between men and women can be explained by the relatively longer life expectancy of women and higher dementia prevalence for older women. Per head of population, public inpatient costs for dementia are higher for women than men in the eldest age cohorts.

Figure 2.2 : Per capita public inpatient costs by age and gender



Source: NZHIS data, Deloitte Access Economics.

2.1.2 Private hospital inpatient

As discussed in the 2008 report, the paucity of private inpatient beds in NZ to treat people with dementia means patients were typically referred to the public system, so no private inpatient costs were estimated in this report either, for 2011.

2.1.3 Public outpatient

Outpatient services include specialists – such as neurologists, psycho-geriatricians and geriatricians – and allied health professionals, such as physiotherapists, occupational therapists, speech therapists, dieticians, needs assessors and social workers.

Similar to the method adopted in the 2008 report, the outpatient costs for dementia were calculated relative to inpatient costs, based on clinical practice patterns at the tertiary care level. Outpatient costs were thus estimated as 9.5% of $127.3 million, or **$12.1 million** for the year 2011.

2.2 Medical costs

2.2.1 General practice (GP) costs

The mean number of GP consultations for people with and without dementia was estimated in Access Economics (2008) from data from the Public Health Intelligence (PHI) unit of the MoH. Differences by age and gender were applied to the updated prevalence data to estimate the volume of GP services attributable to dementia in 2011.

The mechanism for funding GP services has changed significantly since the establishment of Primary Health Organisations (PHOs). PHOs receive (First Contact) funding to provide subsidised GP consultations for their enrolled members. The subsidy is paid based at a rate of $15 per visit for adults entitled to a subsidy (i.e. people who qualify for a Community Services Card or High Use Health Card).[5] The remainder of the cost of the consultation is charged as an out-of-pocket fee to the patient. According to CPI data, in March 2011 the weighted average retail price for a 'General Practitioner – consultation, adult without Community Services Card' was $33.99.[6] No data were identified to estimate the average out-of-pocket price of a consultation where a subsidy was accessed nor the share of visits attributable to dementia where subsidies were used, hence the total average cost of a GP visit in 2011 was approximated as $48.99 (the sum of the subsidy and the non-subsidised out-of-pocket costs).

Moreover, as discussed in the 2008 report, no data were available on the numbers of people with dementia who receive Care Plus, or the average subsidy per GP visit under Care Plus. Consequently, so no additional degree of subsidy has been modelled. The distribution

[5] Ministry of Health, First contact (general practice services), http://www.health.govt.nz/our-work/primary-health-care/primary-health-care-services-and-projects/first-contact-general-practice-services, accessed on 15 December 2011.

[6] Statistics New Zealand (2011), Consumer Price Index, Table 5: Weighted average retail prices of selected items, http://www.stats.govt.nz/browse_for_stats/economic_indicators/CPI_inflation/info-releases.aspx, accessed on 15 December 2011.

of costs, shown in Table 2.2 and Figure 2.3, is thus only an approximation of the costs borne by people with dementia and the costs borne by government.

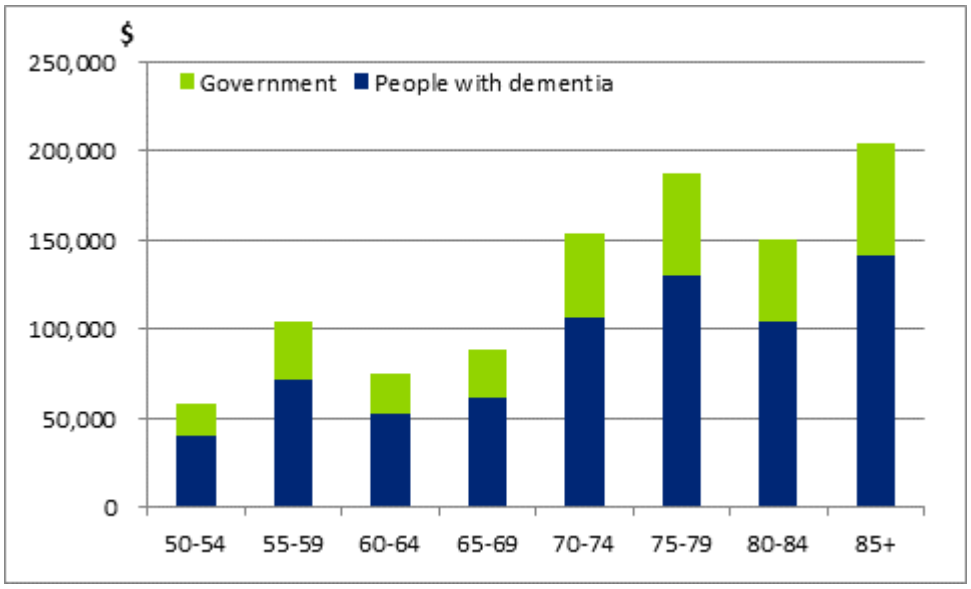
Table 2.2: Costs of GP visits attributable to dementia, 2011

Age	Cost to people with dementia ($)	Cost to government ($)	Total cost ($)
50-54	40,117	17,704	57,821
55-59	72,022	31,784	103,806
60-64	51,948	22,925	74,873
65-69	61,239	27,025	88,264
70-74	106,605	47,045	153,650
75-79	129,952	57,349	187,301
80-84	104,546	46,137	150,682
85+	141,614	62,495	204,109
Total	**708,043**	**312,464**	**1,020,507**

Source: PHI/MoH special data request, Deloitte Access Economics.

