

MEDICAL INFLATION AND WELLNESS PROGRAMMES

A Case Study

May 2014

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Agenda

1. An overview of medical inflation
2. Analysing the impact of increase engagement on health outcomes
3. As an aside – some mortality analysis too...

Definition

Definition: *The medical inflation that consumers experience is defined here as year-on-year increases in contributions under a particular benefit option in a medical scheme. In other words, how the price of the same benefit option in a medical scheme changes from year to year.*

1st equation

Medical inflation = f (claims inflation; expense inflation; reserve building)

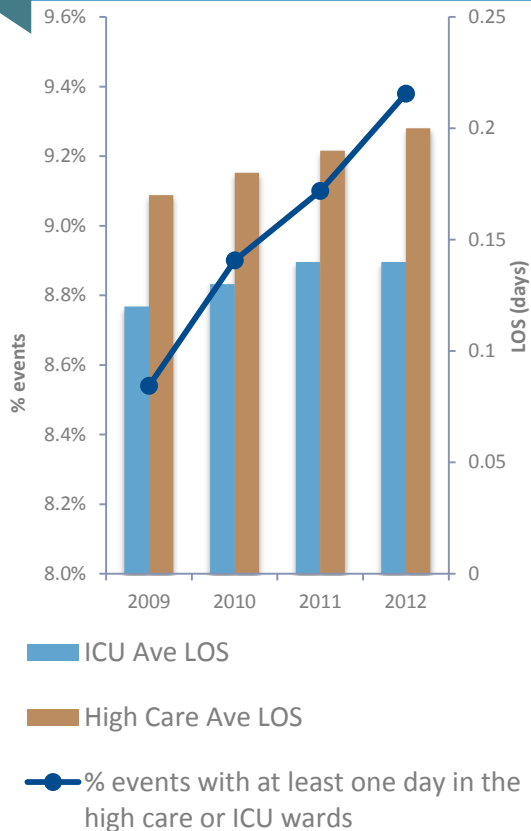
2nd & 3rd equations

Claims inflation = f (tariff (or price) increases; volume of services)

Volume of services = f (demand side factors; supply side factors)

A Supply side: Increased use of high tech interventions

Increasing use of ICU and High Care wards



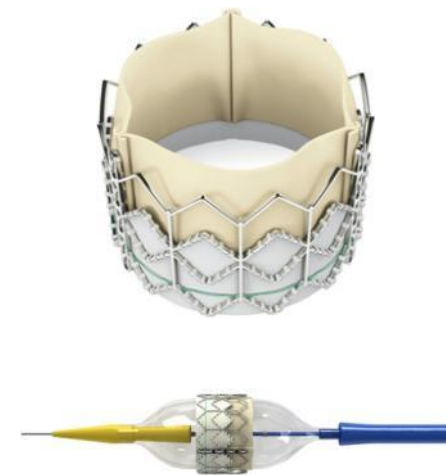
10% increase in use of high intensity care in hospital

Expenditure on high-cost drugs



6% of chronic patients will need biologics and will require 47% of chronic medicine spend in 2016

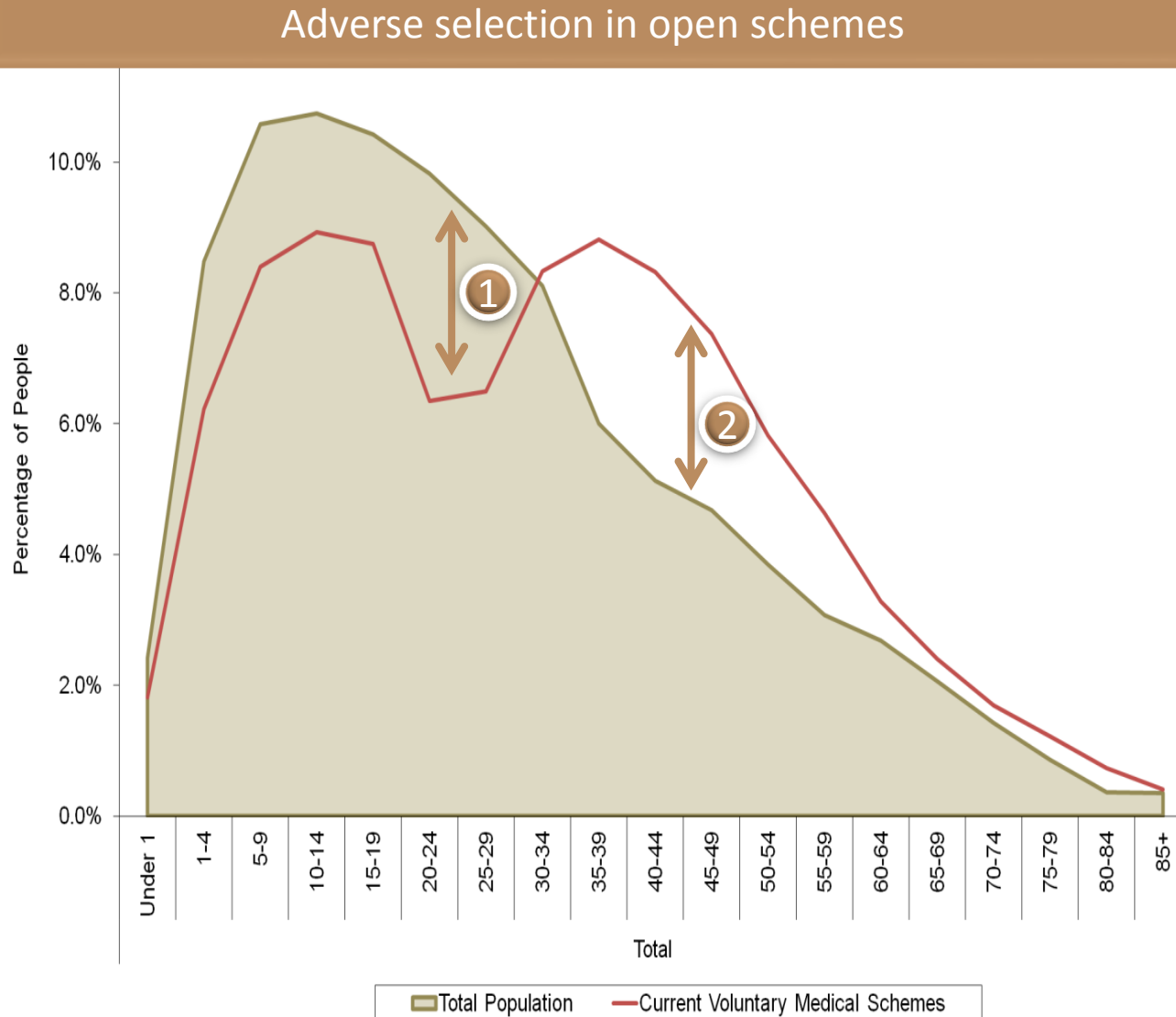
Trans-catheter Aortic Valve Implantation



- 53 cases funded so far
- Average cost of R324,000 per case
- Ave age: 89 years

New technology
30% more expensive than prior alternative

B Demand side: Adverse selection conundrum



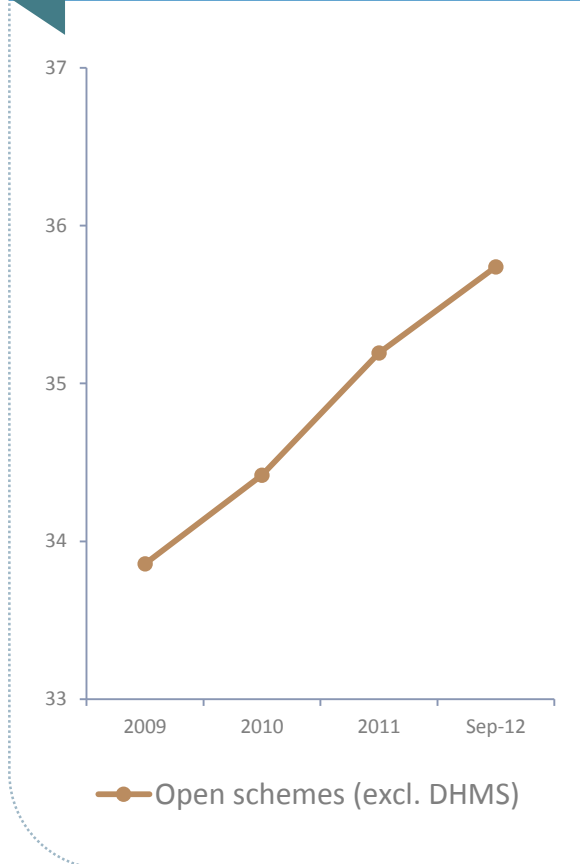
1 Young people opt out of medical schemes

2 Medical schemes have higher proportions of older people

“Impact of adverse selection estimated at R13.5bn – 23% of total contributions for open medical schemes”¹

