ACTUARIAL SOCIETY OF SOUTH AFRICA

Healthcare Expenditure in the Last Year of Life: The Experience of South African Medical Schemes

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Research Objectives

- To investigate the costs incurred by medical schemes arising from the provision of benefits during the 12 months preceding a beneficiary's death.
- To better understand the relationship between these costs and:
  - Age
  - Gender
  - Prescribed Minimum Benefits
  - Pre-identified clinical risk

Contextualising the research

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- Significant body of international literature
- Topic receives much attention in the US
  - Medicare population largely over 65 so last-year-of-life costs account for a **quarter** of spend
- Only one prior study in South Africa
  - Moodley and McLeod (2001)
  - Small number of decedents and changes in the policy environment since then
- Our healthcare system has particular features (open enrolment, community rating and minimum benefits)
  - Important from a policy perspective to identify if last-year-of-life costs are structurally different to other places in the world

Why is this of interest?

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- Potentially useful insights for medical schemes relating to benefit design
- Relates to the important issue of rationing of healthcare
  - Potential concern over limited medical resources being directed to health insurance beneficiaries in their last year of life (Scitovsky, 1994)
  - Difference between a retrospective study and prospective study
    - Cannot infer that healthcare has been provided in the anticipation of death. Such an inference can only be made when analysing terminally-ill patients (usually with a homogenous cause of death).

Data

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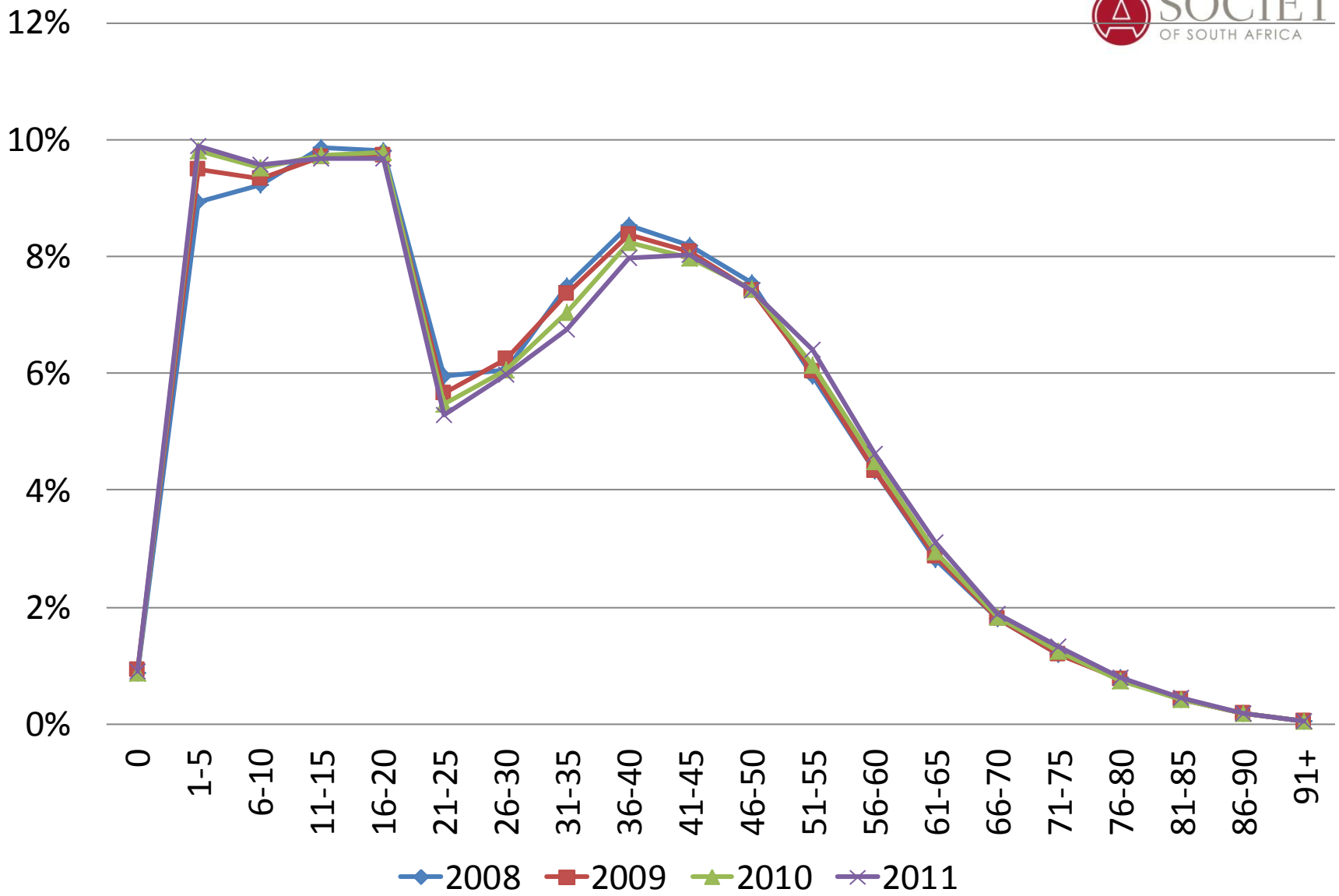
- Data provided by Medscheme, with schemes and beneficiaries de-identified
- Four-year period (2008-2011)
- Robust conclusions can be drawn:
  - Approximately 3 million beneficiaries – around 38% of medical scheme beneficiaries
  - 36,711 decedents (as compared to 1,650 in Moodley and McLeod)
  - Demographic profile in line with industry
  - Data from 18 different medical schemes: wide range of benefit designs, open and restricted schemes
  - Possible peculiarities in terms of how data are captured
- 2 sets of data provided: summary data for the entire risk pool and detailed data for decedents


12%
10%
8%
6%
4%
2%
0%
0
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
61-65
66-70
71-75
76-80
81-85
86-90
91+
2008
2009
2010
2011

Additional Notes on Data

- We used “claim amount” (amount of the claim submitted by the beneficiary) and not “risk amount” (amount reimbursed by the scheme)
  - For the entire risk pool, total claimed amount during the period is approximately 10.6% higher than the risk amount. When looking at just decedents this falls to 4.2%.
  - Claim amount was used as it more closely represents the costs actually experienced by beneficiaries (not entirely as some claims are never submitted)
- Claims data are adjusted for inflation in order to obtain results in real terms

Clinical Groupers

- Data representing each decedent's Resource Utilisation Band (RUB) were also provided.
- An indication of a beneficiary's expected future healthcare utilisation and costs
- Values range from 0 to 5: the higher the value, the higher the predicted resource utilisation for the beneficiary.
- Determined using the (proprietary) Johns Hopkins Adjusted Clinical Groupings (ACGs) Case-Mix system
- Only provided for beneficiaries who have exposure greater than 6 months.