The total cost of GP visits due to dementia in 2011 is estimated to be around $1.02 million. Figure 2.3 shows costs of dementia-related GP visits by age and bearer of costs.

Figure 2.3: Costs of GP visits by age and bearer of costs, 2011



Source: PHI, MoH, special data request, and Deloitte Access Economics

2.2.2 Out-of-hospital specialists

As highlighted in the 2008 report, there were no data available on out-of-hospital specialist services provided to people with dementia in NZ. Discussion with experts in the field confirmed that there were almost no private psychiatrists, physicians, geriatricians or neurologists seeing people with dementia outside the hospital setting for assessment or treatment. The cost of out-of-hospital specialists is also conservatively excluded in this report.

2.3 Pharmaceutical costs

In 2008, the total pharmaceutical cost attributable to dementia was $2.95 million. This estimate netted out the cost of pharmaceuticals used by people dementia that were not attributable to dementia but, rather, were used to treat unrelated conditions.

Extrapolating the 2008 cost estimate using growth in dementia prevalence as well as overall health inflation[7] between the period 2008 and 2011, the total cost in 2011 was estimated as **$4.03 million**.

2.4 Pathology and diagnostic imaging

In 2008, the pathology and diagnostic imaging cost due to dementia was estimated as only $88,572. Similar to the pharmaceutical and GP costs above, this estimate took into consideration downward adjustment to reflect pathology and diagnostic imaging services for people with dementia for conditions other than their dementia.

Extrapolating the 2008 cost estimate using growth in prevalence as well as overall health inflation between 2008 and 2011, the total cost in 2011 remains relatively small, estimated as **$120,867**.

2.5 Research costs

In 2008, the level of public sector research funding for projects relating to dementia was estimated to be $1,259,208. This was based on the data supplied by the Health Research Council of New Zealand (HRC). Inflating this to 2011 based on prevalence growth and overall health inflation provides an estimate for HRC funding of around **$1.7 million.**

The private sector research spend estimate was based on proportionality from a 12-country comparison by the OECD of health R&D in New Zealand and other member countries (OECD, 2004). This study showed the ratio of private health R&D in NZ as 1.33 times public health R&D for the most recent year provided. The estimate of private dementia R&D was thus $1.67 million in 2008. Multiplying 1.33 by $1.7 million gives an estimate for private R&D of **$2.3 million** for the year 2011.

The total R&D in 2011 was thus estimated to be approximately $4.0 million.

2.6 Allied health costs

People with dementia and their families and carers may also access a variety of allied health services such as psychological counselling, physiotherapy, occupational therapy, hydrotherapy, music therapy, aromatherapy and so on. Where these services are provided in residential care facilities, they are counted in the cost estimates in the next section.

[7] Overall health inflation was calculated based on all three components under the health group category in the CPI. They are: (i) medical products, appliances and equipment; (ii) outpatient services; and (iii) hospital services. The average growth rate was 4.9% per annum between 2008 and 2011.

In 2008, the total allied health costs outside of facilities for people with dementia were estimated as $907,087. This was based on the proportionalities from Australian data due to a lack of local data for New Zealand. Inflating this to 2011 based on prevalence growth and overall health inflation provides an estimate for the allied health costs of **$1.24 million.**

2.7 Aged care costs

Apart from specific dementia care, for which 100% of the costs are attributable to dementia, costs for other levels of residential care are only partially attributable to dementia.

Two parameter estimates are required in determining the proportion of residential care costs that are due to dementia. They are:

- the share of residential care clients with dementia (or associated bed days); and
- the share of the residential care costs for people with dementia that are due to dementia (rather than due to comorbid diseases among people with dementia).

However, as mentioned in the 2008 report, it was not possible to identify people with dementia based on Client Claims Processing System (CCPS) data. Consequently, various literature and issues – such as the proportion of people living in residential care in New Zealand being high – were discussed and considered in the previous report (Access Economics, 2008) and a minimum estimate of $272.5 million was derived as the cost of residential care attributable to dementia in NZ in 2008. Inflating this to 2011 based on prevalence growth and overall health inflation provides an estimate for allied health costs of **$371.9 million.**

2.8 Summary of health system costs

A summary of the health system costs derived from the discussion so far in Section 2 is provided in Table 2.3 and Figure 2.4.