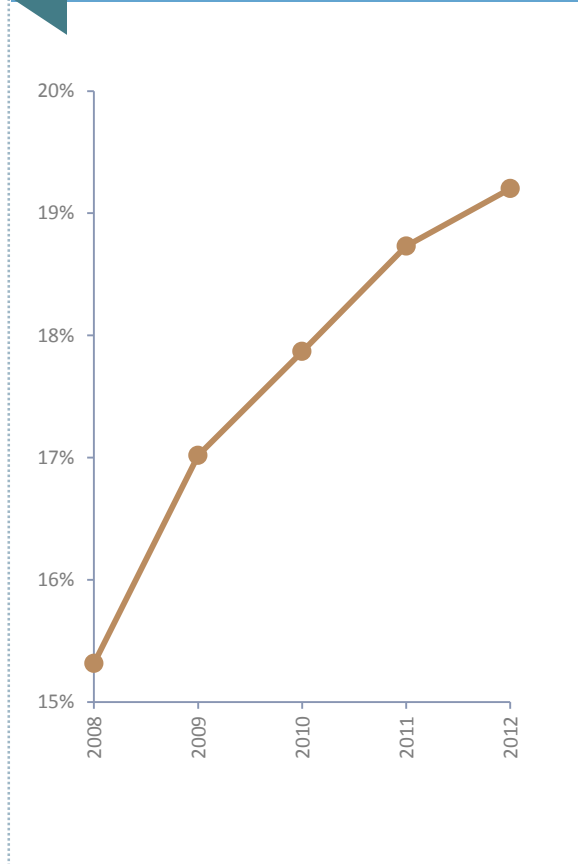
B Demand side: Increasing disease burden drives utilisation

Average age for open scheme beneficiaries



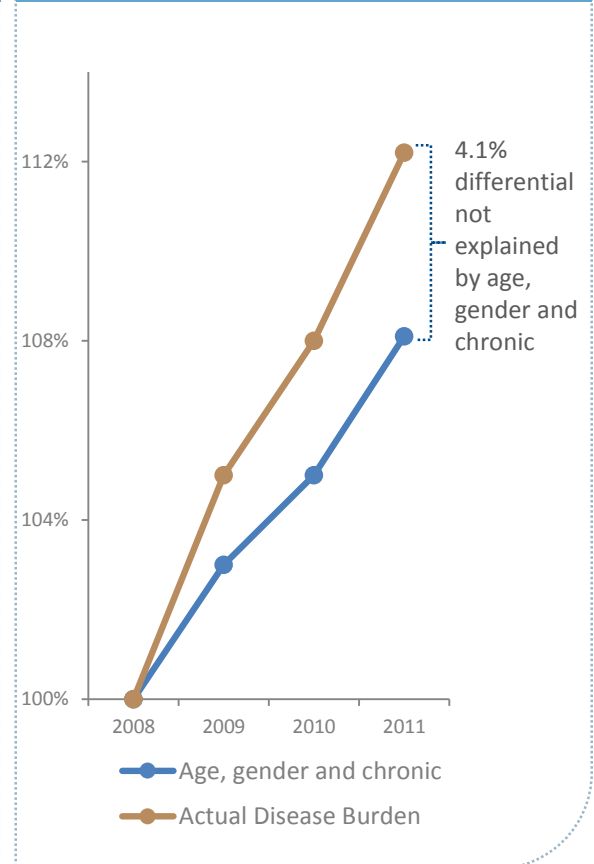
Each year of age adds 1.5 - 3% to claims per year

Proportion of beneficiaries registered for a chronic condition



Chronic prevalence has increased by 60% over the last 4 years
Chronic patients cost 4 x non-chronic

Cumulative increase in disease burden



Cumulative increase of 12% in total disease burden over 4 years

B Demand side: Significant increase in high-cost patients

Number of claimants per 10,000 claiming more than R500,000
(2012 money terms)

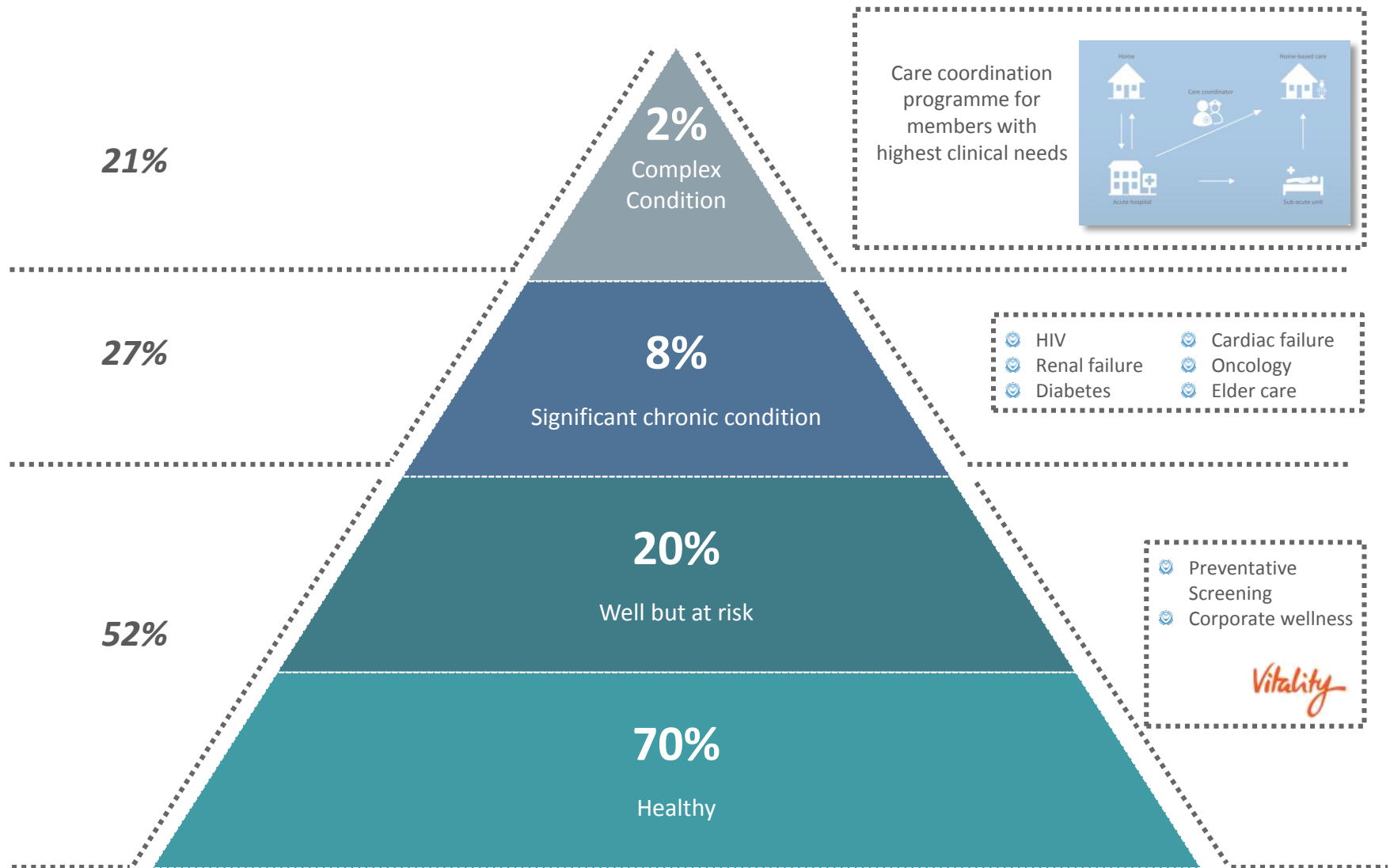


Source: DHMS data, considering all claiming policies, adjusted using CPI

Strategic approach to population risk management

% Spend

Initiatives



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3

modifiable
behaviours



Good nutrition



Physical activity



No smoking

Cancer



Type 2 Diabetes



Respiratory disease



Cardiovascular disease



4

chronic
diseases

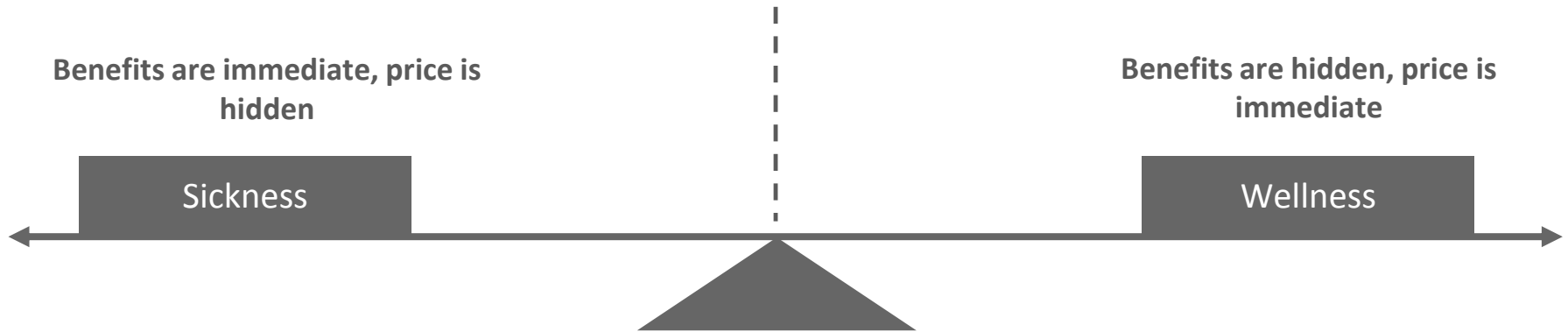
50

% of deaths
worldwide



A case for wellness:

