



New Zealand Society of Actuaries (Inc)

# We're getting older and wiser – what does this mean for health insurers?

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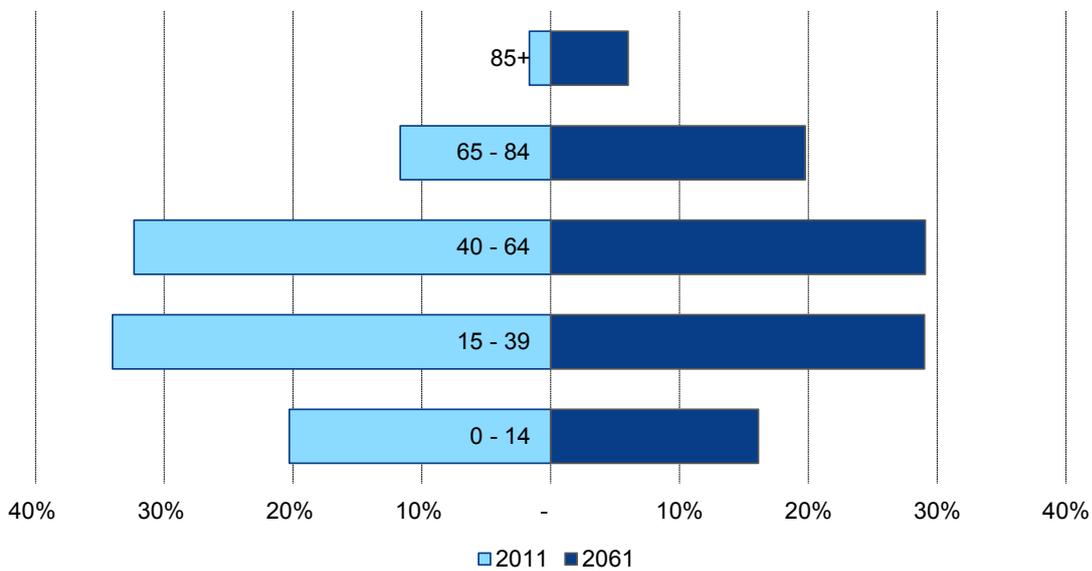
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# 1. Introduction

Healthcare is currently the second largest item of government expenditure in New Zealand, at around \$14 billion, behind Social Security and Welfare. Treasury’s long-term fiscal projections show that public spending on health is expected to increase from 6.8% of GDP to 10.8% by 2060. This equates to 22% of government expenditure, increasing to 31%. Of all healthcare expenditure, public financing accounts for 83% of the total.

An important driver of this increase in costs is the ageing of the New Zealand population. Statistics New Zealand’s median projection is that the percentage of the population aged 65 and over will increase from 14% to 26% by 2060, and the proportion over age 84 will increase from 2% to 6%.

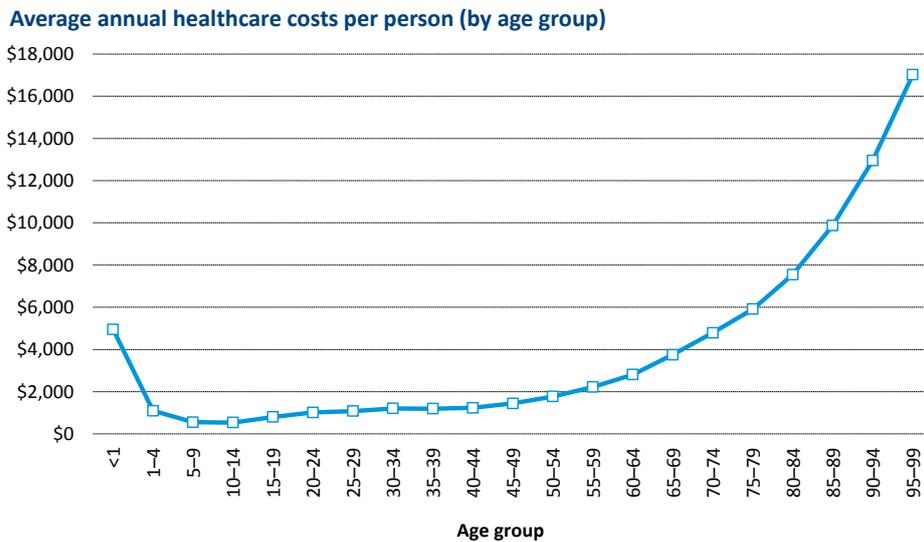
**Change in proportion of population by age group 2011 to 2061**



Source: Statistics New Zealand

An alternative measure of the ageing population is a dependency ratio; i.e. the ratio of population over age 64 to the working age population (aged 15 to 64). This increases from 20% to 44% (from 1 in 5 people to 1 in 2.25).

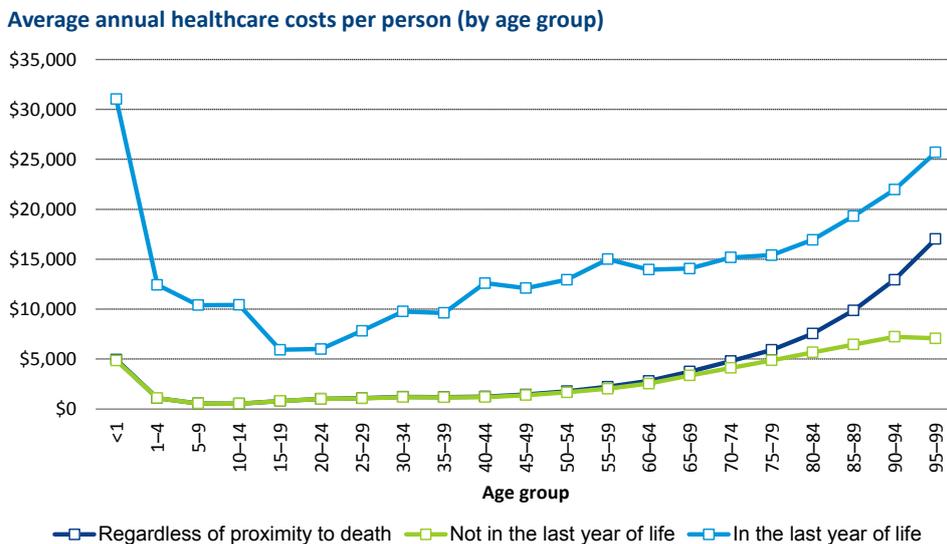
The relevance of this for healthcare is that costs typically increase with age, as most people are aware. Healthcare costs by age group are shown below.



Source: Blakely, Atkinson, Kvizhinadze, Nghiem, McLeod, Wilson (2014)

Excluding the first year of life, the average annual cost of healthcare per person under age 50 is approximately \$1,000. For people aged 70 – 74 this increases to around \$4,800 and by age 90 is over \$10,000.

From the same research healthcare costs were assessed by proximity to death and are shown below.



As can be seen from the above figure, healthcare costs are higher at all ages for people within the last year of life, and there is also more age shape to this curve when compared to the curve for those not in the last 12 months of life. However while the curve of healthcare costs is flatter for people not in the last year of life, there is still considerable shape to it. The approximate average cost below age 50 is still around \$1,000 (excluding the first year of life), while for those 70-74 the cost is \$4,100 per annum, and by age 90 is over \$7,000.

Considering those in the last year of life, the annual costs overall are on average around 7.5 times the annual cost of those not in the last year of life, with this ratio reducing at older ages to around 3 times.

Both age and proximity to death are clearly factors that drive the overall cost of healthcare. Thus the ageing profile of the New Zealand population is likely to be an important determinant of the future costs of healthcare, as the Treasury projections highlight.

There are three important assumptions underlying Treasury's projection that it is sensitive to:

1. There will be a degree of "healthy ageing", meaning that the increase in life expectancy will be accompanied by an increase in the number of years of healthy living.
2. Health sector productivity will grow at 0.3% per annum.
3. Non-demographic demand for healthcare will grow in line with economy-wide real incomes at 1.5% per annum

Looking at the healthy ageing assumption, with no assumption of healthy ageing, healthcare costs in 2060 increases to 12.6% of GDP (rather than 10.8%). "Full healthy ageing" reduces the cost to 9.9% of GDP.

In the face of this increasing pressure on public healthcare expenditure and technological advances, Treasury expects there may be an increase in the proportion of health care costs borne by the private sector. This is likely to be funded through either increased private health insurance or self-financing.

The remainder of this paper considers some of the factors of ageing that will impact private health insurance and ACC, the other significant source of healthcare funding in New Zealand.

There are key differences between private health insurers and ACC, which are summarised in the following table.