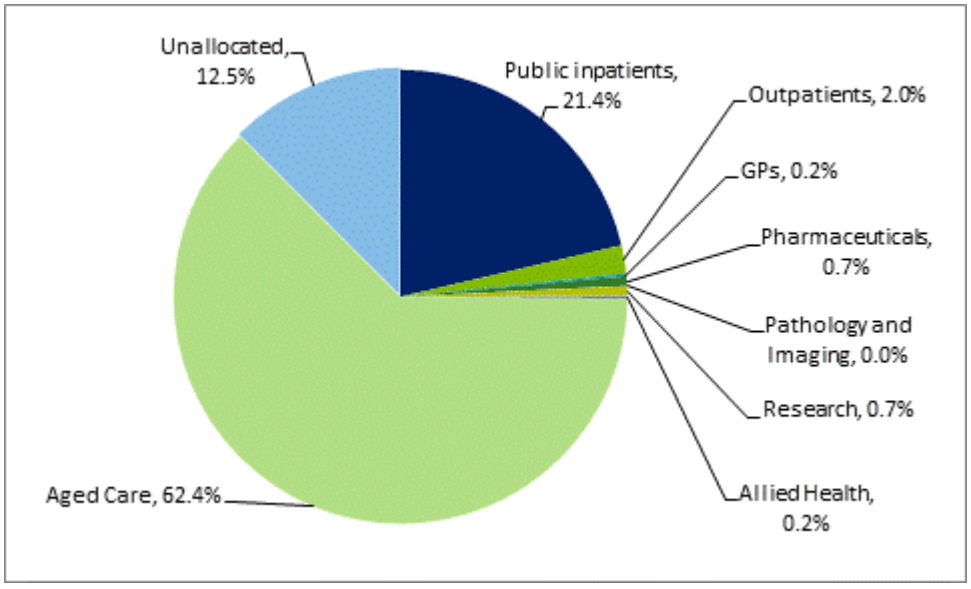
- Total costs estimated in the previous sections sum to $521.7 million in 2011.
- However, this excludes health system costs that are not captured in the sections above, including items such as expenditure on community health, public health programs, health administration, health aids and appliances. Allowance is made for these components by factoring up the total by or 14.3%, to allow for these costs in the manner adopted by the AIHW (2005) where the 'unallocated' component is estimated as 12.5/87.5 of the allocated component.
- The unallocated component, comprising the administrative and other items detailed above, is thus estimated as $74.6 million in 2011 for dementia.

The total health system cost of dementia, included allocated and unallocated elements, is estimated as $596.3 million.

Table 2.3: Summary of health costs of dementia, NZ, 2011

Health cost element	2011 $'000	%total
Total Hospital	139,434	23.4%
Public inpatients	127,337	21.4%
Private inpatients	*negligible*	*negligible*
Outpatients	12,097	2.0%
GPs	1,021	0.2%
Out of hospital specialists	*negligible*	*negligible*
Pharmaceuticals	4,028	0.7%
Pathology and imaging	121	0.0%
Research	4,004	0.7%
Allied health	1,238	0.2%
Aged care	371,870	62.4%
Sub-total allocated	**521,715**	**87.5%**
Unallocated	74,605	12.5%
Total	**596,320**	**100.0%**

Figure 2.4: Summary of health system costs of dementia, NZ, 2011



3 Other financial costs

Other financial costs are all those that are not 'direct' health system costs (Section 2) nor intangible costs – the loss of health and wellbeing (Section 4).

3.1 Productivity losses

Dementia can affect individuals' capacity to work. For instance, they may work less than they otherwise would, retire early, or die prematurely. If employment rates are lower for people with dementia, this loss in productivity represents a real cost to the economy. In addition, informal carers may also work less, in order to care for their loved one with dementia, and this represents an additional productivity loss.

As discussed in the previous Access Economics (2008) report, Deloitte Access Economics measures the lost earnings and production due to health conditions using a 'human capital' approach. The following updated cost elements associated with productivity losses are presented in this section:

- lower employment;
- absenteeism;
- premature mortality;
- informal care; and
- taxation forgone (a transfer payment, rather than a real economic cost).

3.1.1 Lower employment

Given the age distribution of dementia, it is probable that most people have left the workforce prior to disease onset. However, for a significant number of younger onset cases, as well as those choosing to work till later in life, there is a productivity loss.[8] It is measured by estimating the age standardised difference in employment rates between people with dementia and those without. Employment data by age group and gender from Statistics New Zealand were combined with Australian data on the impact of dementia on employment participation to estimate this difference in Access Economics (2008).

At average weekly earnings (AWE) of $1,025 per worker lost due to dementia, the productivity cost associated with lower employment was estimated as $124.7 million in 2008. Inflating this estimate by wage growth over 2008 to 2011 from the New Zealand Income Survey[9] and by dementia prevalence growth over 2008 to 2011 gives an estimate of **lost earnings due to lower workforce participation in 2011 of $157.7 million**.

[8] Younger people with dementia (of working age) may need to retire early from work while carers may also have to give up employment in order to care for them, leading to a double loss of income at a critical stage in family life (MoH, 2002:22).

[9] Statistics New Zealand (2011a) New Zealand Income Survey, http://www.stats.govt.nz/browse_for_stats/income-and-work/Income/nz-income-survey-info-releases.aspx, accessed on 15 December 2011. Nominal growth was only 6.9% over the three years.