Methodology

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Last year of life as compared to prior years

- Analyse the relationship that exists between the years prior to death (not calendar years)
- **Age at death**
- Only decedents are considered

Comparison of decedent and survivor costs

- Determine extent to which decedent costs vary from survivor costs within a particular calendar year
- **Age at 1 Jan**
- Both survivors and decedents are considered

Healthcare Costs in the Last Year of Life

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Determine exposure period

↓

Calculate aggregate exposure.

↓

Calculate aggregate healthcare costs in each year prior to death.

↓

Compare years by taking ratios.

↓

This method is carried out for age at death, category of expenditure and RUB value.

Healthcare Costs in the Last Year of Life

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Determine exposure period

Ascertain the latest date on which each beneficiary discontinued their medical scheme cover (date of death).
Determine the date on which exposure began – later of 1 Jan 2008 and join date.

Healthcare Costs in the Last Year of Life

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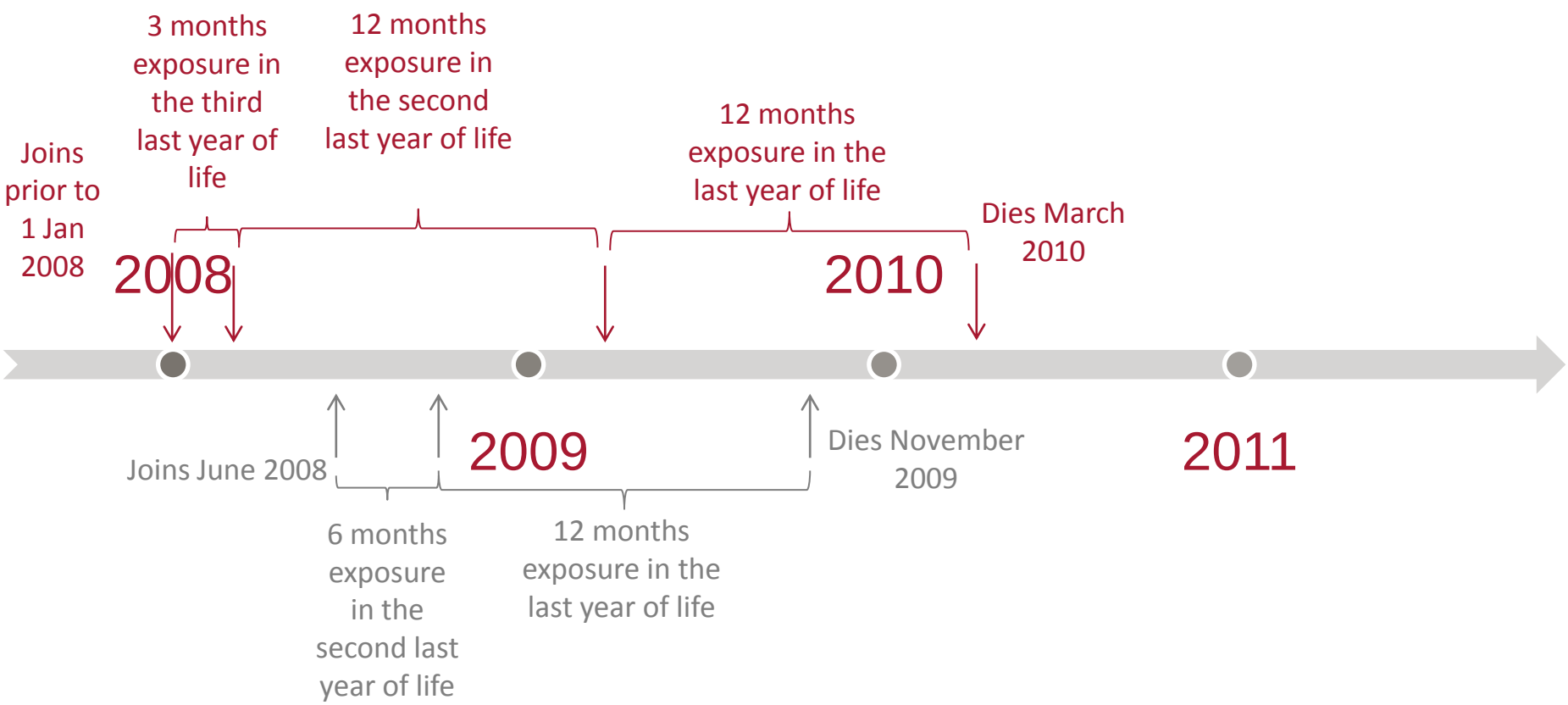
Calculate aggregate exposure. Divide exposure period into the respective years prior to death for each beneficiary. Computed using the end of the month of death. Aggregate exposure was calculated by summing all beneficiaries' exposure months falling within each respective year prior to death.

Example of Allocating Exposure



Note on Aggregate Exposure

- Calculated exposure is subject to overestimation of exposure period.
- End of exposure is end of the month, irrespective of when the beneficiary died or left the scheme.
- Start of exposure is assumed to be the start of the month. Vast majority of joining dates fall at the beginning of the month but there were some data points which had to be adjusted.
- These assumptions for consistency between claims and exposure as claim amounts are summarised by treatment month

Healthcare Costs in the Last Year of Life

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↓

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Compare years by taking ratios.