Low-levels of wellness engagement; impact of behavioural factors



Under consumption of
preventive care

Lack of information

True efficacy of different health and wellness approaches is not well understood

Over-optimism

People tend to overestimate their abilities and health status

Hyperbolic discounting

Future rewards of a healthy lifestyle are significantly undervalued relative to cost today

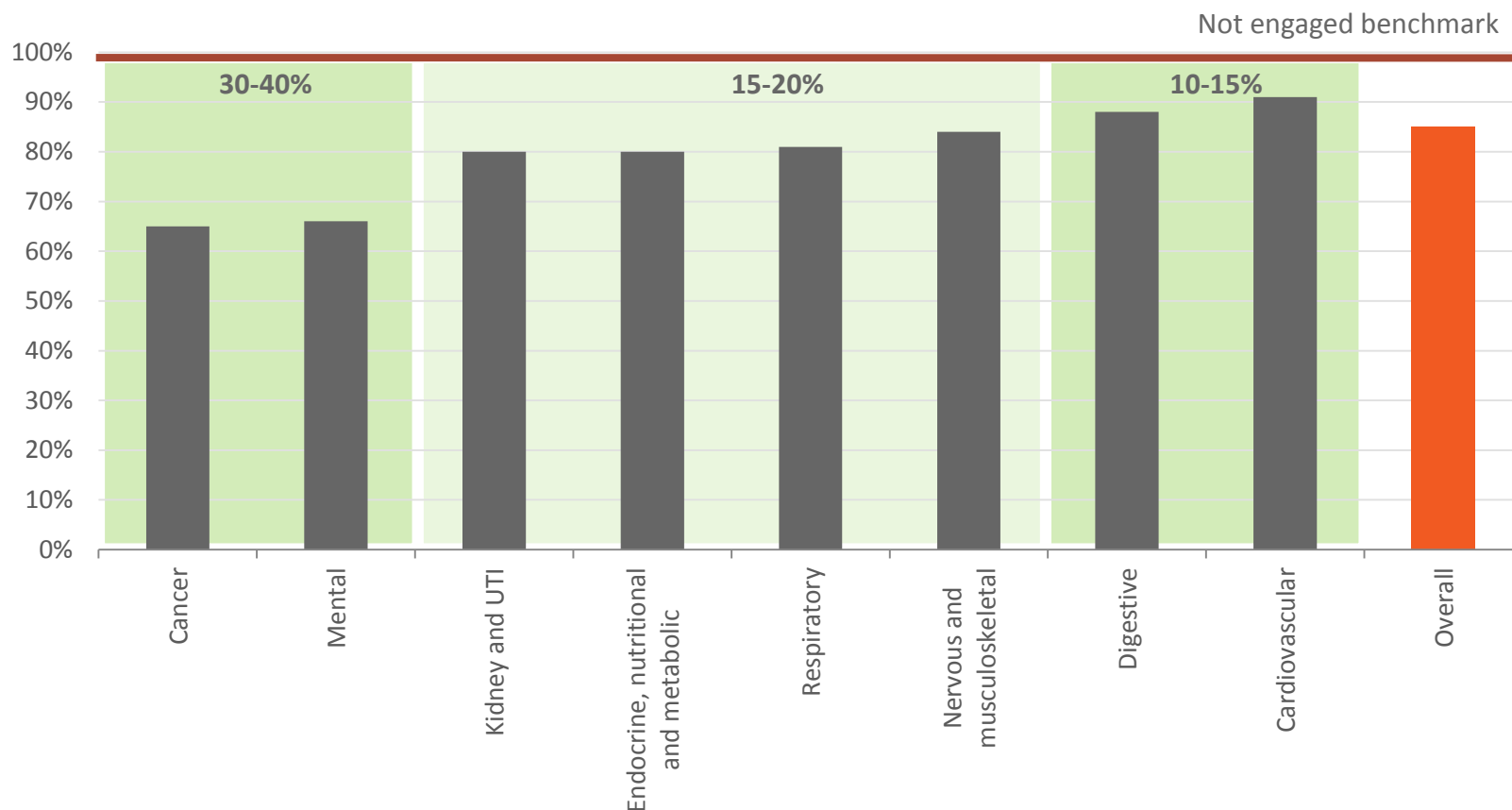
Vitality clinical foundation: Published research

Name of study	Journal	Date published	Hypotheses/ research objective
Fitness-Related Activities and Medical Claims Related to Hospital Admissions — South Africa, 2006	Preventing Chronic Disease	October 2009	Fitness engagement and health and cost outcomes
The Association Between Medical Costs and Participation in the Vitality Health Promotion Program Among 948,974 Members of a South African Health Insurance Company	American Journal of Health Promotion	January/ February 2010	Vitality engagement and cost outcomes
Participation in Fitness-Related Activities of an Incentive-Based Health Promotion Program and Hospital Costs: A Retrospective Longitudinal Study	American Journal of Health Promotion	May/June 2011	Longitudinal assessment of fitness engagement and health and cost outcomes
Eating Better for Less: A National Discount Program for Healthy Food Purchases in South Africa	American Journal of Health Behaviour	In Press	To assess impact of the discount on healthy food on fruit and vegetable intake

Engaged members experienced lower costs per patient compared to other groups

Impact of Vitality engagement on hospital-related costs

Risk-adjusted hospital admission costs: engaged vs. not engaged Vitality members



P < 0.001 for all categories (including overall result) except cancer where P < 0.01

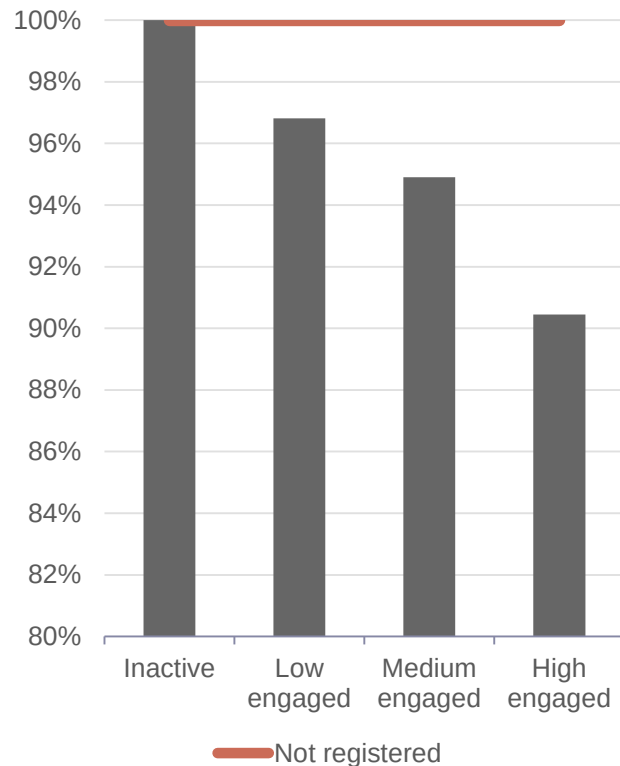
Note: Categorisation based on diagnosis-related groupers using ICD-10, CPT-4 and local procedural codes

Source: "Participation in an Incentive-based Wellness Program and health care costs: Results of the Discovery Vitality Insured Persons Study". Please do not quote without written permission from Discovery or PruHealth.

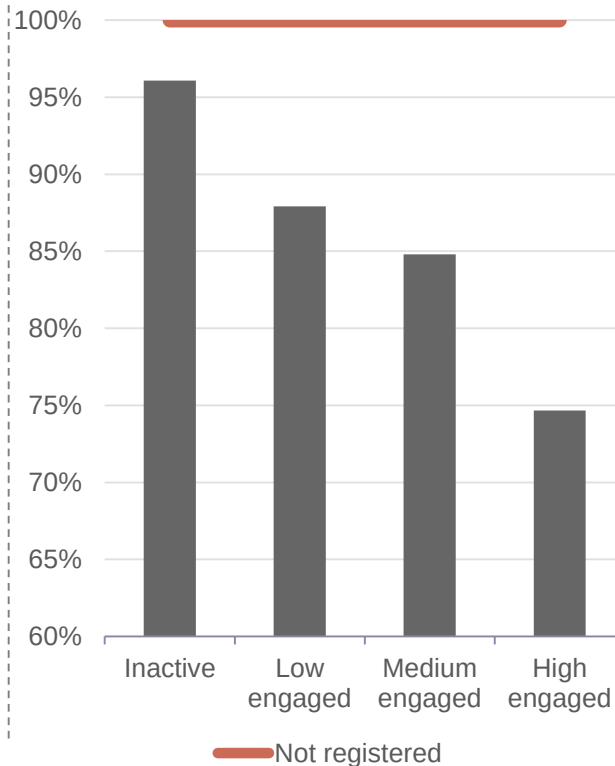
Engaged members experienced lower costs per patient, shorter stays in hospital, and fewer admissions compared to all other groups