3.1.2 Absenteeism

Some people will remain in the workforce in the early stages of dementia, either because they are not yet diagnosed or because they need or want to continue to work for a while. Remaining in employment for a time is more likely if the illness is in the early stages, if the work environment is supportive, if tasks are familiar or repetitive and if supervision and occupational health and safety arrangements are adequate. These people may, however, be absent from work more often than those without dementia as a result of the condition – because they need to take time off for medical appointments, to organise their affairs, or because of their symptoms. This absenteeism represents a further productivity loss.

In 2008, the productivity cost associated with absenteeism was estimated as $2.3 million. Inflating this estimate by wage growth over 2008 to 2011 from the New Zealand Income Survey and by dementia prevalence growth over 2008 to 2011 gives an estimate of **the cost of absenteeism due to dementia in 2011 of $2.9 million**.

3.1.3 Premature mortality

There are also production losses arising from premature mortality associated with dementia. The income forgone for those who die prematurely was estimated based on the assumption that if those who died had lived and not had dementia, they would have been employed at the same rate as the general population. This represents a further productivity loss, measured as the net present value (NPV) of future lost income streams for those people who die from dementia prior to when they would otherwise have retired.

The NPV of premature mortality is then estimated using retirement age, average life expectancy, average age of death and a discount rate of 3.65%.[10] The productivity loss from premature mortality was estimated at $5.5 million in 2008. Inflating this estimate by wage growth and by dementia prevalence growth over 2008 to 2011 gives an estimate of **the cost of premature mortality due to dementia in 2011 of $6.9 million**

3.1.4 Informal care

Most people with dementia receive care at home initially, with day-to-day personal needs and support largely from family and friends. Placing a value on the informal care provided can be achieved by using either the replacement or opportunity cost method, with the opportunity cost method more appropriate in this context of measuring economic impact**.**

Using the opportunity cost method from the previous report, it was estimated that the value of informal care provided by family and friends for people with dementia was $29.3 million in 2008. Adjusting this figure using wage and dementia prevalence growth over the period between 2008 and 2011, **the value of informal care provided for people with dementia is $37.2 million**.

3.1.5 Taxation forgone

Lower earnings due to reduced workforce participation (for both people with dementia and their carers), absenteeism and premature death will also have an effect on taxation revenue collected by the New Zealand Government. As well as forgone income (personal)

[10] More discussion on the derivation of discount rate can be found in Access Economics (2008).

taxation, there will also be a fall in indirect (consumption) tax, as those with lower incomes spend less on the consumption of goods and services.

Based on the average income tax rate of around 23% and average indirect tax rate of around 12.5% (i.e. a total of 35.5%) , it was estimated that $57.5 million in taxation revenue was forgone due to dementia in New Zealand in 2008. Using the same approach, 35.5% is applied to the total productivity losses estimated in the previous sections and **the total taxation forgone in 2011 amounts to $72.7 million**.

Table 3.1 presents a summary of the costs due to productivity losses as well as taxation forgone for New Zealand in 2011.

Table 3.1: Productivity losses, carer costs and taxation forgone, 2011

	Productivity loss ($ million)	Taxation forgone ($ million)
People with dementia	167.57	59.49
Lower employment	157.74	
Absenteeism	2.93	
Premature death	6.91	
Carers - lower employment	37.18	13.20
Total	**204.75**	**72.68**

3.2 Transfers and program payments

Additional expenditure associated with dementia falls under the categories of: welfare transfers; respite and carer support; and travel costs, aids and home modifications.

3.2.1 Welfare transfers

Two types of welfare transfers were considered in the 2008 dementia report. They were the Invalid Benefit and New Zealand Superannuation.

Based on the requirements for each program, Deloitte Access Economics estimated that, in total, people with dementia received transfer payments of $38.2 million ($21.4 million for the Invalids Benefit and $16.7 million in New Zealand Superannuation payments) in 2008. Adjusting the figures using general price inflation calculated from the overall CPI index[11] and dementia prevalence growth for the period between 2008 and 2011, **the total transfer payments which people with dementia receive is $49.6 million ($27.8 million for the Invalid Benefit and $21.7 million in New Zealand Superannuation payments) in 2011**.

3.2.2 Respite and carer support

Respite services are available to disabled people and to carers, family and whanau[12] whose primary role involves the care and support of a disabled family member. Some respite care is provided in the community and in residential care facilities. Short-term care for a person with dementia is known as respite care and, if a person with dementia cannot be left alone,

[11] This refers to the general price inflation in New Zealand. This is not health specific.

[12] Whanau means extended family in the Maori language.

a 'sitter' may be able to come and be with the person while the primary carer goes out. Some Alzheimers organisations provide sitter services (Alzheimers New Zealand, 2007). Other carer support is a subsidy funded by the MoH to assist the unpaid, full-time care of a disabled person to take a break from caring for that person.