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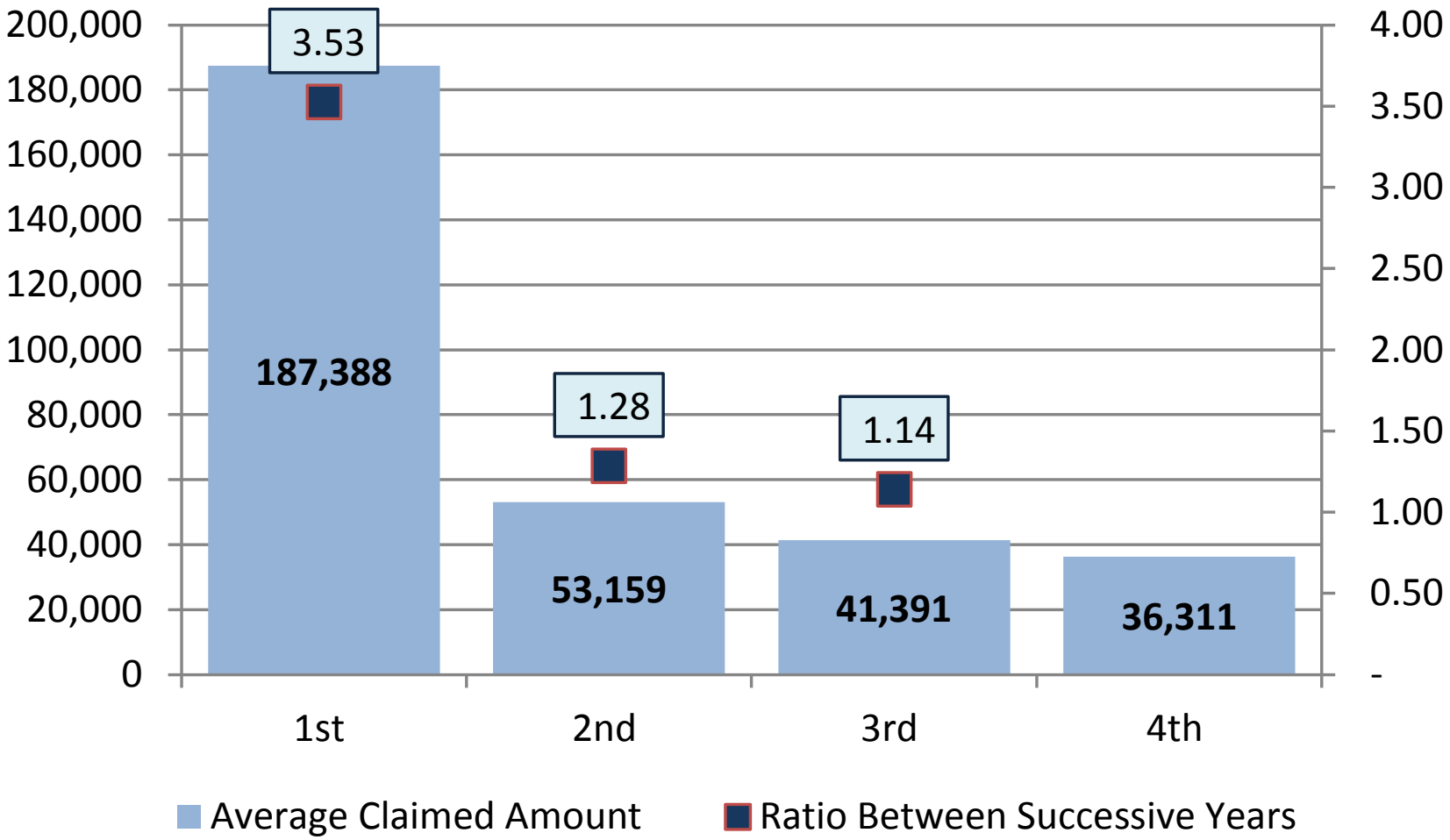
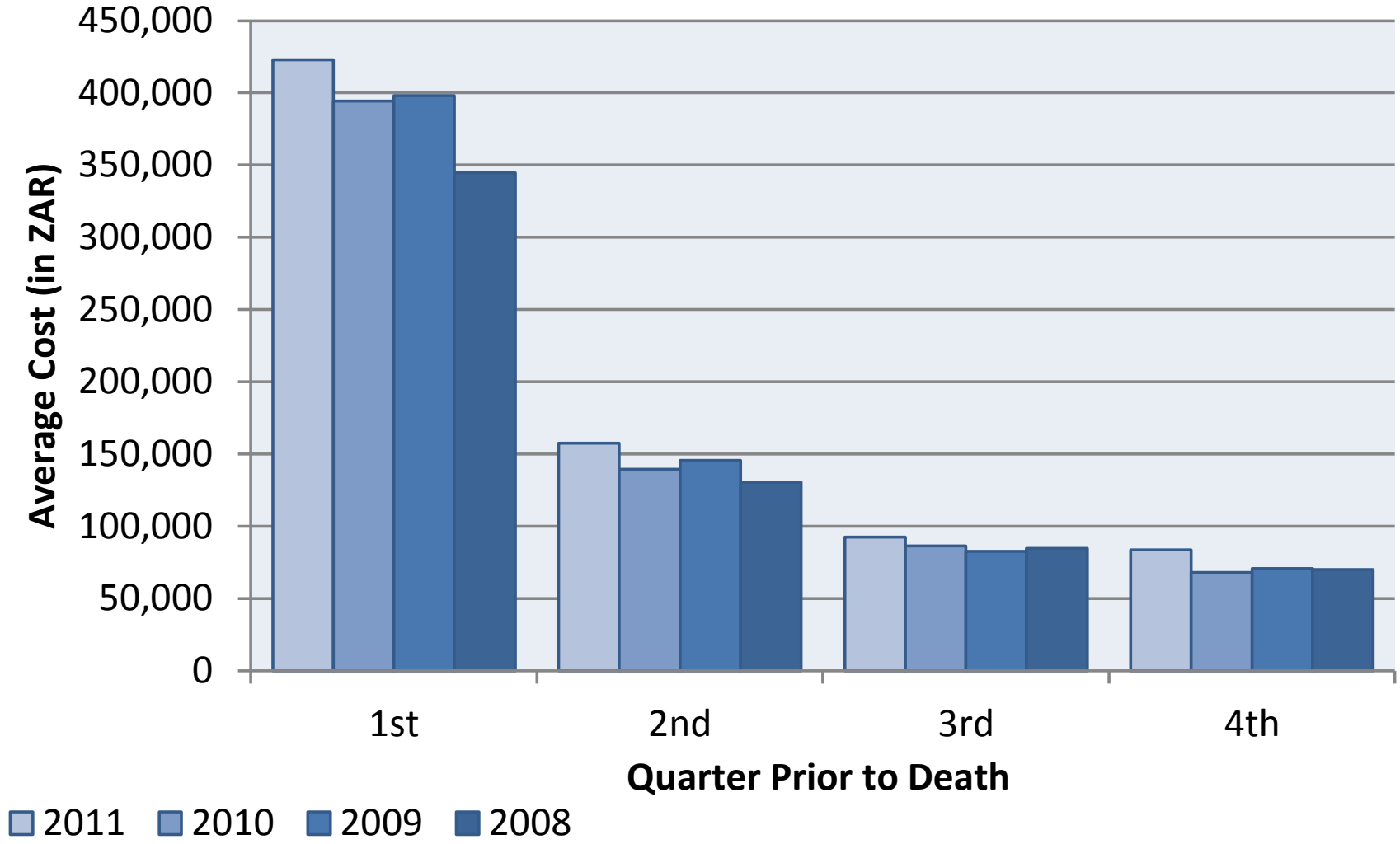
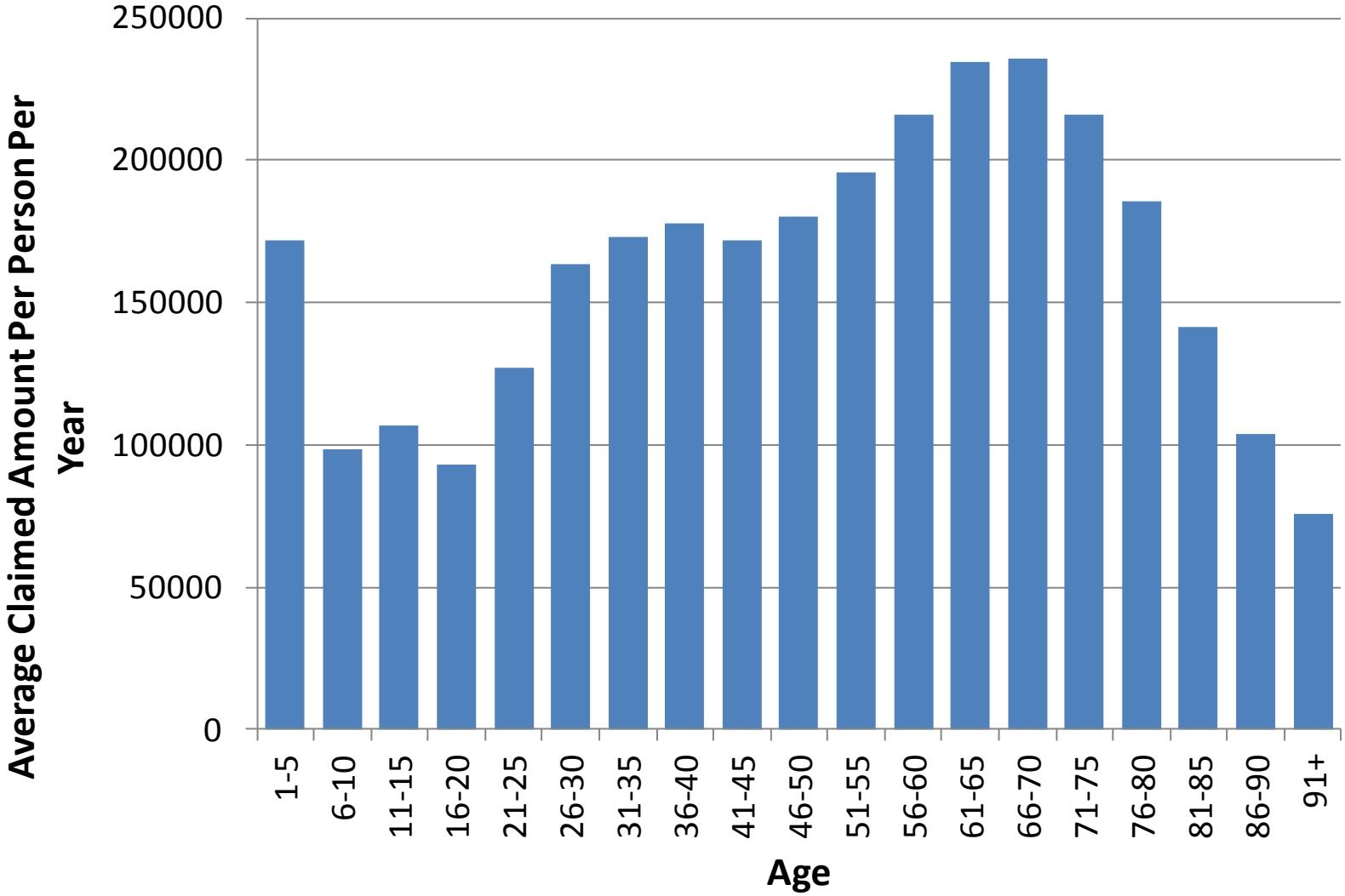