Attribute	Private health insurance	ACC
<b>Funding mechanism</b>	Premiums on a "pay-as-you-go" basis, such that each years' premiums cover the costs incurred in that year (and not the lifetime of costs associated with developed health conditions).	Levies on a "fully-funded" basis, such that each years' levies cover all costs (current and future) associated with the accidents which occur in that year.
<b>Population coverage</b>	Opt-in (30% of the population)	Compulsory (100% of the population)
<b>Entitlement structure</b>	Specified in policy conditions that can be changed from year to year	Specified in legislation (the Accident Compensation Act 2001)
<b>Clients</b>	Policyholders	Claimants, levy payers (employers, earners, motor vehicle owners and the Government), providers of health and rehabilitation services
<b>Costs of a claim</b>	Liability for a claim occurs when approved treatment for an accepted condition is provided. An "episode of care" includes all costs associated with a procedure including diagnostics, surgical and hospital costs	Includes all treatment and compensation for an injury as specified in the legislation.
<b>Market</b>	Competitive (11 in NZ)	Monopoly
<b>Annual expenditure</b>	\$1.0 billion	\$2.9 billion (including compensation)

## 2. *Private Health Insurance*

The relationship between age and cost of healthcare funded by private health insurance<sup>1</sup> is similar to that observed in the public sector, although given the nature of private health insurance there are differences.

### *Private versus public healthcare*

Key differences between private health insurance (PHI) and publicly funded healthcare lie in the nature of the events they fund. For example private healthcare does not fund:

- Accident care, which is funded by ACC (so is excluded from public financing also)
- Maternity care
- Emergency care

An alternative way to view the difference is that the public health system has a responsibility for the “state of health” of the population, while health insurers are liable for funding eligible treatment. If no treatment is undertaken, the insurer has no liability. In (overly) simplistic terms the health insurer is not concerned about the state of health of their policyholders, although in practice they are as healthier lives will not claim as much. In practice many participants in the health insurance market are not-for-profit organisations that have a close relationship to their membership and therefore a strong interest in their overall health, beyond the contractual obligation.

Private healthcare funding is targeted at elective treatments/surgeries as well as reimbursement for specialist consultations, imaging and tests, general practitioner consultations and prescriptions. PHI funds these either to the extent that they are not publicly funded (e.g. the shortfall in prescription costs), or fully in order to facilitate access that is not available in public due to waiting lists or conditions that do not yet meet assessment criteria for public funding.

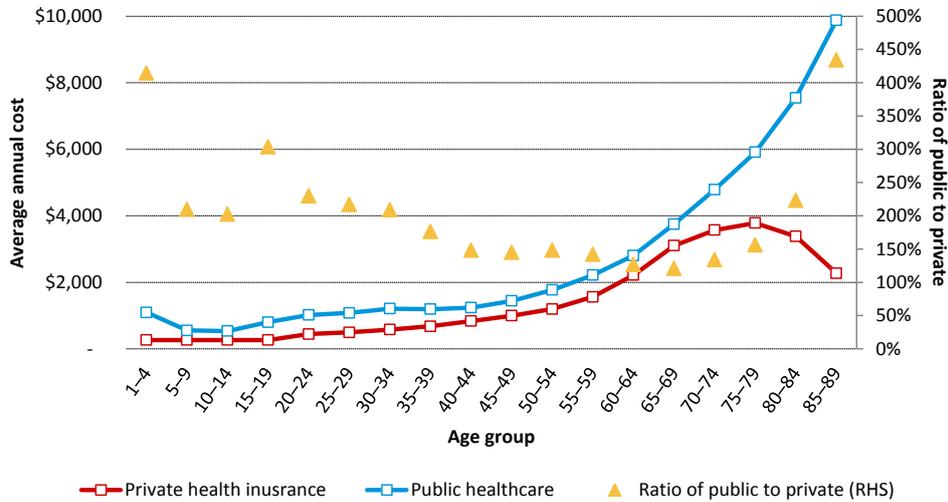
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<sup>1</sup> For the purposes of this paper we have used Southern Cross Medical Care Society data as being indicative of the experience of the total private health insurance market

## Private Health Insurance

The following graph shows the difference in the average cost of public healthcare spending per person compared to the average cost of private health insurance spending per policyholder.

Average annual healthcare costs per person - public versus private



Sources: Southern Cross; Blakely et al (2014)

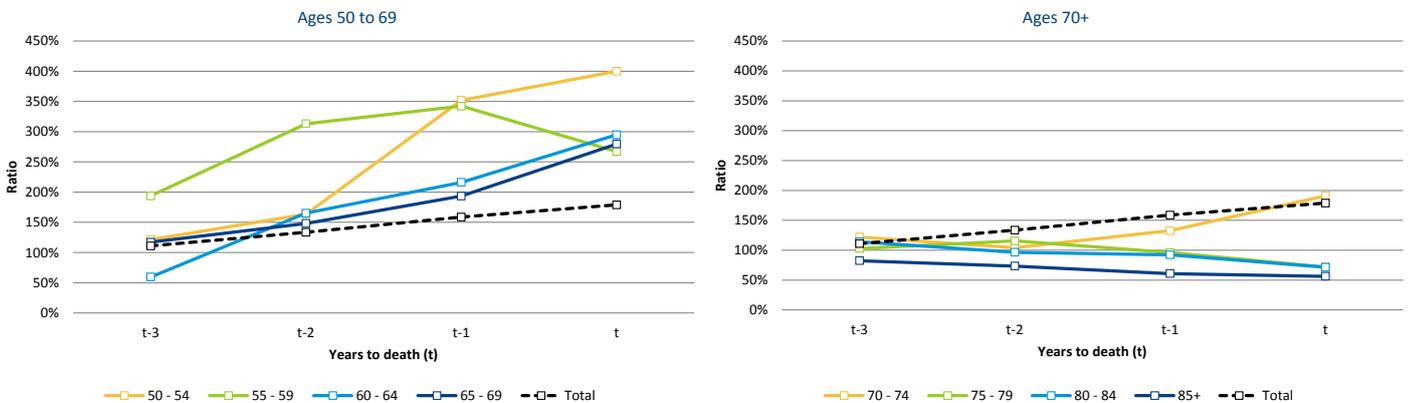
Costs per person in the public sector range from 20% higher to 330% higher than PHI costs (noting that bulk funded public costs have been excluded). This is not surprising given the difference outlined above, in particular end of life and maternity care.

## Proximity to death

A key finding in the paper by Blakely et al (2014) is the increase in cost of care at the end of life. The two graphs below consider the cost of PHI claims in the years immediately prior to death. In these graphs “t” indicates the year prior to death, “t-1” the second to last year of life and so on.

Costs for PHIs have been considered by comparing the average cost for those who have died relative to the average claim cost across all policyholders in the particular age group.

Proximity to death - Ratio of average claim costs for those who die compared to all policyholders



Observations:

- In total, the overall costs rise relative to the average cost, as death approaches.
- Three years prior to death, costs are approximately 10% higher than the overall average. This rises to approximately 180% in the last year of life (the black dotted line above)
- The impacts differ across age groups, in general below age 70, claim costs rise as death approaches. Above this age however PHI claim costs reduce as death approaches. We have not investigated this further but surmise that as death approaches for older lives, physical impairment and/or co-morbidities reduce the ability of the patient to undergo elective surgery. As a result, the risks associated with surgery in particular outweigh the benefits derived from it. In addition, the existence of co-morbidities may mean that they might receive treatment (which would otherwise be funded by a PHI) alongside their other healthcare treatments, hence they do not need to claim through health insurance.

These findings are very different to the costs in the public health system.

### Drivers of PHI costs

We've looked at the drivers of claim costs by age initially by considering the split of costs into average claims and incidence rates. The question to answer is: do older people claim more (up to a certain age) because they claim for more expensive procedures or because they claim more often?

- Average claim cost

Across the years 2007 to 2013, we have expressed the average cost of an episode of care as a percentage of the cost for the group aged 50-59.

An episode of care combines the costs of procedures or tests that are associated with a specific treatment or surgery, for example, combining the imaging and test costs with the hospital charges, being theatre costs as well as surgeon and anaesthetist fees.

- Incidence Rate

In a similar manner we have expressed the average incidence rate over the years 2007 to 2013 as a percentage of the incidence rate for the 50-59 age group.

We have excluded "minor" medical costs such as GP visits, prescriptions, and dental costs from the analysis of incidence rates as these have a high frequency but low impact financially.

Age group	Relative claim cost	Relative cost of an episode of care	Relative incidence rate
50 - 59	100%	100%	100%
60 - 69	183%	153%	149%
70 - 79	267%	195%	210%
80 - 89	204%	114%	215%
90+	112%	59%	158%

From the table above we can see that:

- The cost of claims peaks for the 70-79 age group and at that point is 1.7 times greater than the cost for PHI policyholders in their 50s. The average cost is still double for those in their 80s and then drops back to being 10% higher for those in their 90s.