Impact of fitness engagement on hospital admissions and costs

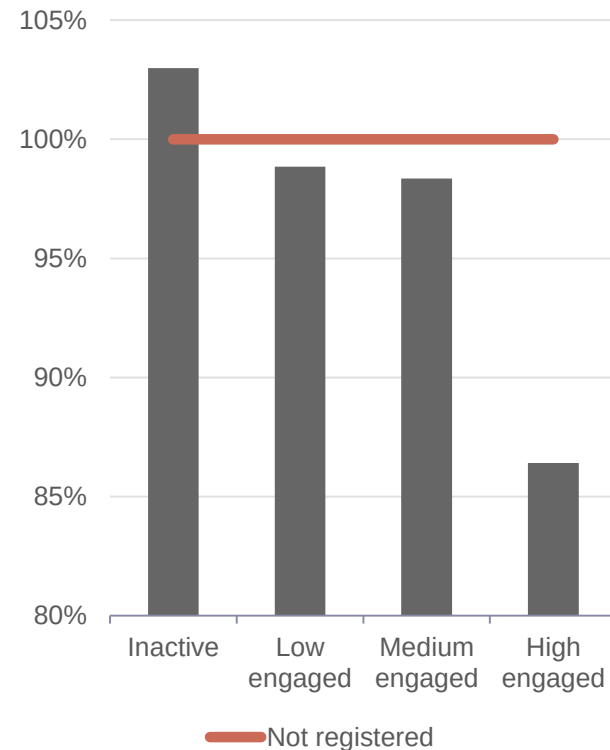
Admit rate (number of admissions)*



Length of stay in hospital (days)

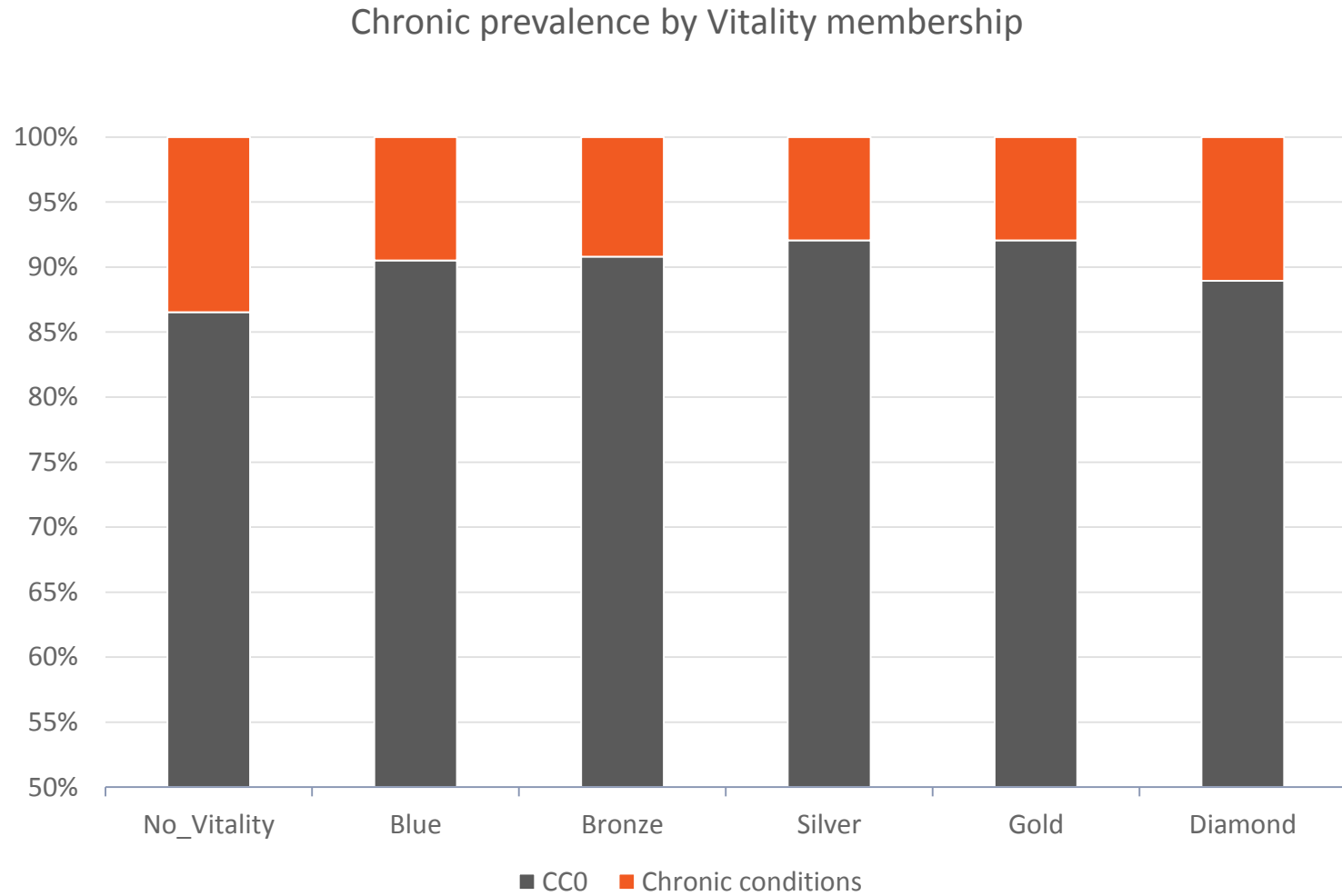


Cost per patient



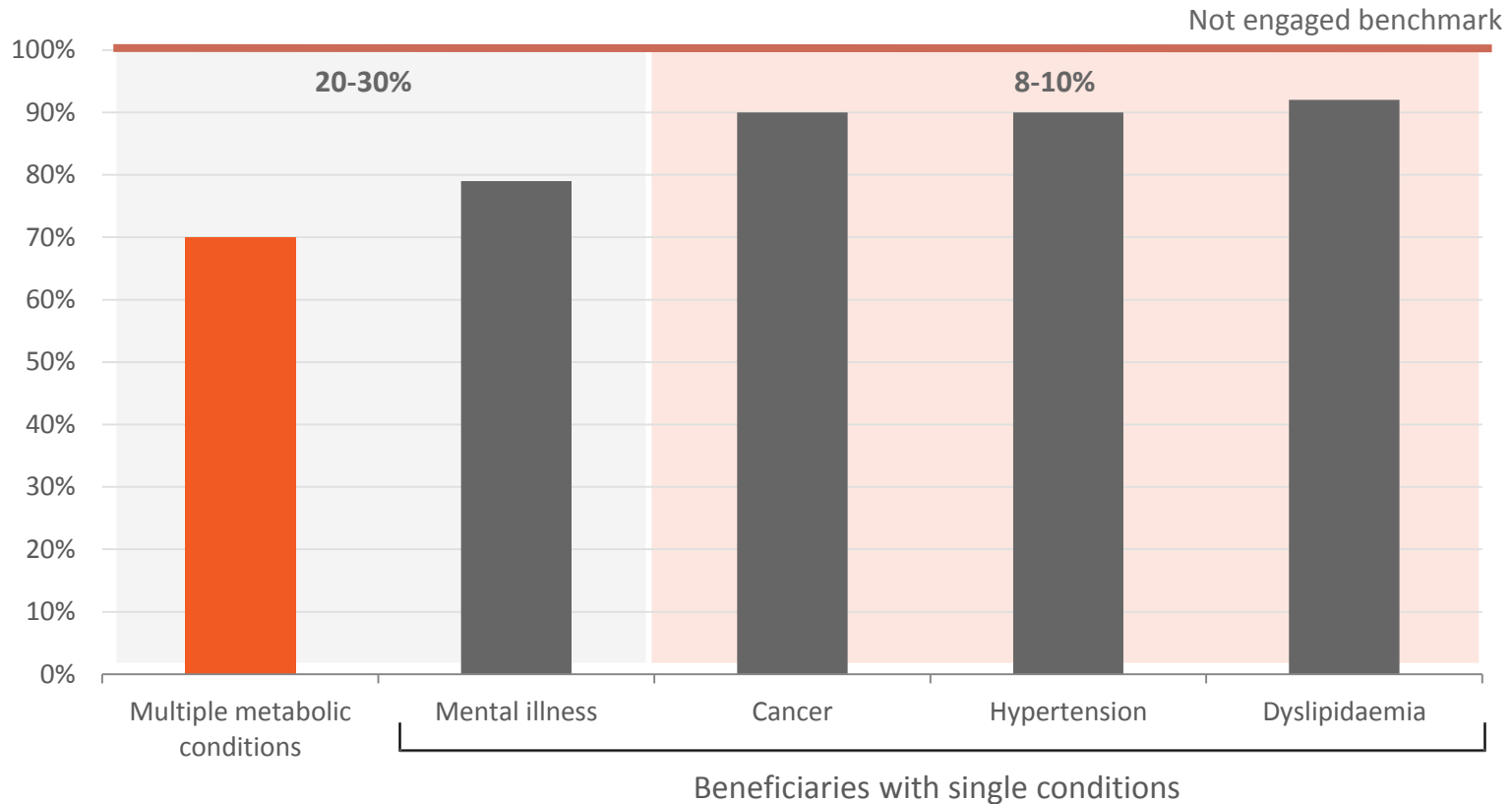
Fit people make better patients on a risk-adjusted basis