200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
-
3.53
1.28
1.14
187,388
53,159
41,391
36,311
1st
2nd
3rd
4th
Average Claimed Amount
Ratio Between Successive Years


450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Average Cost (in ZAR)
1st
2nd
3rd
4th
Quarter Prior to Death
2011
2010
2009
2008

Average Costs in the Last Year of Life According to Age at Death



Average Costs in the Last Year of Life According to Age at Death

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- Very high cost for neonates (R740,000 pbpy)
  - Less than a full year of exposure: comparison over the last 6 months of life may decrease differences in average costs between neonates and other ages
  - Complex ethical and emotional issues
  - Strict rationing guidelines in the public sector (<0.9kg) (Econex, 2012)
- Sharp drop-off after age 70
  - Low levels of benefits for nursing homes, frail care and hospice – possibility of costs that are not visible to medical schemes. Similar findings elsewhere in the world (Scitovsky, 2005)
  - Choice of "place of dying" can impact on costs– elderly patients may choose to go into frail care rather than a private hospital.
  - Implicit age-based rationing already occurring. Levinsky et al (2001) suggested that it may be as a result of the elderly patients avoiding aggressive healthcare procedures.
  - Those that survive to older ages often stable on chronic medication – has an impact on the costs arising from co-morbidities/clinical complications