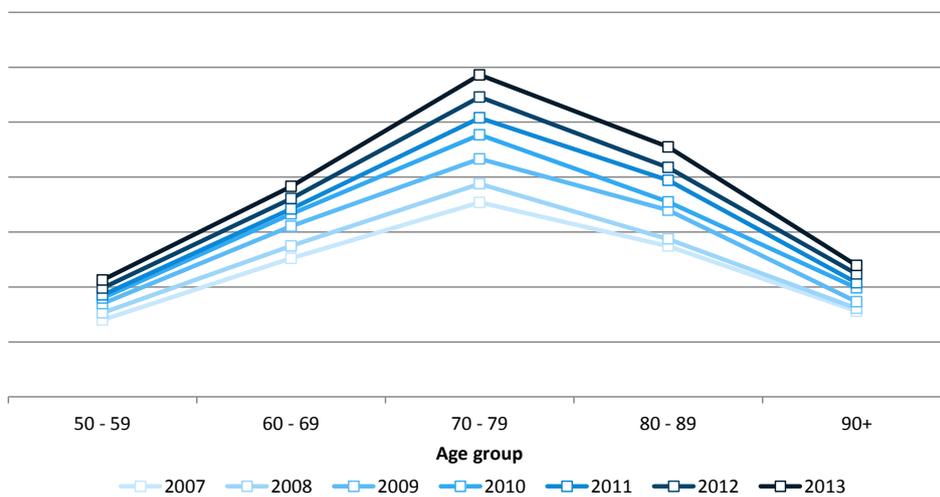
- At older ages, more treatments are provided per policyholder; the incidence rate is significantly higher for all these age groups compared to the 50-59 age group.
- But the complexity of treatment reduces for the oldest age groups, as indicated by the average cost of the episode of care (assuming more complex procedures cost more).

### Changes in Average PHI claims per policyholder over years 2007 to 2013

We acknowledge that this is a relatively short period of time, and that a longer period is required in order to draw stronger conclusions. However some interesting features can be identified even in this short period. Restricting the period also reduces the impact that changes in policy terms and conditions have on the results. In an ideal world, we would use a longer time frame and have constant policy terms throughout (but unfortunately our world is not ideal).

Over the seven year period claim costs per (older) policyholder have increased by an average 7.9% per annum, with the largest average increase for 70-89 age groups (8.8% per annum).

Average cost per member by age and year



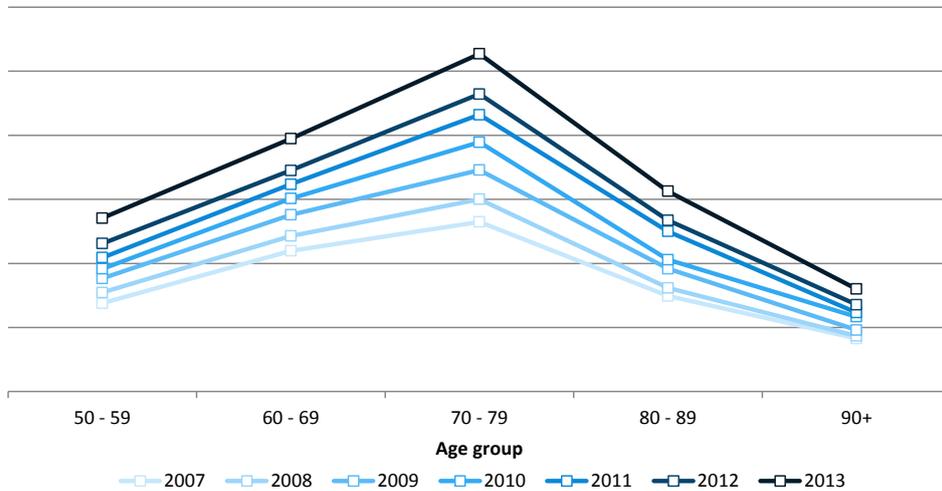
### Incidence Rates

Overall incidence rates for those policyholders aged 50 plus increased by 1.3% per annum over the seven years, however for the oldest age groups the increases were higher: 3.7% p.a. for those in their 80s and 6.4% p.a. for those in their 90s. For this last group there are relatively small numbers (an average of 1,800 policyholders over the period), but it is growing. Again we have excluded day-to-day treatments from this analysis.

### Average Cost per Episode of Care

We have determined the average cost of an episode of care over the years 2007 to 2013.

Average cost per episode by age and year



The average annual increase over this time for these age groups is 11.7%, with the highest rate of increase 13.1% p.a. for those aged 80-89.

This increase includes changes in the cost of specific procedures as well as changes in the type of procedures (e.g. the introduction of new technology or benefits) and the mix performed.

### What's happening at the oldest ages?

From the analysis above we can see that while more procedures are being performed at all older ages (and hence the incidence rate is increasing) the increase in the cost of procedures is the key driver of the increasing cost of PHI.

For Southern Cross at the oldest ages (members aged over 80), there have been significant increases in:

- Ophthalmology costs driven by increases in the incidence of claims. The incidence of claims has increased by over one-third (from 117 to 157 claims per thousand members in a year). However, the average cost has remained largely unchanged over the period.
- Growth of private oncology impacts all ages including the elderly.
- Growth in imaging and tests at all ages but especially the elderly. Incidence and average cost have both increased.
- Growth in number and cost of skin procedures being performed.
- Growth in incidence and cost of orthopaedic procedures.

## *Implications of an ageing population*

Based on (only) seven years data there would appear to be relatively strong evidence of an increase in the number of procedures being done at older ages. This outcome seems reasonable to us given:

- Medical advances are allowing less intrusive surgeries to be performed (e.g. laparoscopic) reducing the risks associated with surgeries for all patients including older patients.
- Improvements in preventative medicine have resulted in healthy ageing, e.g. “70 is the new 60”. More, older patients are now physically able to withstand the rigours of surgery and have sufficiently good quality of life to justify elective surgery being performed. For example there are an increasing number of hip replacements being done at older ages.
- Increased prevalence and use of scanning technology (CT, MRI, PET) across all ages, including the elderly.

This increase is supported by evidence from:

- Canada, where rates per capita of various procedures including imaging, cataracts and knee replacement have increased significantly for the elderly between 1990/01 and 2005/06 (Lee: 2007), and
- Public health statistics in New Zealand, where the rate of cataract procedures per capita increased by 41% from 2005 to 2012.

A consequence of improvement in preventative medicine, as well as an ageing population, is an increase in the incidence of chronic disease that come with ageing such as visual and hearing dysfunction, mobility problems, arthritis and Alzheimer’s, and a relative decline in the instances of acute illness. As a result we expect that a more active older population will increase the demand for elective surgeries including joint replacement surgery, as well as eye surgery such as cataract removal.

### *Implications for PHI*

The value proposition for PHI currently is largely built around being complementary to the public health system, enabling policyholders to access private care to reduce waiting times for surgery, or to fund treatment for which public funding is not readily available, e.g. drugs not funded by Pharmac, or because the patient does not meet the clinical criteria for public funding of treatment. This value proposition will be strengthened as public funding pressure imposes restrictions or rationing on the ability of the public sector to meet demand. This outcome is foreshadowed in the Treasury projections.

### *Focus on preventative medicine*

An increase in the prevalence of chronic illnesses however presents a challenge to the current value proposition. An increase in chronic illness creates a different emphasis. For elective surgery and acute illnesses the focus is on diagnosis, treatment and cure. For chronic illnesses the focus shifts to prevention and then management of the illness.

Wellness programmes are an obvious example for health insurers; targeting smoking and/or obesity in an attempt to reduce illnesses commonly associated with these such as heart and lung disease and diabetes. However in voluntary PHI markets it is difficult to convince policyholders (or potential policyholders) to pay for a programme that they may not use; non-smokers have no interest in a programme to stop smoking, and a number of smokers will have limited interest also.

Employer-based schemes may, however, be better placed to implement such programmes as the employer has an incentive to fund the programme to improve the health of their workforce

An alternative approach is for health insurers to change focus from individual policies to community based programmes, working more closely with the public sector for shared benefit.

#### *Affordability*

Since 2006 premiums for policyholders aged 65 and over on RegularCare (a long standing Southern Cross policy) have increased by 5.0% per annum on average. Over this same period the NZ Superannuation rate has increased by 4.2%. We expect that the key issue for insurers will remain the affordability of PHI.