In New Zealand, carers have available to them four weeks respite care per annum[13]. It was assumed that all carers have access to this service and used it to its capacity. Consequently, the community respite and carer support cost related to dementia was estimated to be $15.5 million each for government and for the rest of society ($30.9 million in total) to provide respite care in 2008. It was also assumed that the burden of costs for the four weeks respite and carer support was shared equally between government and the rest of society. Inflating these figures using general price inflation rate and dementia prevalence growth, **the community respite and carer support cost related to dementia is estimated to be $20.1 million each for government and the rest of society ($40.1 million in total) in 2011**.

3.2.3 Travel costs, aids and home modifications

3.2.3.1 Travel and transport

Transport assistance is provided by the MoH to access specialist health and disability services; other agencies also provide transport assistance for people with disabilities through programs such as Total Mobility[14].

Based on the details of the program, a cost of around $2.8 million in 2008 across the population of people living at home with dementia was estimated. Inflating this figure by general price inflation and by prevalence growth between 2008 and 2011, **the estimated travel and transport cost was around $3.6 million in 2011**.

3.2.3.2 Modifications and aids

People with dementia and their families and carers may require a variety of additional equipment, aids and home modifications in order to continue living at home safely. There are a number of public programs for older people, people with a disability and their families and carers to assist them to make home modifications and provide aids and equipment that will help them to remain living in their own home and avoid having to go into a residential care facility.

The Housing Modification program and the Equipment and Modification program are two examples of MoH funded services. Detailed expenditure on MoH-funded services for equipment and modifications are presented in Table 3-8 in the previous report.

Using the per person cost for aids and modifications and the number of people living at home who had moderate or severe dementia, it was estimated that the total cost of aids and modifications was approximately $3.1 million in 2008. Inflating this figure using the

[13] If a carer provides informal care for 48 weeks per year (availing themselves of respite care), it is assumed unlikely that the carer would offset the productivity costs by increasing their paid employment for four weeks of each year.

[14] More details regarding the program can be found in the previous report.

price inflation for medical products, appliances and equipment[15] and prevalence growth between 2008 and 2011, **the total cost of aids and modifications is $4.0 million in 2011.**

3.3 Deadweight losses

Any extra costs that are borne by government carry with them efficiency costs to the economy, known as deadweight losses (DWLs)**.** Deloitte Access Economics calculated that the DWL incurred in 2008 was $81.3 million, based on New Zealand studies estimating the rate of efficiency losses (18% on average) from NZ taxation and transfers (Access Economics, 2008:48). Using the same methodology as previously, **the DWL incurred in 2011 was estimated to be $109.6 million**. This total comprises the DWLs from:

- the portion of health care costs borne by government, estimated at $82.7 million ($596.3 million * 77%[16] * 18%);
- taxes forgone, estimated at $13.1 million – using the opportunity cost method to value informal carer costs - ($72.7 million * 18%);
- welfare payments, estimated at $8.9 million ($49.6 million * 18%); and
- all other costs borne by government, estimated at $5.0 million (($20.1 million for respite and carer support + $3.6 million for travel and transport + $4.0 million for aids and modifications) * 18%).

3.4 Summary of other financial costs

In addition to the health care costs identified in Chapter 2, there are substantial other financial costs associated with dementia. In total, other financial costs are estimated as $358.5 million in 2011. The main components are presented in Table 3.2.

Table 3.2: Summary of other financial costs for dementia, 2011

Other financial cost element	2011 $'000	%total
Productivity losses	167.6	46.7%
Lower employment rates	157.7	
Absenteeism	2.9	
Premature mortality	6.9	
Informal care	37.2	10.4%
Respite and carer support	40.1	11.2%
Mobility aids and modifications	4.0	1.1%
Deadweight losses	109.6	30.6%
Health system costs	82.7	
Taxation forgone	13.1	
Social security payments	8.9	
Other costs	5.0	
Total	**358.5**	**100.0%**

[15] This is one of the three components that comprise the CPI index for health as mentioned in footnote 7.

[16] Government funds an estimate 77% of NZ health care services (Access Economics, 2008).

4 Burden of disease

Deloitte Access Economics adopts 'burden of disease' methodology, using disability adjusted life years (DALYs) to quantify the substantial costs of the loss of wellbeing and quality of life resulting from dementia.[17] This measure (the DALY) includes two components: **years of healthy life lost due to disability (YLDs)** and **years of life lost due to premature death (YLLs).**

4.1 YLD

YLDs from dementia were calculated by multiplying the number of people with dementia in NZ by the disability weight that applies to them. It is assumed that all people with dementia in 2011 experienced their condition for the entire year. As discussed in the previous report, the average disability weight across all severity levels of dementia was calculated to be 0.478.

4.2 YLL

YLLs were calculated based on life expectancy according to the age and gender of people who died from dementia. For estimation purposes, people were assumed to be aged at the mid-point of their age group when they died. No age weighting was applied to the DALYs or the value of a statistical life year (VSLY) in the calculation, meaning that a year of life for a younger people was valued equivalently to a year of life in old age.