Average Costs in the Last Year of Life According to Category of Expenditure

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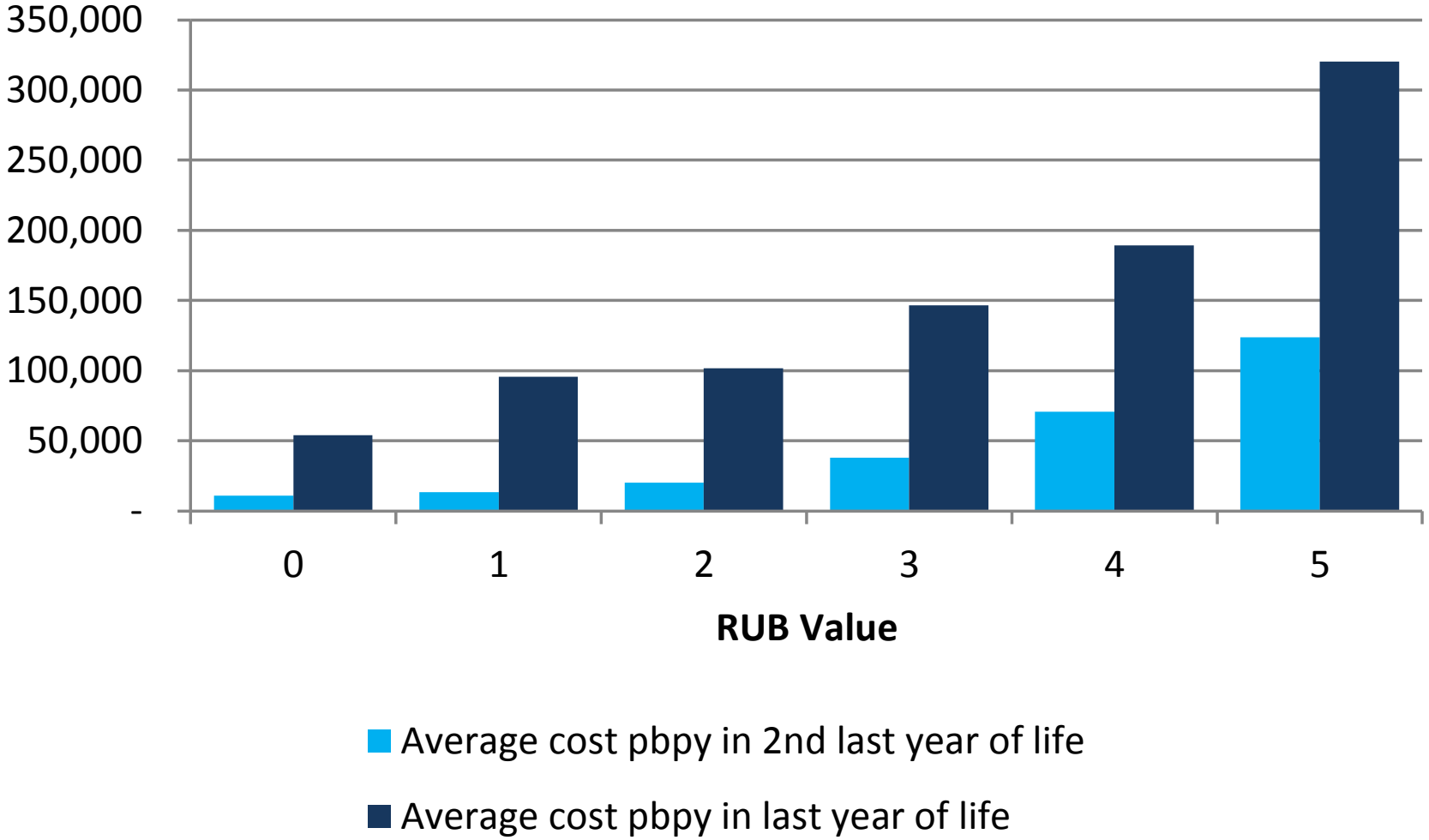
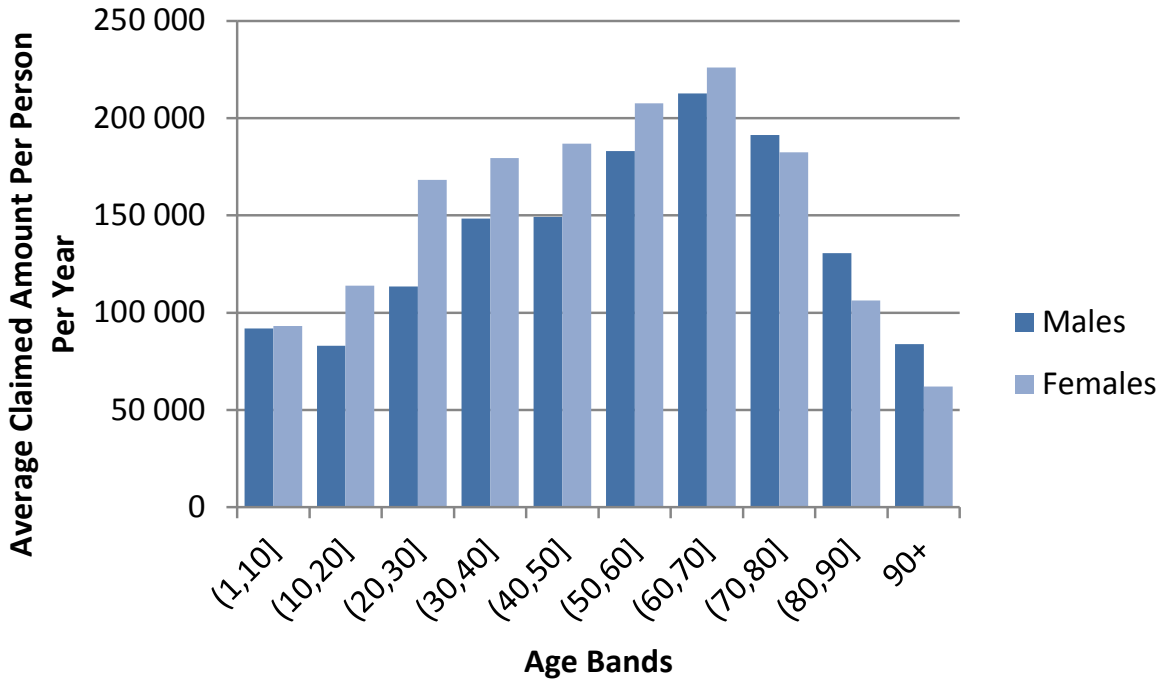
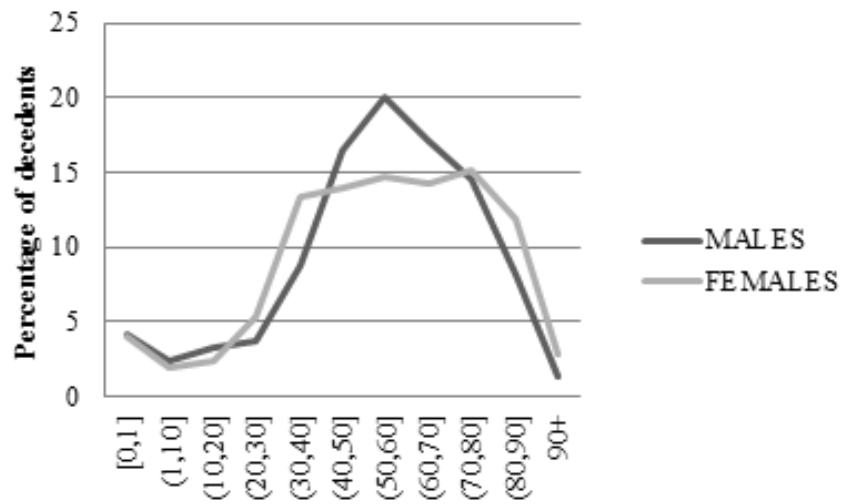
	Proportion of Average Claimed Amounts Years Prior to Death		Ratio (1st/2nd last year of life)
Category of Expenditure	**1st**	**2nd**	
Acute Medicines	1.59%	5.00%	1.12
Anti- Retroviral Therapy	0.27%	0.66%	1.42
Auxiliary	**7.84%**	**6.49%**	**4.24**
Chronic Medicines	1.20%	4.78%	0.88
Dental	0.15%	0.67%	0.77
General Practitioner	1.33%	2.79%	1.68
Hospital	**59.47%**	**42.28%**	**4.96**
Medical Specialist	**8.27%**	**8.97%**	**3.25**
Optical	0.17%	0.82%	0.75
Pathology	**5.45%**	**4.55%**	**4.23**
Radiation/Oncology	**6.46%**	**12.03%**	1.89
Radiology	4.12%	5.17%	2.81
Special Benefits	3.68%	5.79%	2.24
Unknown	0.00%	0.01%	0.72


350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
0
1
2
3
4
5
RUB Value
Average cost pbpy in 2nd last year of life
Average cost pbpy in last year of life


Average Claimed Amount Per Person Per Year
250 000
200 000
150 000
100 000
50 000
0
(1,10]
(10,20]
(20,30]
(30,40]
(40,50]
(50,60]
(60,70]
(70,80]
(80,90]
90+
Age Bands
Males
Females


Percentage of decedents
25
20
15
10
5
0
[0,1]
(1,10]
(10,20]
(20,30]
(30,40]
(40,50]
(50,60]
(60,70]
(70,80]
(80,90]
90+
MALES
FEMALES

Comparison of decedent and survivor costs

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Decedents' costs and exposure periods aggregated by summing all decedents' costs and exposures respectively, within each calendar year

In the same way, aggregate survivor costs and exposure are calculated.