In our view increased longevity, even with an increase in the number of years of health living, will increase demand for health services at older ages and increase the cost of claims. Healthier 70, 80 and 90 year olds will demand more elective surgery to improve their quality of life and will be physically better able to withstand the surgery. We suspect this will include increased demand for second or third hip and knee replacements, particularly as the number of younger patients in their 40s receiving their first replacement increases. New technologies will create less intrusive treatment options. And the increase in demand will not be satisfied by the public sector as funding pressure grows and becomes unsustainable.

### 3. ACC Experience

As the provider of accident insurance for all New Zealanders, ACC is directly affected by demographic changes in the New Zealand population. Changes in the age-profile of the population not only affect the numbers and severity of claims but also the underlying worker population that funds the costs of ACC coverage.

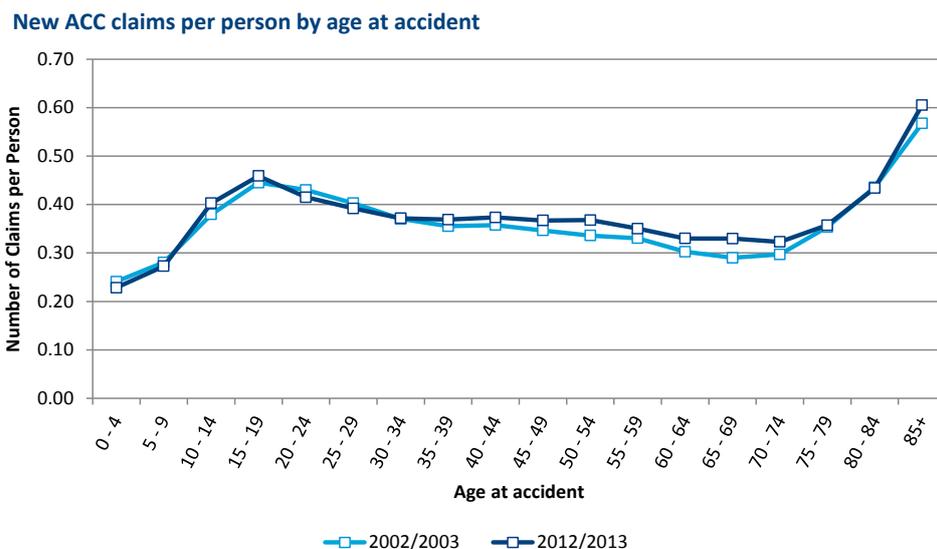
In this section we discuss the ageing population through its impact on three areas:

- new claim rates and costs
- the serious injury portfolio
- the funding of ACC levies

#### New claim rates and costs

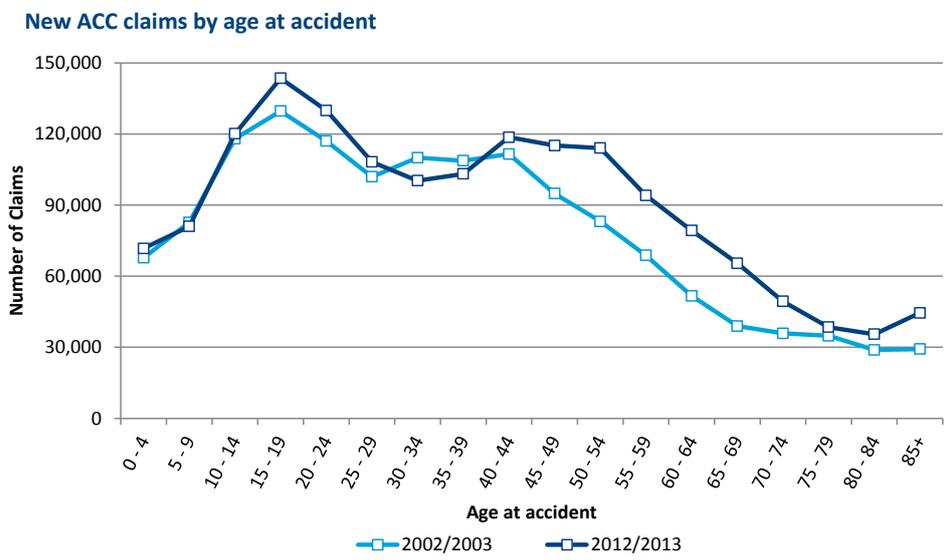
##### Claim incidence

Every year, approximately one-third of New Zealanders experience an injury that results in a claim being lodged with ACC. Claim rates vary by age as can be seen in the following graph showing the number of new claims per person by age group. The graph compares the claim rates for the accident years ending 30 June 2003 and 2013.



The claim rate is lowest for those aged under five and increases through the school years to a peak in the 15-19 age group when teenagers are learning to drive and taking part in riskier activities. The claim rate decreases through the working ages as exposure to more physical activities decreases and workers move into less physically demanding and lower risk management and overseer roles. The claim rate increases sharply from age 75 as older aged adults are more susceptible to falls and have more health co-morbidities which increase the risk of injury.

The general distribution has not altered over the 10-year period but rates for those aged over 35 have increased by 6% overall, with the greatest increase in the 65-69 year age group at 14%. When this increase in incidence rate is combined with the change in age-profile of the NZ population over the last 10 years, the resulting increase in the numbers of new claims for claimants aged over 40 is as shown in the following graph.



The combination of the small increase in claim rates and the increase in the population aged over 35 results in an additional 171,000 claims. Of these, 25,500 were made by claimants aged over 75. If the claim incidence rates by age are held constant at current levels, the Statistics NZ median population projections lead to:

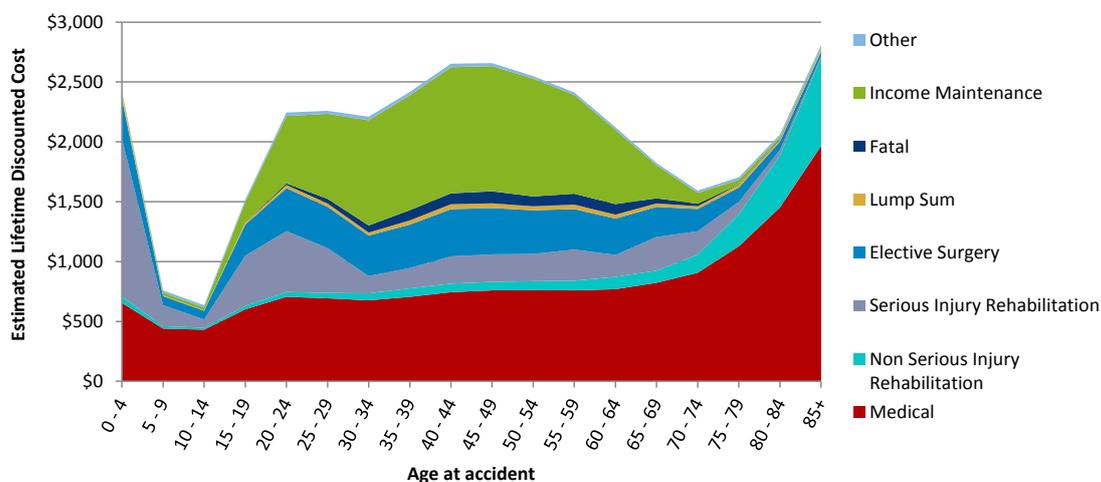
- an additional 190,000 claims in 2025, a third of which will be from those aged over 75.
- an additional 630,000 claims in 2061, just under half of which will be for those aged over 75.

### Claim Severity

Approximately 90% of ACC claims are minor and require only medical treatment and recovery generally occurs within a short period of time. At the other end of the spectrum, a few hundred injuries occur each year resulting in extreme and permanent impairment to individuals. These serious injury claims usually require rehabilitation support in the form of home or nursing care at various levels throughout the individuals' lives. In between these two extremes are claims requiring varying levels of rehabilitation, income maintenance and more intensive medical treatment such as elective surgery.

The following graph shows the breakdown of benefits paid by age at time of accident for the four accident years ending June 2010 to 2013. The costs shown are estimated average lifetime costs per claim discounted to the beginning of the accident year.