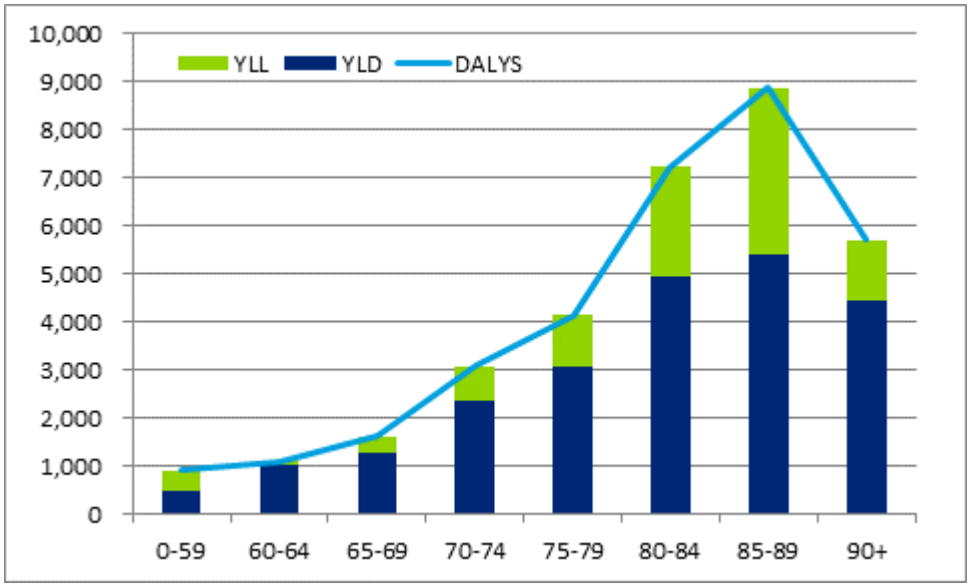
4.3 Results

The total burden of disease from dementia, measured in DALYs, is the sum of the burden of morbidity (YLDs) and the burden from premature death (YLLs).

Figure 4.1 shows the burden of disease due to dementia in NZ in 2011 by age, broken into its YLD and YLL components, inflated from 2008 levels on the basis of the growth in dementia prevalence over the period to 2011. In total, 32,649 years of life were lost due to dementia across the NZ population. The majority of the burden was due to morbidity (lost wellbeing and quality of life), with 23,017 YLDs making up 70% of DALYs. The remaining 30% of the burden was due to the estimated 9,633 YLLs from dementia.

[17] The methodology is outlined in Section 4.1.1 in the 2008 dementia report.

Figure 4.1: Burden of disease from dementia, NZ, 2011



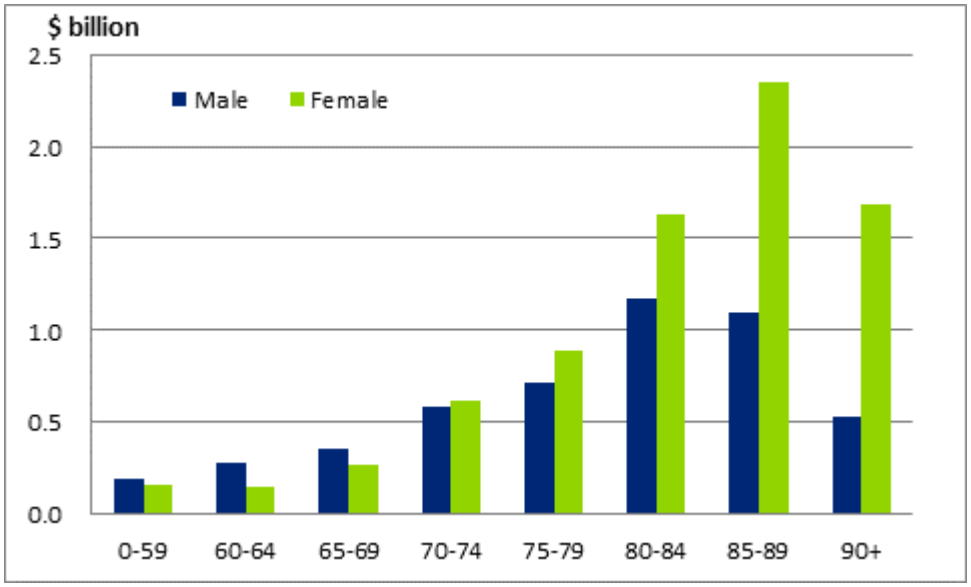
The burden of disease from dementia is disproportionately carried by women. While the burden for males was 12,689 DALYs (39% of total), the female burden was 19,960 DALYs (61% of total). Males experienced 9,228 YLDs and 3,461 YLLs, while females experienced 13,788 YLDs and 6,172 YLLs.

The burden of disease from dementia was converted into a dollar value, by multiplying the total DALYs from dementia by the value of statistical life year (VSLY) - $387,674 in 2011[18].

Figure 4.2 shows the gross value of the burden of disease from dementia in 2011 in NZ by age and gender. The total estimated gross value of the morbidity and mortality burden from dementia was $12.7 billion in 2011 ($4.9 billion for males and $7.7 billion for females).

[18] This figure is obtained by inflating the 2008 figure of $335,939 by the overall health inflation between 2008 and 2011.