Ratios are calculated to compare the average survivor and decedent costs within each calendar year.

This method is carried out for age at 1 Jan, category of expenditure and for PMB/non-PMB costs.

Comparison of Decedent and Survivor Costs

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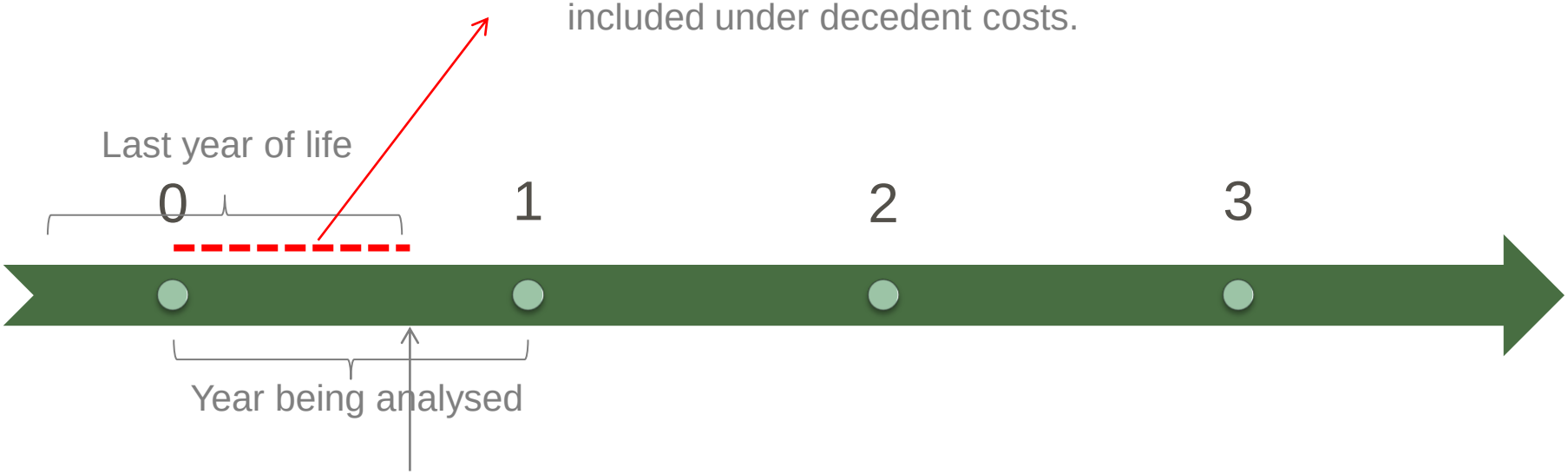
- The last year of life is as defined previously (i.e. overestimation of decedent exposure)
- There are three scenarios for allocating costs

Scenario 1	Scenario 2	Scenario 3
• Dies in the year being analysed	• Dies in the calendar year subsequent to the year being analysed	• Survives the calendar year being analysed and the subsequent year

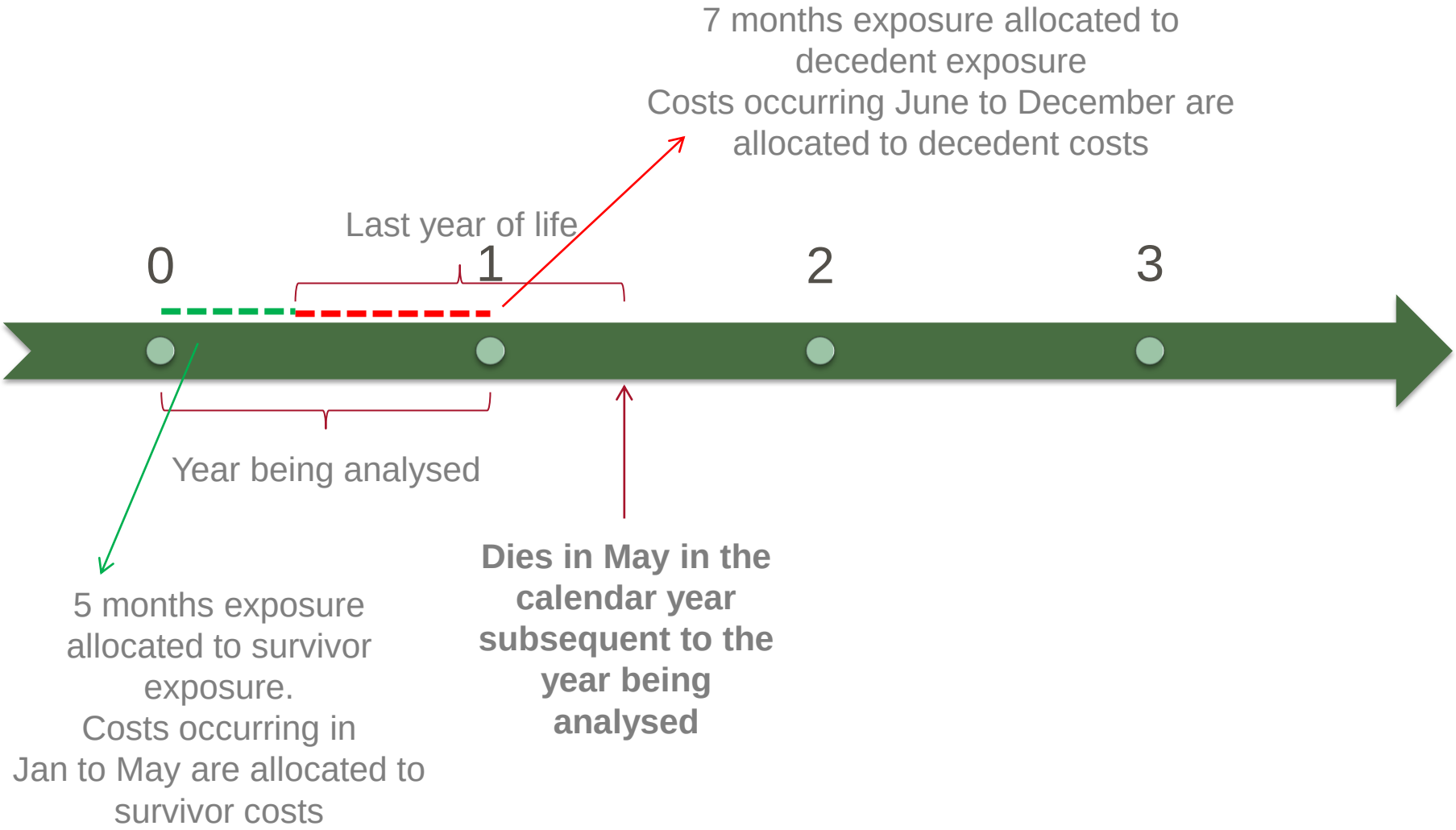
Scenario 1

10 months of exposure, all assigned to decedent exposure.
No contribution to survivor exposure.
Claims for January to October are included under decedent costs.