Estimated Lifetime discounted cost per claim by benefit type



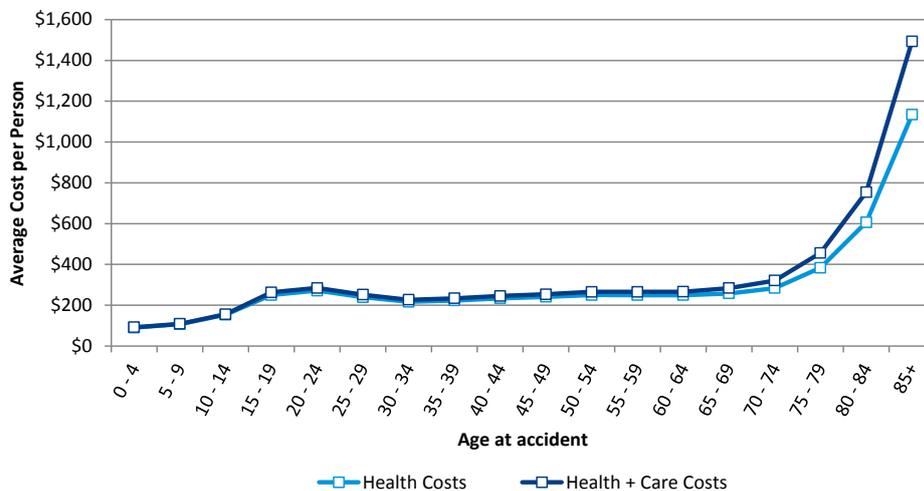
The levels of support vary by the age of the claimant:

- the youngest cohort (0-4) has a high proportion of serious injuries compared to the other cohorts, so on a per claim basis this is the dominant component of the lifetime cost
- at ages 5-9 and 10-14, the injuries are more likely to be minor in nature, for example scuffed knees and broken bones, which drives the average cost per claim down
- serious injury costs are also significant during the “accident hump” at ages 15-29 when young adults are more likely to be involved in riskier activities and serious motor vehicle crashes
- income maintenance is a significant portion of the average cost for claimants of working age, the same cohort for when elective surgery is performed most
- for claimants aged 80 and over at time of injury, medical and in-patient rehabilitation are at the highest levels and lead to the highest average lifetime cost for all ages. In-patient rehabilitation is a large proportion of non-serious injury rehabilitation for older claimants.

The profile of the medical costs by age at accident is especially significant for older ages and, combined with the higher incidence rates, the effect can be seen more clearly when examined as a cost per person rather than per claim.

The following graph shows medical costs and non-serious injury rehabilitation costs paid within one year of accident. A large proportion of the lifetime medical costs paid for a claim are paid within this period during which the majority of rehabilitation costs paid are for in-patient rehabilitation.

**ACC Health and Care costs per person**



### Effects of Co-morbidities

Managing underlying health co-morbidities is one of the issues ACC currently faces in managing the claims of older people. An ageing population will continue to increase pressure on the distinction between injury and health and, together with an ageing workforce, will result in supply and cost pressures on claims management, health and rehabilitation services. This pressure is most visible in the areas of elective surgery, residential care, and home and community support services. This is an area where the boundaries between ACC, public health and private health insurance are most blurred and a claimant will often need to access help from more than one of these providers.

The following is a brief summary of the main points from research conducted in 2012 (Gribben and Wren) on the effects of health co-morbidities on ACC claims.

The research was conducted on a random sample of over 300,000 people registered with a range of primary care practices in New Zealand continuously over a three year period from 1 July 2008 to 30 June 2011. A multivariate model analysis on this sample used the data from primary care (GP) practices linked with Ministry of Health and ACC data via the New Zealand National Health Index (NHI).

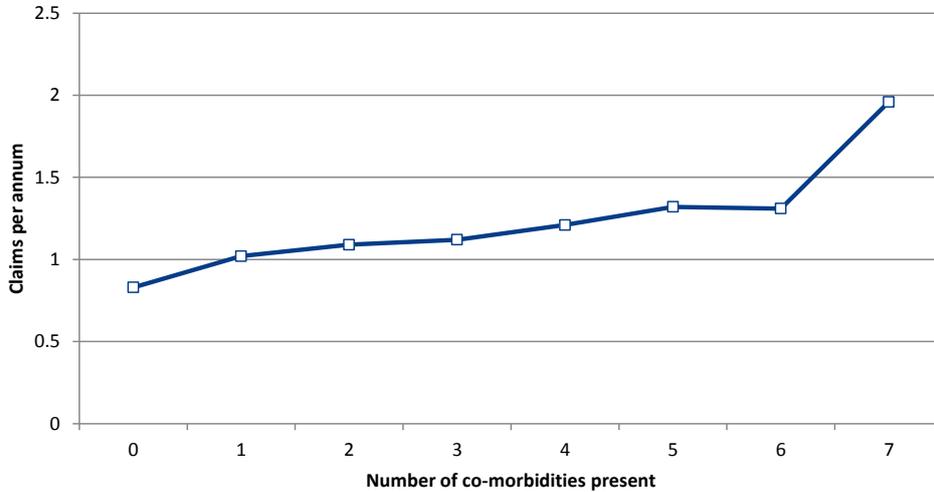
The co-morbidities included in the study were:

- asthma
- chronic obstructive pulmonary disease (COPD)
- ischaemic heart disease (IHD)
- heart failure
- diabetes mellitus
- mental health condition (depression, bipolar, anxiety, schizophrenia)
- cancer diagnosis (lung/breast/colon/cervix/prostate)
- osteoarthritis

The analysis found that the presence of a health co-morbidity has a strong statistically significant (95%) association with increased service utilisation and higher costs. The effects were independent of, and additional, to normal health cost effects typically associated with age, gender, ethnicity and socio-

economic status. The following graph shows the correlation found between the presence of a co-morbidity and the number of ACC claims.

Claims utilisation vs number of co-morbidities



Source: Gribben and Wren (2012)

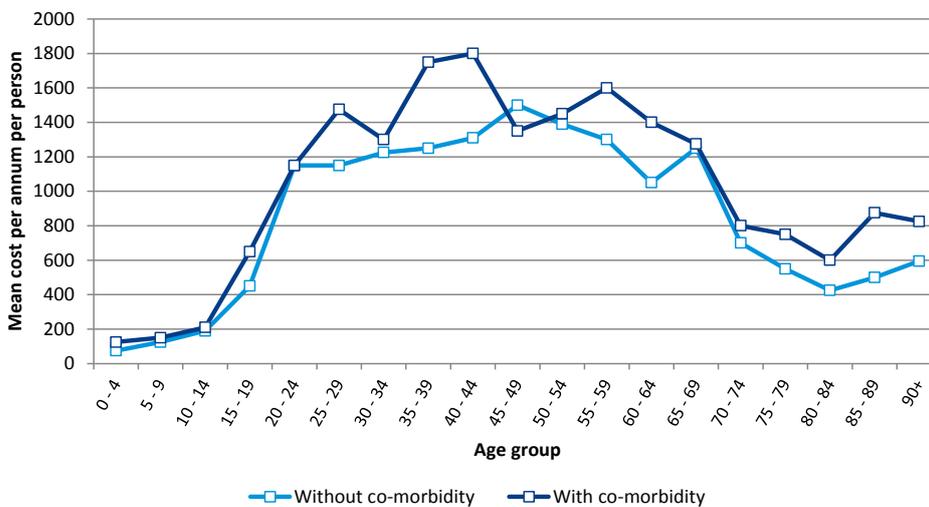
The reason for the claim utilisation increasing significantly from the presence of six to seven co-morbidities is unclear, but most likely linked to the cumulative effects of the co-morbidities.

In addition, the presence of one or more health co-morbidity showed:

- 28% more claims
- 4.5 times the lump sum payment amount (for permanent impairment)
- 59% higher medical treatment costs
- 39% higher income maintenance costs
- 59% higher total cash costs across all benefit types

The following graph shows the difference in the average annual claim cost per person with and without the presence of co-morbidities at different age groups. The excess cost when co-morbidities are present is represented by the area of the gap between the light and dark lines.

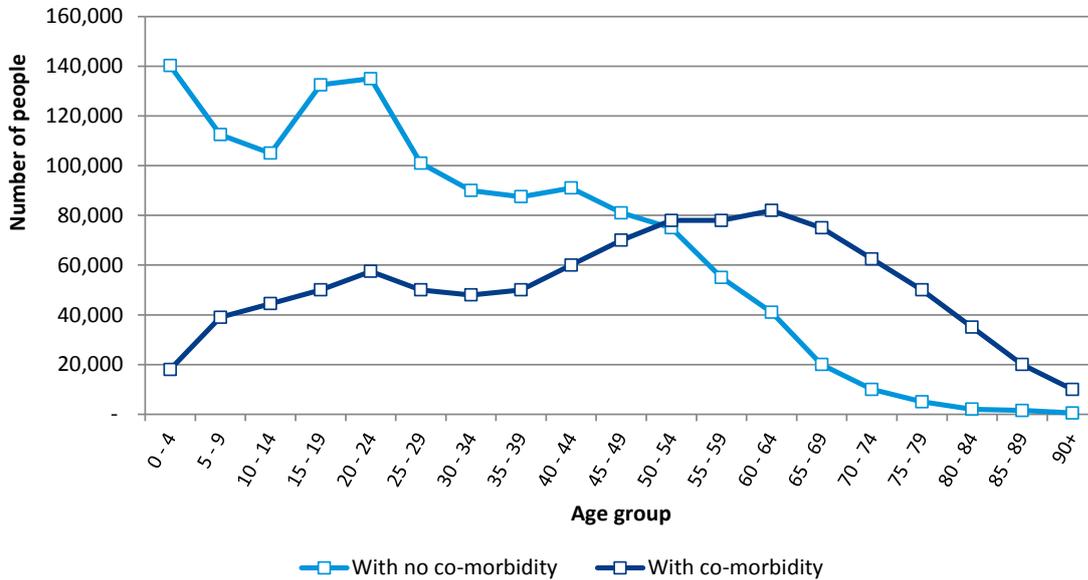
Comparison of costs per person with co-morbidities vs without co-morbidities



Source: Gribben and Wren (2012)

It can be observed that the gap is largest for the working-age population and those over the age of 80. The following graph shows that, as the population ages so does the relative presence of co-morbidities in the age groups, compounding the effects of the cost difference at older ages.