Figure 4.2: Value of burden of disease from dementia, 2011



4.3.2 Sensitivity analysis

To provide a range for the value of burden of disease in New Zealand, Deloitte Access Economics applied the low value (VSLY = $242,262) and high value (VSLY = $533,086)[19] to the estimated DALYs.

As a result, the sensitivity analysis provides a range of $7.9 to $17.4 billion for the estimate of the gross value of the burden of disease from dementia in NZ in 2011.

Bearing in mind that the wage-risk studies underlying the calculation of the VSL take into account all known personal impacts – suffering and premature death, lost wages/income, out-of-pocket personal health costs and so on – the estimate of $12.7 billion should be treated as a 'gross' figure and costs to individuals already calculated should be netted out. The result after netting out these items is presented in Table 4.1, with a consequent net cost of lost wellbeing of $12.4 billion in 2011.

Table 4.1: Net burden of disease from dementia, 2011

	Individual ($ million)
Gross cost of lost wellbeing	12,657.3
Minus production losses net of tax	132.1
Minus GP costs borne out-of-pocket	0.7
Minus aged care costs borne out-of-pocket	134.6
Net cost of lost wellbeing	**12,390.0**

[19] These figures were obtained by inflating the 2008 figures of $209,932 and $461,946 by the overall health inflation between 2008 and 2011.

4.4 Economic impact of dementia

Table 4.2 presents a summary of all the costs of dementia in New Zealand for 2011. The cost summary presents the financial and burden of disease costs separately, since the latter (health/wellbeing) is not considered part of living standards as measured by gross domestic product (GDP), and since greater uncertainty surrounds the dollar estimate of the disease burden.

The total financial cost of dementia in 2011 was estimated as $954.8 million.

- Of the total, $596.3 million (62.5%) was for health system expenditures and $358.5 million (37.5%) was for other financial costs.

The value of the healthy life lost was estimated as a further $12.4 billion, bringing the total to an estimated $13.4 billion.

Table 4.2: Summary of economic costs of dementia, New Zealand, 2011

Cost item	$ million	% Financial costs	% Total costs	Individual $ million	Government $ million	Other society $ million
Health cost						
Total hospital	139.43	14.60%	1.04%	-	139.43	-
Inpatients	127.34	13.34%	0.95%	-	127.34	-
Outpatients	12.10	1.27%	0.09%	-	12.10	-
GPs	1.02	0.11%	0.01%	0.71	0.31	-
Pharmaceuticals	4.03	0.42%	0.03%	-	4.03	-
Pathology and imaging	0.12	0.01%	0.00%	-	0.12	-
Research	4.00	0.42%	0.03%	-	1.72	2.29
Allied health	1.24	0.13%	0.01%	0.86	0.38	-
Aged care	371.87	38.95%	2.79%	134.55	237.32	-
Sub-total allocated	**521.72**	**54.64%**	**3.91%**	**136.12**	**383.31**	**2.29**
Unallocated	74.61	7.81%	0.56%	-	74.61	-
Total health costs	**596.32**	**62.46%**	**4.47%**	**136.12**	**457.92**	**2.29**
Other financial costs						
Productivity losses	204.76	21.45%	1.53%	157.67	47.09	-
Lower employment rates	157.74	16.52%	1.18%	121.46	36.28	-
Absenteeism	2.93	0.31%	0.02%	2.26	0.67	-
Premature mortality	6.91	0.72%	0.05%	5.32	1.59	-
Informal care	37.18	3.89%	0.28%	28.63	8.55	-
Respite and carer support	40.11	4.20%	0.30%	20.06	20.06	-
Mobility aids and modifications	3.96	0.41%	0.03%	-	3.96	-
Deadweight losses	109.64	11.48%	0.82%	-	-	109.64
Health system costs	82.65	8.66%	0.62%	-	-	82.65
Taxation forgone	13.08	1.37%	0.10%	-	-	13.08
Social security payments	8.93	0.93%	0.07%	-	-	8.93
Other costs	4.98	0.52%	0.04%	-	-	4.98
Total other financial costs	**358.45**	**37.54%**	**2.69%**	**177.72**	**71.11**	**109.64**
Total financial costs	**954.77**	**100.00%**	**7.15%**	**313.84**	**529.03**	**111.93**
Net burden of disease	12,390.00		92.85%	12,390.00		
Total including net BoD	**13,344.77**		**100.00%**	**12,703.84**	**529.03**	**111.93**
% financial total	100%			32.87%	55.41%	11.72%
% total including BoD	**100%**			**95.20%**	**3.96%**	**0.84%**