Vitality usage is agnostic to health status



Engaged chronic members experienced lower costs per patient compared to other groups

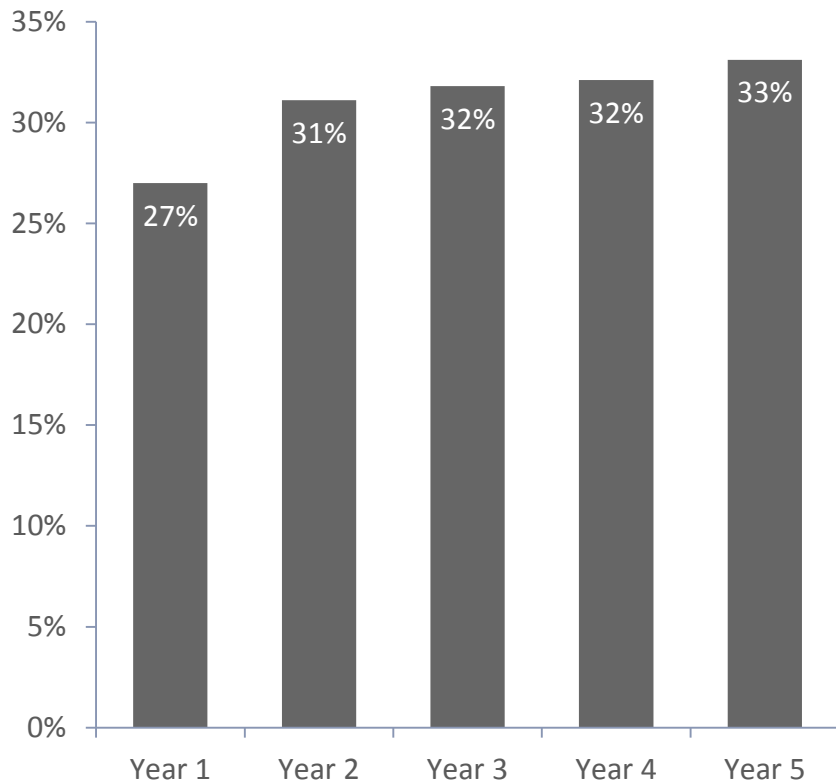
Risk-adjusted hospital cost for chronic members: engaged vs. not engaged Vitality members



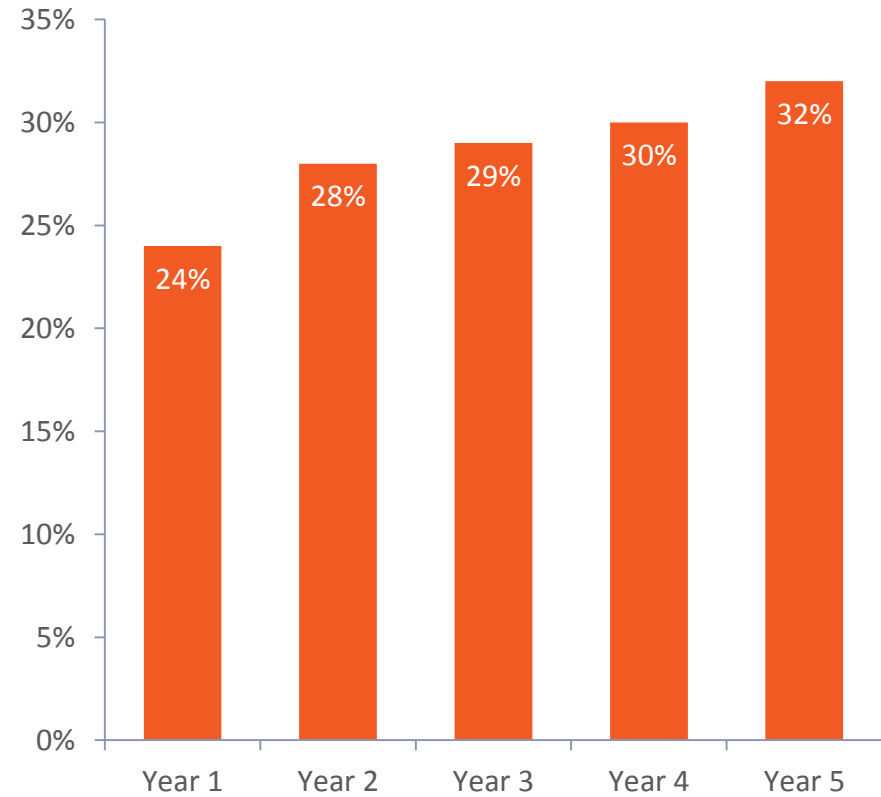
P = 0.001 for multiple metabolic conditions, all single conditions are not statistically significant

Increased gym membership and usage is observed among Vitality members over time

Proportion of members making use of the gym benefit



Proportion of members classified as active



First model to test impact of increasing engagement

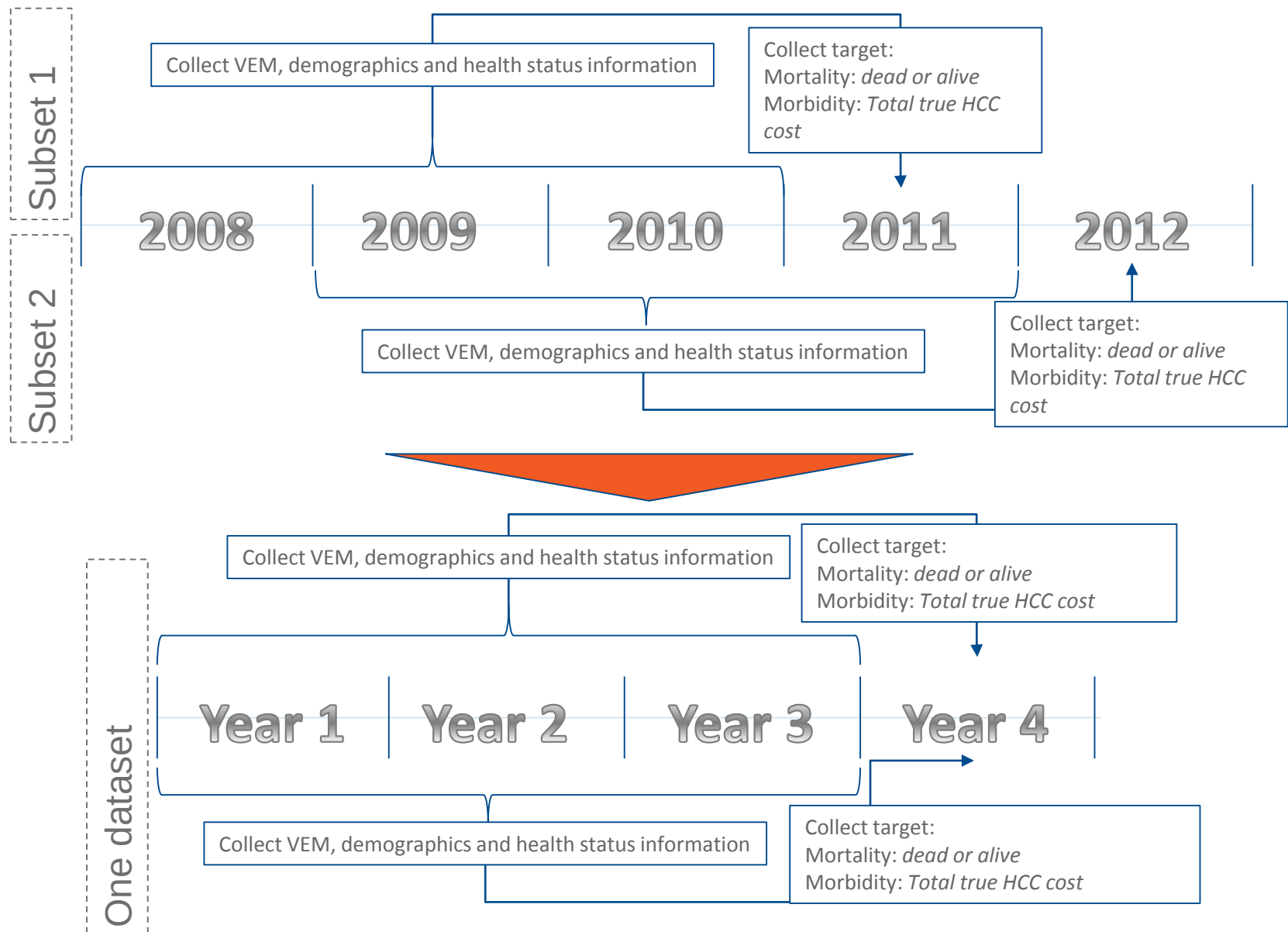
This analysis looks at all Health & Vitality members who subscribed uninterruptedly for a full **three year** period to both products. The **VEM**¹ is tracked over this period and the life is categorised into a longitudinal engagement category. An outcome or target is then explored during the course of the fourth year.