**Comparison of population with co-morbidities vs without co-morbidities**



Source: Gribben and Wren (2012)

From the graph above it is clear that the proportion of the population with a health co-morbidity is very low at birth but increases with age until the number of people with a co-morbidity exceeds those without from the age of 50. At ages above 75 the number of people with no underlying health condition is very small.

The research study estimated that 11% of total ACC expenditure in any one year can be directly attributed to the presence of the most common co-morbidities. It is conservatively estimated that due to an ageing population, and after making adjustments for future changes in the prevalence of the most common health co-morbidities in the population, the future total ACC costs to 2025 that can be directly attributable to the presence of health co-morbidities in the population will increase from approximately 11% to 13%.

The estimates of the proportion of costs that are due to co-morbidities are relatively stable because, even though the ageing of the population means more people have co-morbidities, this is counterbalanced by relatively fewer people being in the younger age groups where the cost differences for people with co-morbidities are greater.

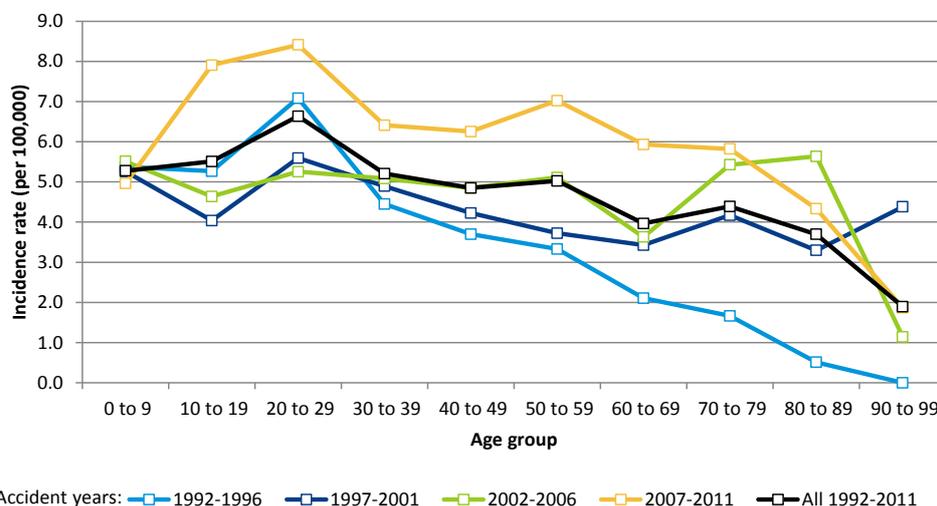
## Serious Injury portfolio

Of particular interest to ACC is the impact of ageing on claimants who require services for a long time. Claimants with catastrophic injuries, such as brain injuries, spinal injuries, paraplegia and tetraplegia, often require significant levels of services for the rest of their lives. The serious injury portfolio at ACC captures the social rehabilitation needs of these claimants, which includes the types of care (e.g. attendant, residential, home-help) and the capital expenditure (e.g. housing and vehicle modifications, wheel chairs and medical consumables) that claimants need in order to manage their injuries.

In general, incidence rates for serious injuries are low, with roughly 270 new serious injury claims occurring each year. The serious injury portfolio currently contains around 4,000-4,500 claimants who have received some form of social rehabilitation service in the past year.

The following graph shows the number of serious injury claims per 100,000 people in the population by age group.

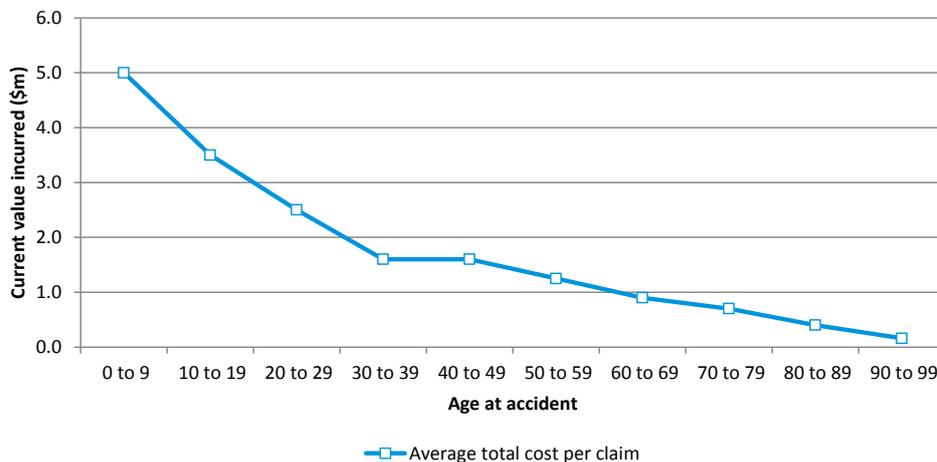
Average incidence rate (number of claims / 100,000 of population)



The overall average incidence rate (the black line) decreases as age increases. For ages 70 and over this is in contrast to the incidence graph for all ACC claims (shown earlier) where incidence increases for older people. There are two reasons why this may be happening. Firstly, at older ages it is less likely that a seriously injured person would survive their injuries, and therefore make it into the portfolio in the first place. Secondly, risk taking behaviour may reduce over time, so it becomes less likely that an older person would become seriously injured. The peak at ages 20 to 29 is consistent with the “accident hump” which is seen in mortality tables, and is consistent with the ages that riskier behaviours are undertaken.

The total lifetime cost of providing social rehabilitation to these claimants varies greatly depending on the age of the claimant and the severity of the injury. The following graph shows the average lifetime cost of providing non-capital social rehabilitation to claimants with serious injuries.

**Average expected lifetime cost (current values) of social rehabilitation (non-capital) for serious injuries**

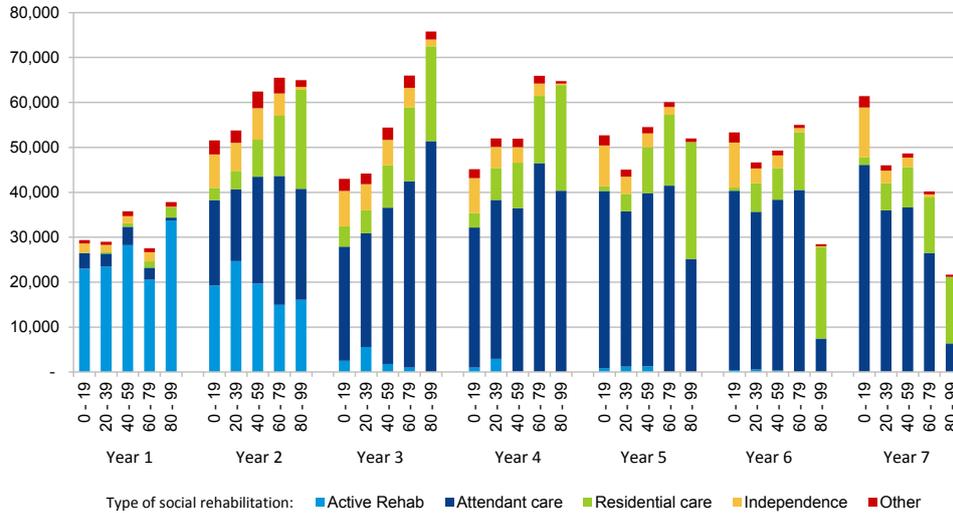


Unsurprisingly, the youngest claimants have the highest expected lifetime cost. The gradient is much steeper at the younger ages than the older ages, because of the additional costs incurred through adolescence into adulthood. In particular moving out of home and training for work are significant milestones for seriously injured claimants, and additional assistance is required to support this process.