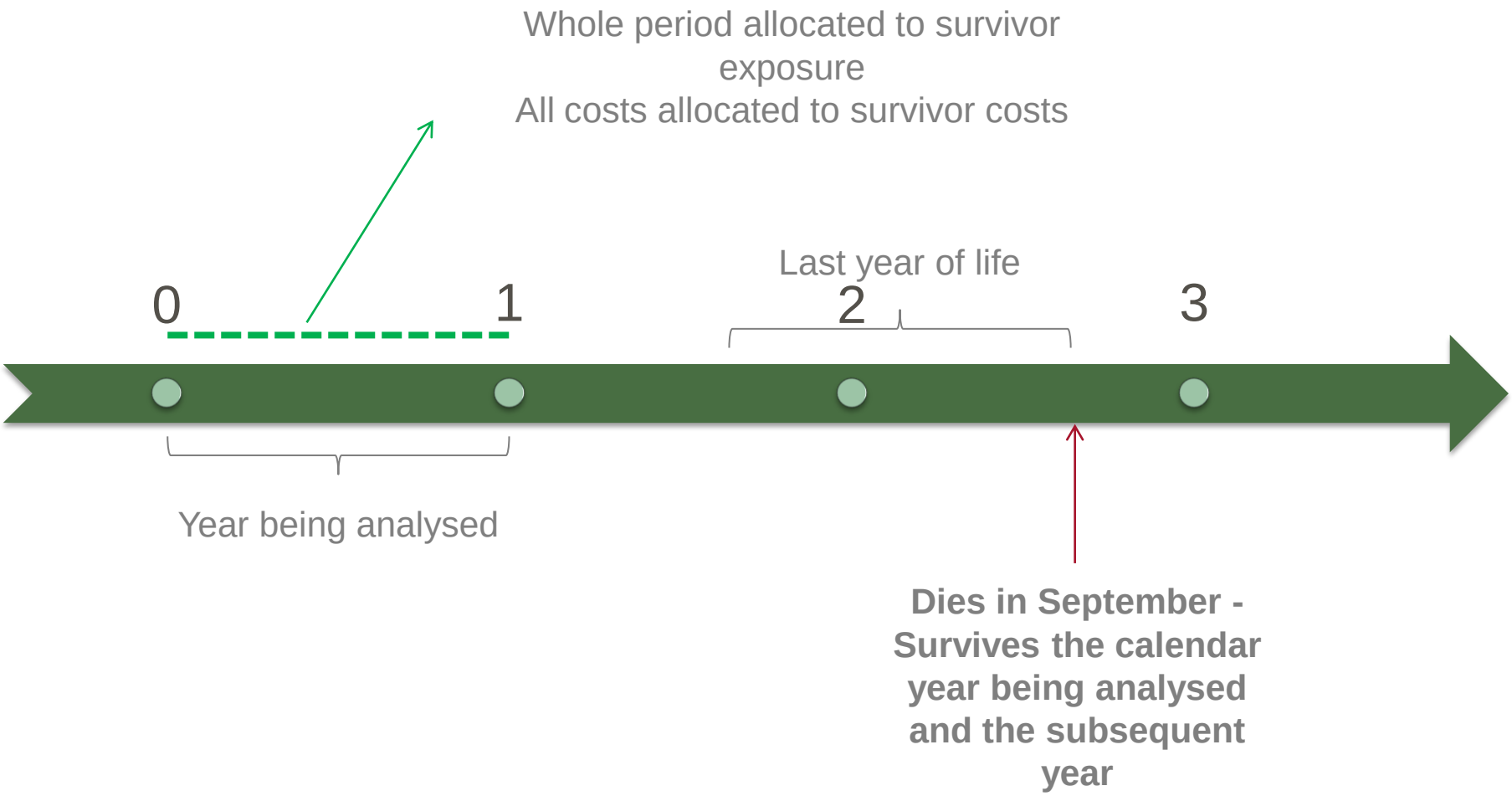


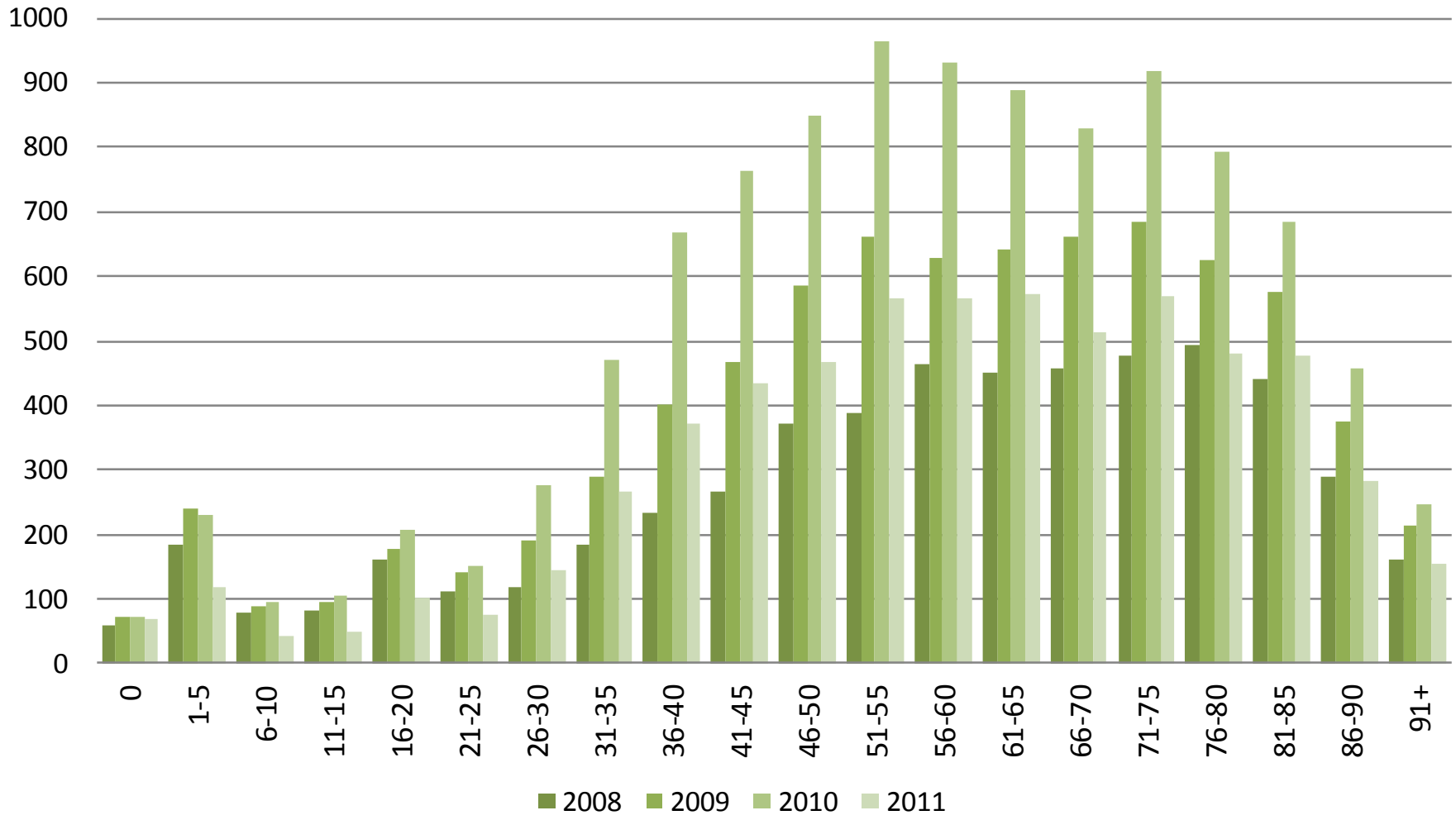
Dies in October of the year being analysed