The analysis explores the association between changes in engagement and morbidity measures



¹ Vitality engagement metric is the before limit point summation tracking true engagement in the form of activity related events excluding carry over points, bonus points and outcome points

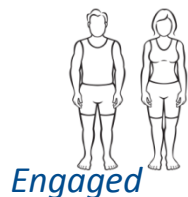
Data structure



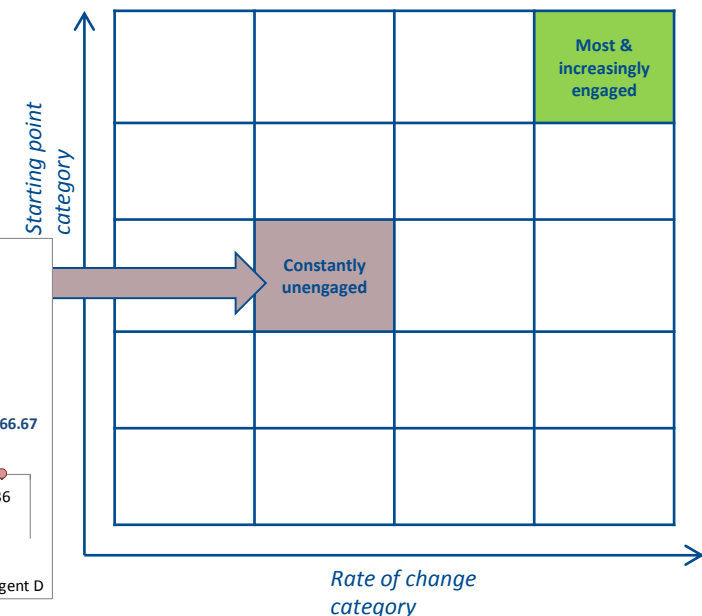
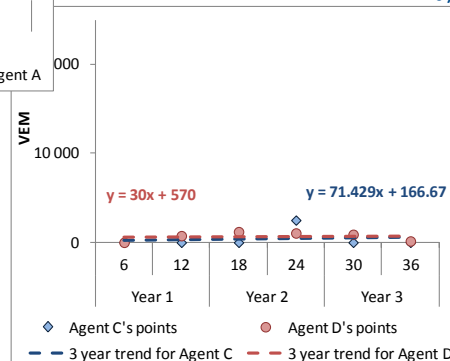
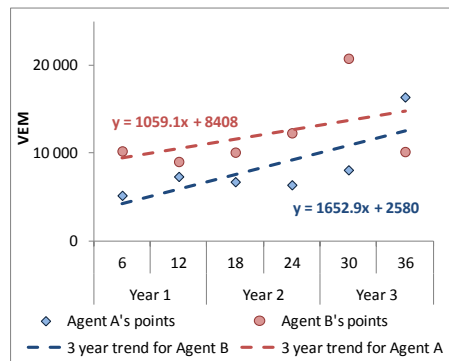
A longitudinal view of engagement

- Compile a three year monthly VEM per beneficiary
- Regress a straight line through the data points
- Use the results parameters – i.e. the intercept parameter β_0 and the slope parameter β_1
- The parameters are then grouped to create a progression matrix of engagement where the top right hand corner represent the most engaged group of people
 - This was done for various iterations but a 6 month cumulative VEM view was chosen to be the champion of a three year engagement view

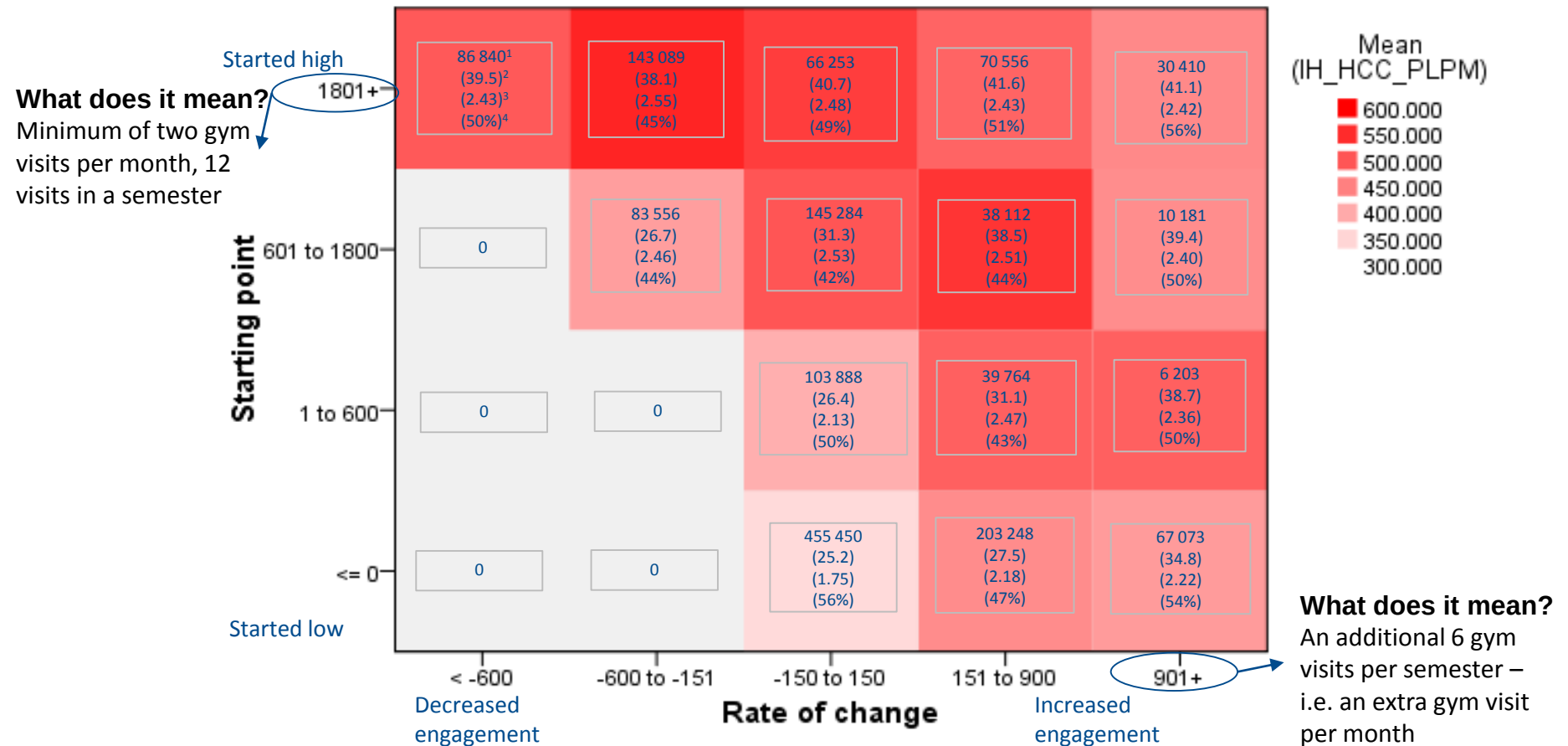
Consider



VS



Heat map of claims with no risk adjustment



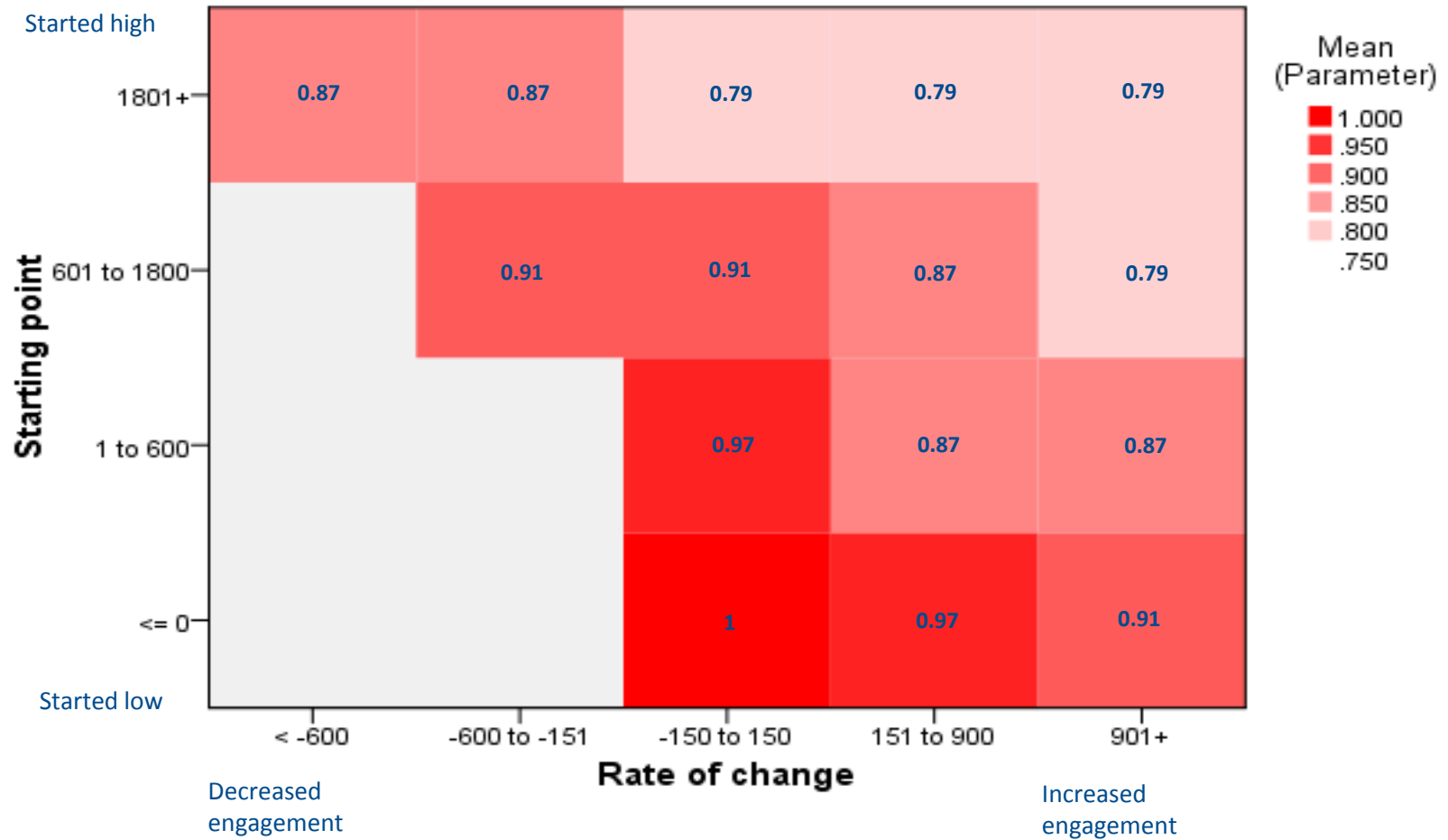
Notes:

- 1 - number of lives in each cell
- 2 - average age of each cell's population
- 3 - average RUB of each cell's population
- 4 - % of males in each cell

Starting level refers to the intercept of the straight line

Rate of change refers to the slope of the line, where the line refers to the regression fitted on each individual's VEM

Heat map of **morbidity** rates with risk adjustment



Notes:

1 - estimated parameter for each cell

Starting level refers to the intercept of the straight line

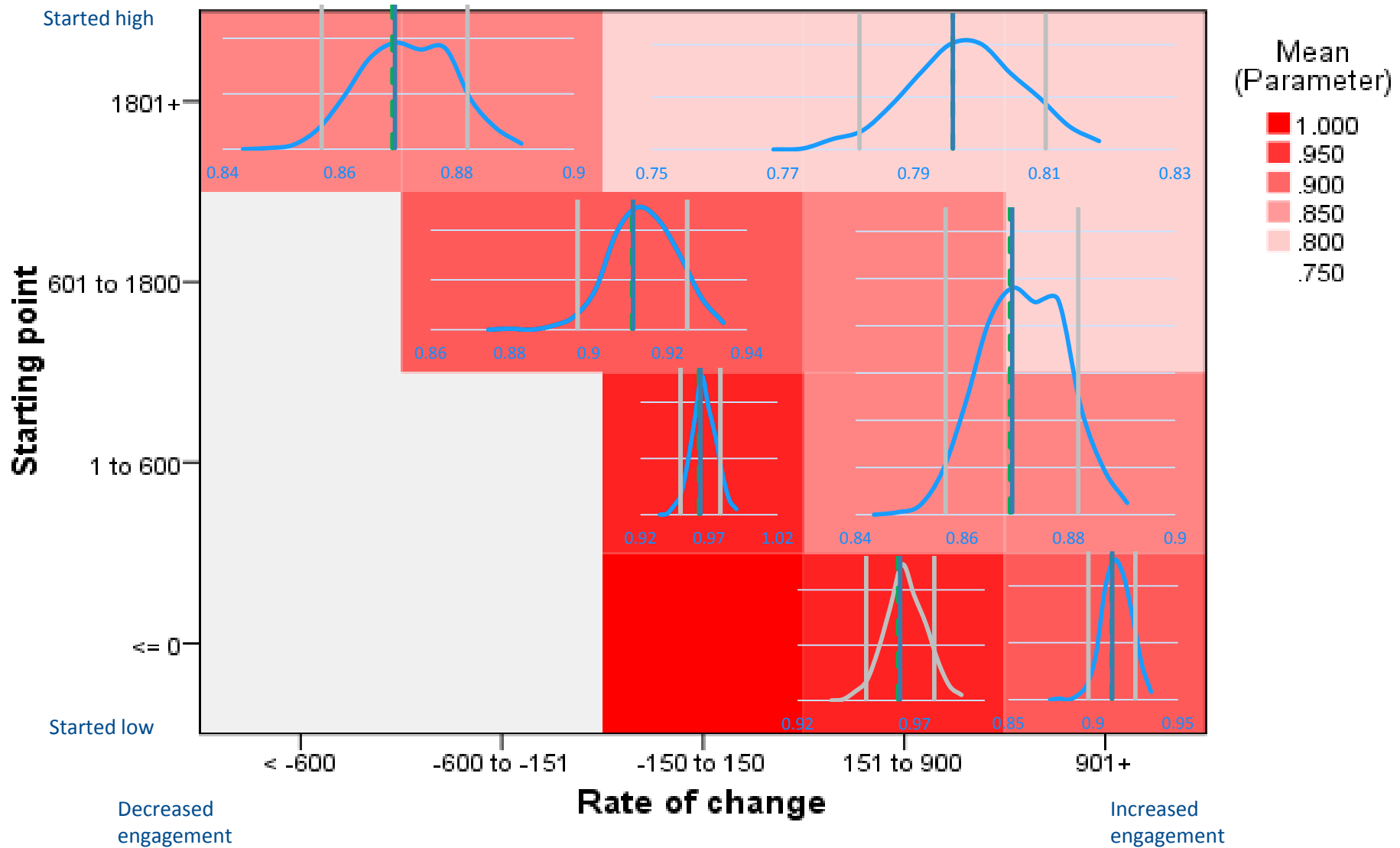
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Bootstrapping: testing the results

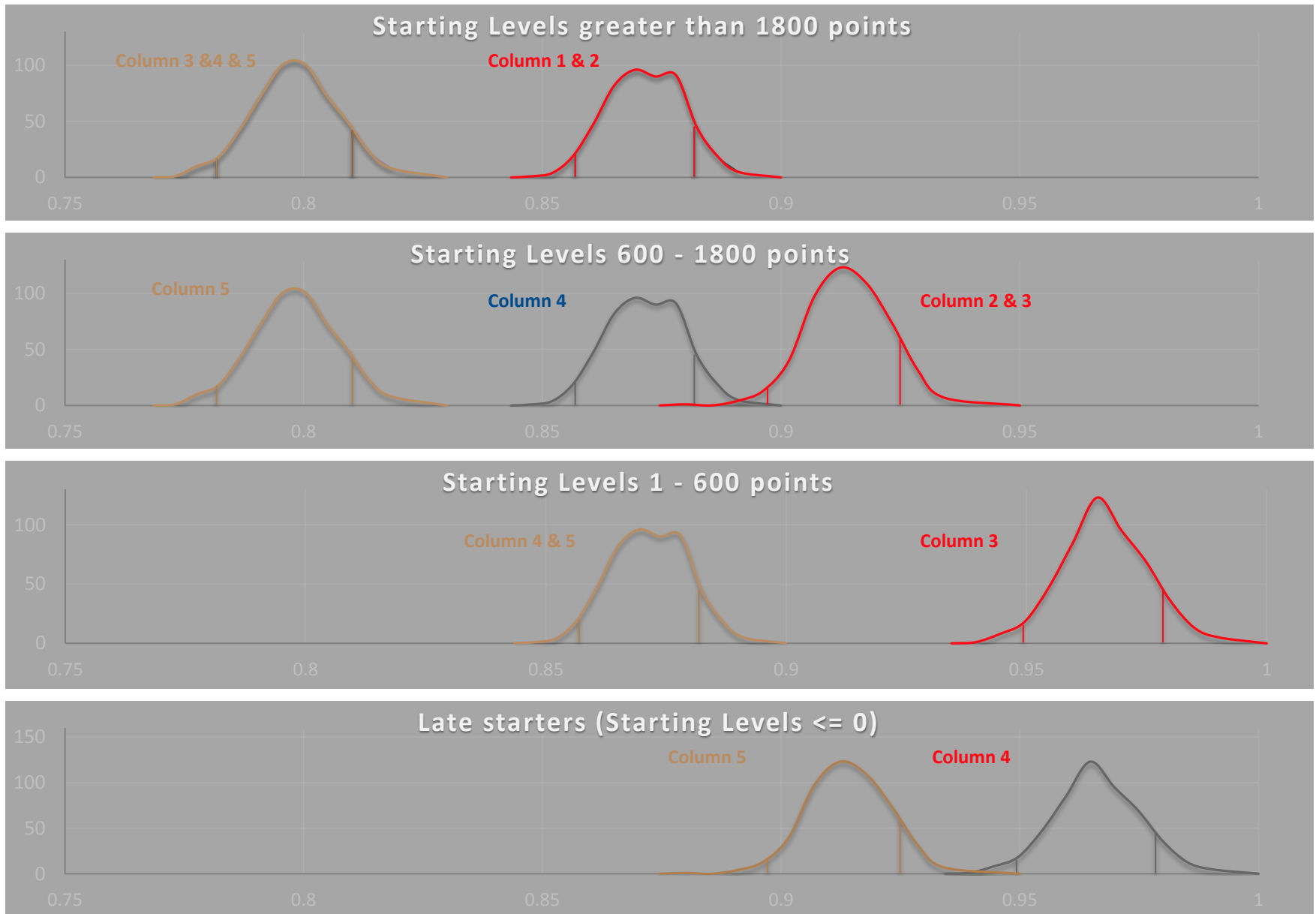
- Bootstrapping is a method of resampling with replacement
- 500 random samples of equal size as the original were drawn
- This means that each new sample could contain the same observations multiple times while others might not be included at all
- The parameters for each of the models are saved and shown in the following slides on histograms and the bottom and top vigintiles are indicated
- The results are promising;
 - Histograms are well separated and averages are basically on top of the original estimates