The picture painted above shows that from an incidence perspective, the ageing population is unlikely to have a significant impact on the serious injury portfolio, because the expected increases in the older ages of the population are likely to have the lowest incidence rates of serious injuries, and in the long term they cost the least.

From a cash-flow perspective, however, the picture is different. The following graph shows the average cost of serious injury claims in the first seven years after injury.

**Average cost per claim for the first seven years after accident by age group**



It is worth noting that this graph only captures the social rehabilitation costs, so it excludes the cost of the initial hospital admission, which for seriously injured patients will be significant. In addition the year is measured from 1 July, so the year one bucket only captures roughly half of the payments (assuming accidents occur uniformly across the year). This helps to explain why the first year costs are the lowest, when you would likely expect them to be the highest.

The graph shows that the average costs in the early years after an accident occurs are generally largest for the older age cohorts. This relationship begins to break down at around year five, and after that the pattern seems to reverse. There are a number of reasons why this might be the case:

- Attendant care for the youngest cohort begins to grow as claimants reach key lifetime milestones, such as starting school or moving out of home, as additional costs are incurred in preparing families for this transition.
- The more severely injured a claimant is, the less likely they are to survive into the long term. This is particularly true for older claimants, because the strain of living with a serious injury takes its toll on the body. Over time, the average severity of each age cohort will drop, as the most severe claimants will likely pass away first, and this would occur sooner in the older cohorts than the younger ones.

Extrapolating this graph further creates a lot of noise, but the general pattern is that between the ages of 20 and 80 there is no significant difference in the average annual cost of supporting claimants, at roughly \$50k per annum.

In terms of the types of social rehabilitation services received, it is difficult to draw a conclusion on the average cost of active rehabilitation<sup>2</sup> by age group. In year one, this type of rehabilitation makes up between 75% and 90% of the total cost, down to 25% to 45% in year two.

<sup>2</sup> an intensive form of rehabilitation which generally takes place in a hospital

The older age cohorts make greater use of residential care facilities than the younger age cohorts. This is hardly surprising, given that older cohorts are less likely to have natural support systems in place to help care for them and so it is likely the more obvious choice for them and their families.

### *Ageing of the current portfolio*

For ACC's serious injury portfolio there is insufficient detailed longitudinal data to draw any meaningful conclusions on how the needs of claimants change as they age, in particular at the oldest ages. Based on discussions with claim managers, there are three ways in which ageing can drive higher care costs:

- Claimants ageing – as claimants age and living with a serious injury takes its toll on the body, there can be a decrease in functions which require more care to be provided. This is similar to the effect that ageing has on someone in the general population, but the onset is likely to be earlier for a seriously injured person.
- Family carers ageing – for claimants who are children at the time of their accident, it is common for family members to become full time carers. As these carers age, their ability to assist can diminish which can lead to additional capital expenditure, for example expenditure on a hoist to help lift a claimant, or a switch to agency provided care, which is more expensive than family provided care.
- Natural support ageing – as husbands / wives of claimants age, they can become less able to help provide support to the claimant, for example they may not be able to cook dinners or provide suitable sleepover supervision, in which case more care may be required.

The anecdotal evidence suggests that as claimants age their care needs become greater, but it is difficult to establish if the driver of this is actually age, or if it is the length of time living with an injury.

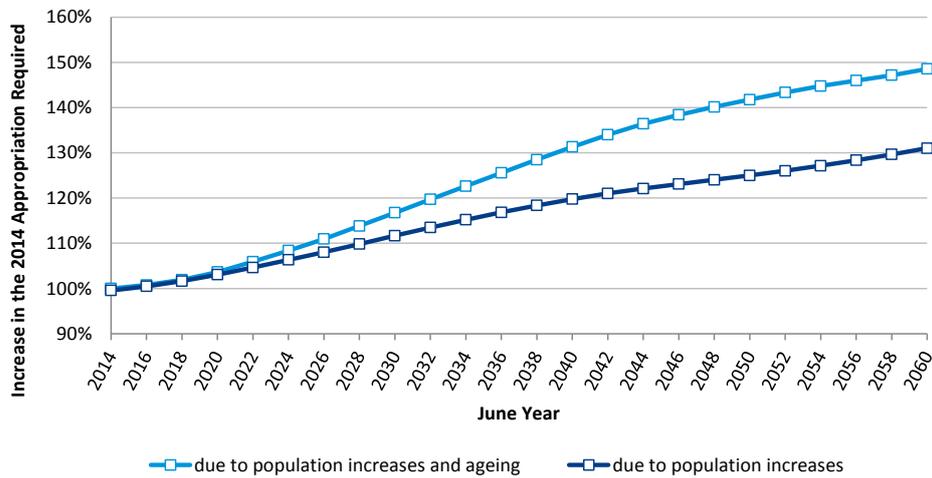
### *Funding of ACC Levies*

The Accident Compensation Act 2001 determines that claims are allocated to one of five accounts depending on the nature of the accident and each account is managed separately with funding and claim costs unable to be distributed between them. The Non-Earners' Account, which funds all non-motor vehicle accidents involving non-earners, is the account most impacted by an ageing population.

Population projections show those aged 65 and over are expected to increase by 138% from 2014 to 2061, while the population younger than 15 is only expected to increase by 8%. The entire non-earner population is estimated to increase by 32%, broadly in line with the total population. Although population ageing has a significant effect, the increased labour force participation among older people and the relative decrease of those younger is expected to dampen the effect on the population covered by the Non-Earners' Account.

If we assume that the current age-specific claim rates and average claim costs remain static, it is interesting to see what effect the projected demographic changes in the NZ population have on the claim costs funded by the Non-Earners' Account. The difference in the estimated lifetime discounted cost of claims incurred between assuming the current population age-mix and that projected is shown in the following graph.

**Increases in Non-Earners' Account funding required due to population ageing**



This graph shows how the funding requirements are expected to increase due to demographic changes. It is expected that a 32% increase in the funding is required by 2061 due to the total projected population increase. A further 17% is required in addition to this due to projected changes in the age distribution.

As noted earlier, the increase in funding requirements can also be considered with regard to the dependency ratio – the size of the working population available to fund the costs. Statistics NZ’s median population projections and unemployment rates by age based on historical 10-year averages were used to estimate projections for the non-earner and earner populations out to 2061. Using these assumptions and excluding inflation, we find that for every \$1 required by earners in 2014 to fund the estimated lifetime discounted cost of non-earner claims incurred in that year, earners in 2061 would need \$1.11.

## 4. The Future

We do not profess to know what the future will look like, but we wanted to discuss some areas that private health insurers and ACC may want to consider in relation to an ageing population.

### *Private health insurers*

The “rate for age” structure of the private health insurance market in New Zealand means that older people find affordability of their policies challenging. There are likely multiple reasons for this occurring, but we will focus on two in particular:

- Health insurance premiums increase, which is hardly surprising given that on average a person over the age of 65 costs the NZ public healthcare system five times as much as a person under the age of 65 (Bryant, Teasdale, Tobias, Cheung, & McHugh, 2004).
- Insufficient retirement income to allow the policyholder to continue their cover, which is exacerbated by premiums increasing.

We believe that there are opportunities for health insurers in addressing the above.

#### *Health insurance premiums increase*

The literature tends to focus on age 65 when referring to ageing because this is the age at which superannuation begins, but from a health costs perspective the age at which costs begin to increase is likely to change. There is evidence to suggest that as well as living longer, New Zealanders also appear to be getting healthier and less dependent in older age (Keene, 2010). So a 60 year old in ten years time will be, on average, healthier than a 60 year old today – e.g. “70 is the new 60”.

If these trends continue, then the relative health costs for people in their 60s will fall and health insurers will find themselves with a market that does not exist today. It is unlikely that insurers will benefit from this market if they try to sell new policies to people in their 60s, so to take advantage of this new market, the challenge for insurers will be to sell to younger cohorts who will then grow into this group of customers.

#### *Insufficient retirement income*

With the introduction of KiwiSaver and the decline of defined benefit pension schemes, there is a shift in the way pensioners receive their regular income. Instead of receiving NZ Superannuation topped up by a regular pension income, in the future retirees will receive NZ Superannuation plus a lump sum payment upon retirement.

This indicates that if health insurers want to keep servicing this part of the market, there may be a need for a different mechanism for charging premiums. In the subsection below, we will consider the merits of three pricing mechanisms.

#### *A lump sum premium*

The obvious one that comes to mind is charging a lump sum premium for a fixed term policy, say ten years, when a policyholder's KiwiSaver funds become available. From a policyholder perspective, the main advantage is that they have certainty of the cost of their health insurance for the next ten years and do not have to worry about not being able to afford cover. The downside of this approach is that the health insurer is then taking on the risk of escalating claims costs, which as we have shown earlier have been significant over at least the last seven years.