Scenario 2


7 months exposure allocated to decedent exposure
Costs occurring June to December are allocated to decedent costs
Last year of life
0
1
2
3
Year being analysed
5 months exposure allocated to survivor exposure.
Costs occurring in Jan to May are allocated to survivor costs
Dies in May in the calendar year subsequent to the year being analysed

Scenario 3


Whole period allocated to survivor exposure
All costs allocated to survivor costs
Last year of life
0
1
2
3
Year being analysed
Dies in September - Survives the calendar year being analysed and the subsequent year


1000
900
800
700
600
500
400
300
200
100
0
0
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
61-65
66-70
71-75
76-80
81-85
86-90
91+
2008
2009
2010
2011

The Problem with 2011

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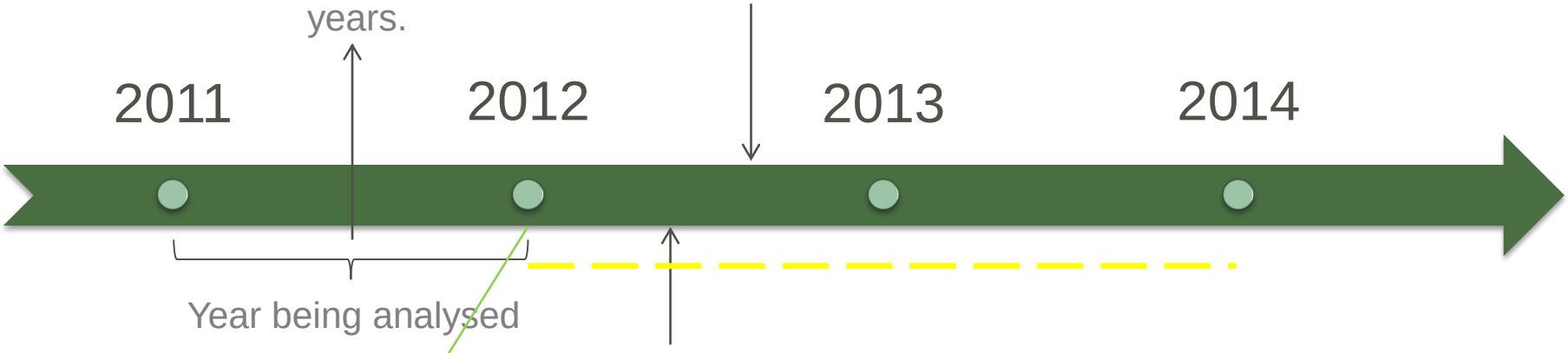
Problem 2: Beneficiaries dying in 2011 are, on average, closer to death than that of beneficiaries dying in 2012. So aggregate decedent costs are substantially higher than for other calendar years.

RESULT: significant overestimation of average decedent costs in 2011.

We are here



No data from 1 January 2012

Assumption: everyone who survives to 31 December 2011 is classified as a survivor

Problem 1: those who die in 2012 contribute towards both decedent and survivor exposure BUT classified as survivors. Result: decrease in decedent exposure for 2011. Same applies for costs.

Analysis of Survivor and Decedent Costs

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Year	2008	2009	2010	2011
Percentage	3.92%	5.23%	6.57%	5.39%
Risk-Adjusted Average Decedent Claim Amount (in ZAR)	120,890	149,189	157,760	213,856
Risk-Adjusted Average Survivor Claim Amount (in ZAR)	9,711	10,299	10,072	10,287
Ratio	12.45	14.49	15.66	20.79

250,000
200,000
150,000
100,000
50,000
0
Average Cost (in ZAR)
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
61-65
66-70
71-75
76-80
81-85
86-90
91+
Age
Decedents 2010
Survivors 2010

Last year of life and PMBs

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	1st	2nd	3rd	4th
Percentage of costs that are PMB related	73.95%	58.18%	53.59%	48.61%

	2008	2009	2010	2011
Percentage of decedent costs that are PMB related	61.44%	69.30%	73.70%	80.10%
Percentage of survivor costs that are PMB related	32.99%	37.73%	39.02%	42.83%

Conclusions: Key Factors Influencing Last-Year-of-Life Costs

The three main factors that have the most notable impact on costs:

1. Dominance of hospital costs
2. Impact that young beneficiaries have on costs in the last year of life
3. Vital to constantly monitor the number of beneficiaries who have a RUB value of 5.

Conclusions: Rationing

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- On a per beneficiary basis medical schemes incur significant costs in the last year of life
- But, these costs only constitute between 3.92% and 6.57% of total yearly expenditure
- And the majority of costs are incurred in the treatment of PMBs
- In 2010 only 1.7% of costs would have been affected by an attempt to ration last-year-of-life costs
- Potentially some merit in managed care interventions focussing on high-risk beneficiaries
- Require prospective research to better understand decision making in advance of death

Conclusions: Benefit Design

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- Thinking about the “place of dying”
- Possible benefits from greater co-ordination of care for the frail and chronically ill
- Trends in last-year-of-life expenditure may be revealing in terms of technological advances (Stearns & Norton, 2004), for example, new cancer treatments

Conclusions: Policy Implications

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- Useful to compare results to Moodley and McLeod (2001)
  - Average last-year-of-life costs were 3.2 times greater than those in the second last year of life (as compared to 3.53)
  - Ratio of decedent to survivor costs obtained in Moodley and McLeod (2001) were similar to results in this study
- Increased impact of last-year-of-life costs likely to be the combined result of anti-selection (in a voluntary, community-rated, open enrolment environment) and PMBs
- Late-joiner penalties insufficiently high to protect schemes
- Can be argued that PMBs are achieving aim of protecting the public sector from “dumping” at the end of life

Further Research

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- Prospective study
- Further analysis to understand potential anti-selection
- Growth rate projection of the number of beneficiaries in their last year of life
- Analysis of out-of-pocket expenses, such as frail care and nursing care.
- Investigate the reasons for decline in the costs after the age of 70
- Collection of data on the cause of death
- Detailed investigation into clinical grouper systems which allows for better monitoring of high-risk beneficiaries

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