Figure 4.3: Distribution of financial costs of dementia, (% total), NZ, 2011

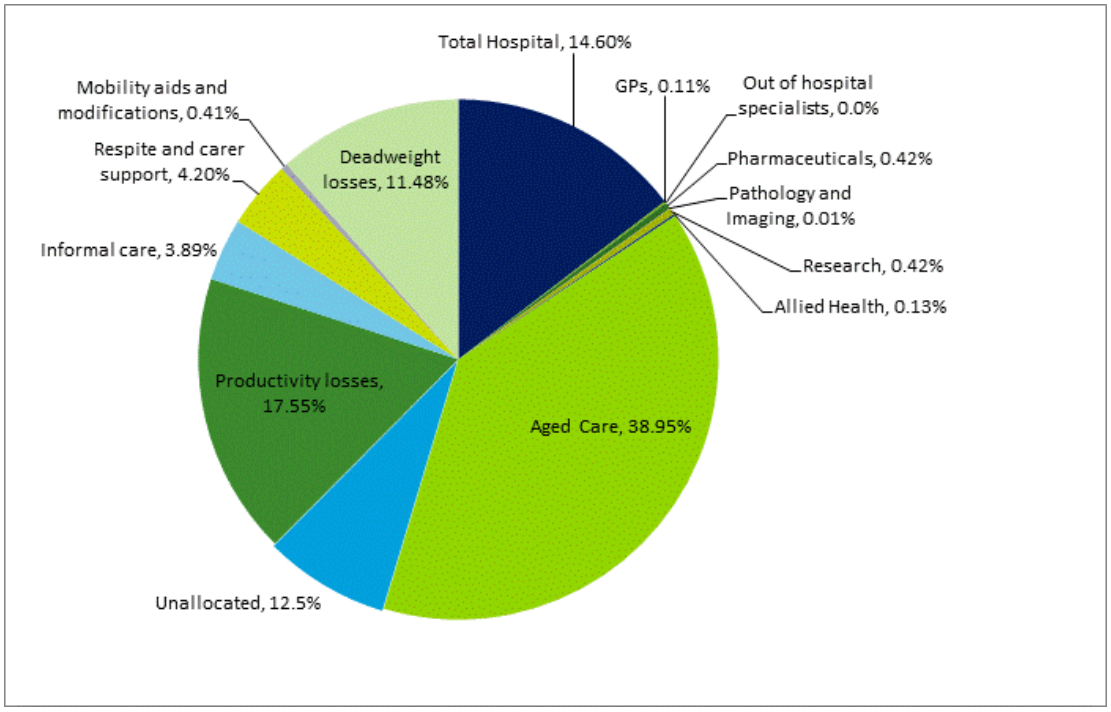
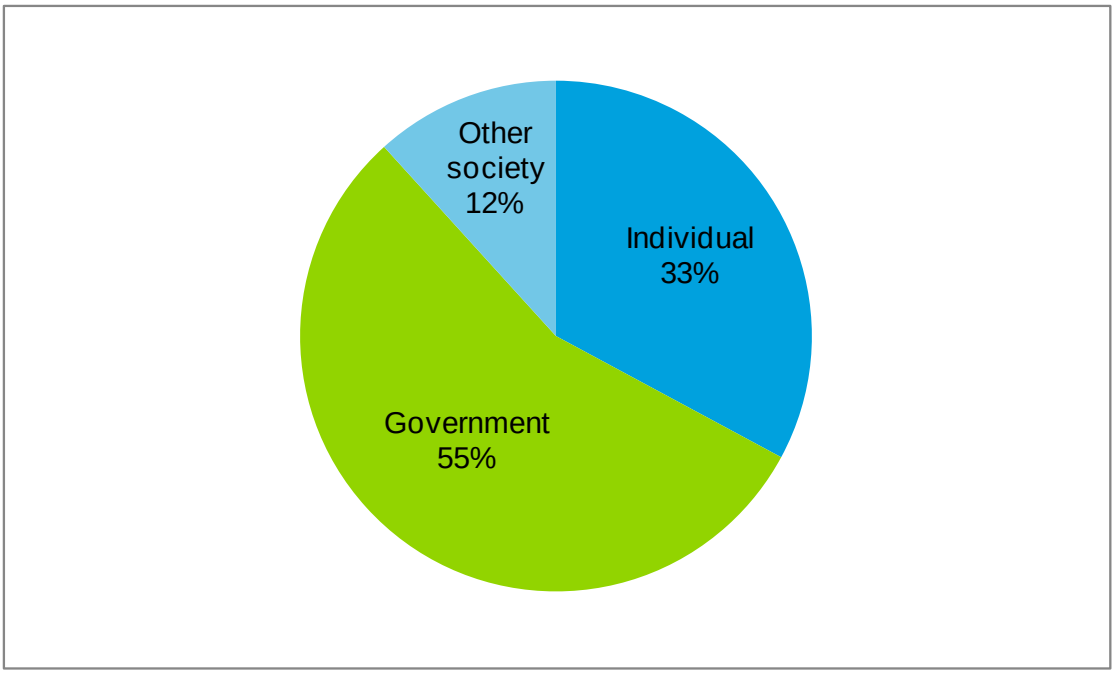


Figure 4.4: Financial costs of dementia by bearer of costs, (% total), NZ, 2011



Individuals with dementia and their carers bore 33% of the financial costs of dementia in 2011, the Government bore 55% of the costs, and the remaining 12% of financial costs were borne by other payers in society. These shares change to 95%, 4% and 1% if the value of healthy life lost is included.

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