### *Cross-selling with annuity products*

While annuity products are not very common in the market at the moment, if they become more prevalent, then they will effectively turn retirement lump sums back into a regular income source (much like a defined benefit scheme). The advantage of this approach is that the anti-selection risks work in opposite directions for the two products. Health insurance products are at risk of less-healthy people being under-priced, whereas annuity products are at risk of more-healthy people being under-priced.

From a policyholder perspective, the benefits of this aren't as great as the lump sum premium option above, because rising premiums will eat into their retirement income, but they will still benefit from having coverage that they might have otherwise not had.

The limitation of this is that it depends heavily on the ability for a viable annuity market to develop. In addition, although the anti-selection risks are in opposing directions, there is a natural tension between a product designed to extend life (health insurance) and a product designed to pay out on survival each year (annuity).

### *Pre-paid premiums*

There are a few different ways that pre-paid premiums could work. The obvious one is through a "level-term" style product similar to that type of life insurance product. The risk of claims escalation will not be as great as under a lump-sum premium because profits from policy cancellations can be used to offset this risk. Policyholders get the advantage of knowing exactly what their premiums will be.

Another pre-paid form of premiums is in the form of an individual healthcare fund. The idea is similar to that of KiwiSaver, where during your working life you put aside a percentage of your income which can then be used to fund your healthcare costs throughout your life, including funding your health insurance premiums into retirement. While such a fund would likely need government backing to get underway, there are benefits for health insurers if individuals have a designated healthcare fund.

### *People getting "wiser"*

As information becomes more widely available, policyholders are likely to get smarter about how they purchase health insurance products. For example, with the prevalence of social media if one person is given a certain level or type of service then it is common for a lot of people to find out about it and put pressure on a company to provide them with the same service. This is true of all types of businesses, not just health insurers. Technology provides a platform for potential and existing policyholders to use (or "abuse") the health insurance system, so health insurers will need to get smarter about how they operate.

With access to more information, policyholders may also demand better differentiation of risks in order to get a cheaper insurance premium. The flip-side of this is that other customers will have to pay more for their higher risks.

### *Younger cohorts*

There is also opportunity for health insurers to focus on selling to younger cohorts. It is estimated that by 2051, 63% of the health budget will be spent on people over the age of 65, compared to 40% today (Bryant et al, 2004). This means that younger cohorts run the risk of being under-served by the public system in the future. The challenge for health insurers will be convincing younger people to take up health insurance before they need to make a claim.

## ACC

Ageing presents a different type of challenge for ACC when compared to health insurers. While health insurers can reprice every year in response to the experience which ageing has on claims, ACC's levies are on a fully funded basis, so the effects of ageing in the future needs to be taken into account now. The following discusses some of the factors which ACC could consider in relation to the ageing population.

### *Living longer with disabilities*

Above it was mentioned that it appears that New Zealanders are getting healthier and less dependent in old age. In spite of this, medical and technological advances mean that people with chronic conditions are also living longer (Keene, 2010).

From ACC's perspective, this means that existing claimants may live for longer with their injuries, and therefore require support for longer. The areas which would be most impacted are:

- Social rehabilitation – providing care and capital to claimants with long term injuries (both serious and non-serious)
- Elective surgery – the longer a claimant lives with an injury increases the opportunity for them to require subsequent surgeries, e.g. a hip replacement has a finite life, and so the longer the claimant lives, the more repeat hip replacements required.

The other side of this argument is that healthier people should recover from their injuries faster, and therefore the cost of providing services to these people reduces.

### *Increases in certain types of claims*

#### *Elder maltreatment*

The World Health Organisation (WHO) expects elder maltreatment to increase in many countries due to rapidly ageing populations. Currently elder maltreatment is estimated to occur in 4-6% of the population. Elder maltreatment can vary from physical to psychological to financial abuse, and in some instances can lead to serious physical injuries and long-term psychological consequences (World Health Organisation, 2011).

The WHO's focus around elder maltreatment is on prevention, in particular around public and professional awareness campaigns, caregiver training, and caregiver support interventions (for example around stress management). There is limited evidence at this stage on what works to prevent elder maltreatment (World Health Organisation, 2011). In New Zealand, Age Concern is the state-funded agency that deals with elder abuse nationwide (Ewing, 2014).

While these are not strictly new types of claims for ACC, an increase in the volume of elder maltreatment has the potential to increase the number of claims ACC receives. These types of claims are not strictly related to physical injury either, claimants who are psychologically or sexually abused may also require counselling-related treatment.

Elder maltreatment is an area which ACC should be prepared to manage. Prevention strategies may be in their infancy, but ACC should follow international research and develop their own prevention strategies.

### *Carer injuries and carer induced injuries*

With an ageing population, there is the potential for demand for carers to outstrip their supply which would put pressure on natural supports, such as family members and friends. The risk is that untrained carers injure themselves or unintentionally injure the person they are caring for, therefore increasing the number of claims ACC receives.

### *Co-morbidities*

The effects of health co-morbidities on ACC claim numbers and costs are discussed in section 3. As the over 65, and particularly the over 85, cohorts grow, there will be an increasing number of claimants who suffer from co-morbidities. In particular the presence of co-morbidities may influence the need for medical treatment beyond what was required due to the original injury and extend the duration of rehabilitation and compensation.

Entitlements to treatment and compensation under ACC are specified in legislation, so when a claim with co-morbidities is accepted all of the costs associated with treatment and rehabilitation are paid by ACC. Increasing numbers of co-morbidities in the injured population will put upward pressure on levies and an approach that considers joint-funding with Health authorities may alleviate this.

### *Raising the retirement age*

It seems inevitable that in the medium term the retirement age will have to rise. This rise is needed to ease the pressure on the working population who will fund NZ Superannuation for an increasingly large proportion of retirees who are living longer in retirement.

A rise in the retirement age impacts on ACC by:

- increasing the length of time that claimants can receive weekly compensation for
- changing the exposure older workers have to injury.

An increase in the age of eligibility for NZ Superannuation automatically corresponds to a change in the age at which weekly compensation ceases (currently age 65). All else being equal a change in these ages will result in a shift from NZ Superannuation to ACC for claimants receiving weekly compensation at age 65, and a shift from accidents in the Non-Earners' Account (funded by a government appropriation) to the Earners' and Work Accounts. The former will increase ACC's levies, but the latter is harder to determine because it will depend upon the average cost of the additional claims in the Earners' and Work Accounts compared to the average cost of the claims loss from the Non-Earners' Account.

### *Increase of workers in 65+ cohorts*

For workers eligible for NZ Superannuation from the age of 65 there is little entitlement to weekly compensation under the current legislation, regardless of their work participation prior to injury. In the past this has been a reasonable approach, where people have generally worked full time and then retired full time giving a clearer distinction between working and retirement.

In the future it is expected that the participation rates of older workers will increase (Department of Labour, 2010), so as the number of workers increase there could be pressure on legislators to change the entitlements to weekly compensation. The difference in income between an entitlement to weekly compensation and no entitlement has the potential to be sizable, e.g. a worker earning \$40,000 p.a. (gross) would receive roughly \$20,000 p.a. (net) in weekly compensation if injured and unable to work.

## 5. *In Conclusion*

As might be expected we conclude that an ageing population will impact directly on the cost of non-publicly funded healthcare, be it ACC or private health insurance. We also anticipate that, as a result of the expected increases in the cost of publicly funded healthcare, there may be a transfer of cost from public to private, for example as a result of rationing or increased waiting lists in the public system.

Cost pressures result not only from people living longer and therefore consuming more over their lifetime, but also from advances in technology that extend the boundaries for treatment to older (and younger) ages and to those with co-morbidities that might otherwise have been too ill to be treated.

Healthy ageing brings a raft of considerations not least of which is the age at which individuals stop paid employment, which has obvious consequences for income replacement benefits and ACC.

Solutions are not easy to find or implement. The alternative to living longer and in better health is not one we wish to consider. It seems inevitable however that there will be some rationing of the supply of publicly funded healthcare, but this is an extremely political subject that is unlikely to win many votes.

As noted above, the costs of healthcare increase dramatically as death approaches. It is outside the scope of this paper, but at some point there needs to be considered discussion about the merits of prolonging life at any cost.

## Appendix – Acknowledgements and References

### Acknowledgements

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## *Appendix – About the Authors*

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Jenn works as an Actuary at PwC, where she undertakes the outstanding claims liability valuation of the Serious Injury portfolio for ACC, and is involved in the valuation of ACC's other benefits.

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John is a Principal with Finity Consulting and is the Appointed Actuary to Southern Cross Medical Care Society. John is a member of the New Zealand Society of Actuaries Health Committee, the Professional Standards Committee and currently serves on the Society's Council.