Resampling

- Below are the results of the estimated parameters for each cell
- Bottom middle cell is blank since it is the base level factor



Comparing the impact of engagement



Testing the results on admissions

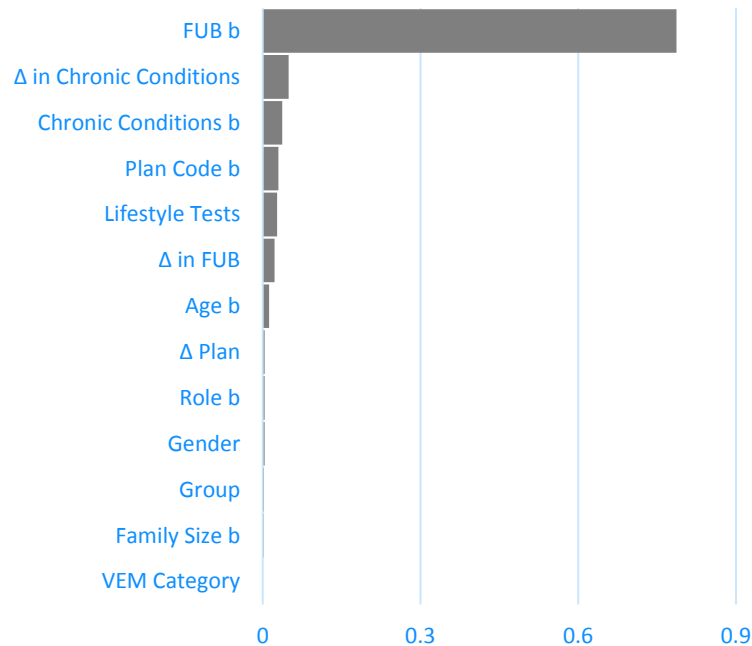
- Built negative binomial log link GLMs for number of admissions over the fourth target year
- Offset by the number of months exposed in the fourth year
- Two models, one with youths and one without
- Youth is defined as people who were at least 18 when the three year engagement period started
- This was done to understand possible bias due to children who cannot make points on Vitality

Admissions for adults

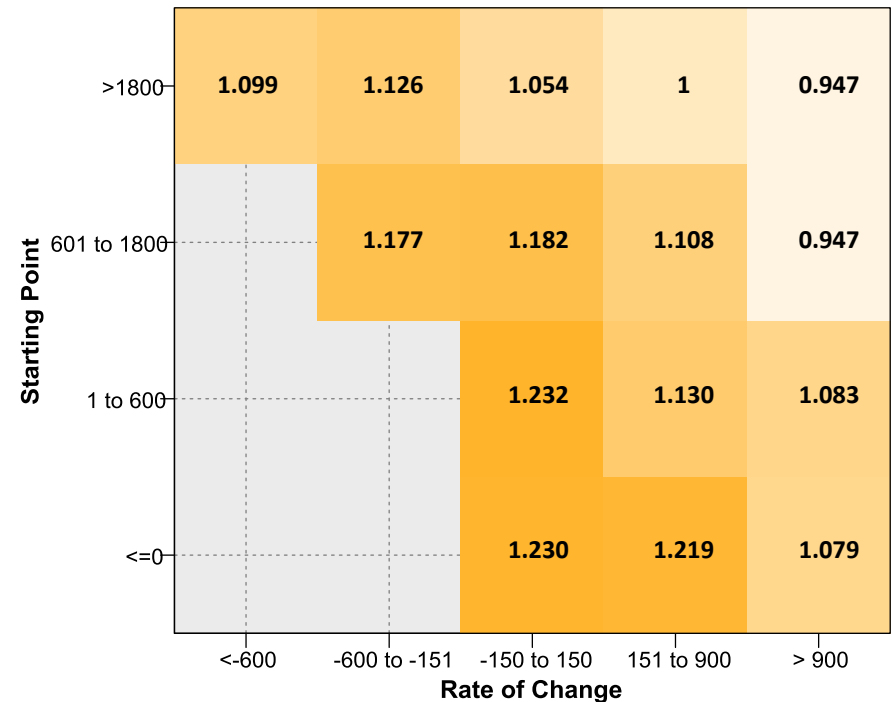
Stats

- Correlation between actual and predicted 27%
- Likelihood ratio chi-square is significant (<0.0004) indicating that the parameters have explanatory power
- All individual variables in the model contribute to the prediction as indicated by the wald chi square type 3 tests.
- The various factor levels are all significantly different from zero as indicated by the individual Wald Chi Square test.

Factor Importance



VEM

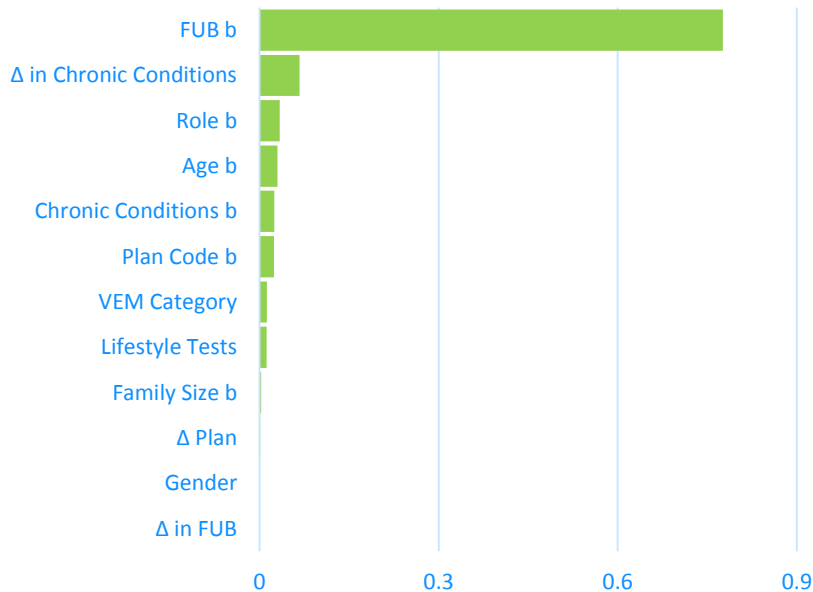


Admissions for all

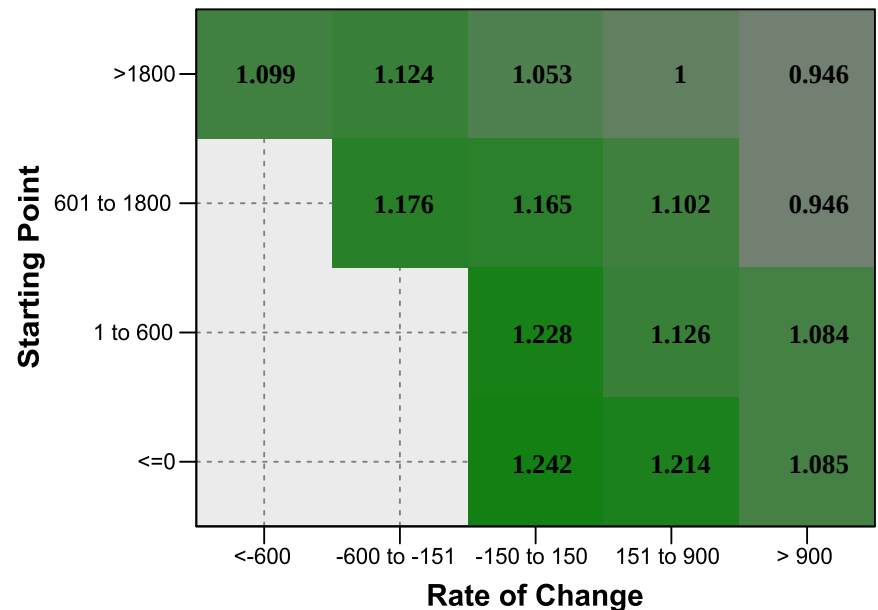
Stats

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Factor Importance



VEM



Impact on Admissions

- ② Two models were built; both with the whole population that satisfied the restriction to have active membership on three year vitality & health
- ② If we only consider the adult portion of the analysis and exclude admissions for maternity the impact ranges between 2,828 and 3,154 admissions per year
 - This is an reduction of **2.8% and 3.2%** in admissions for this group
- ② If we consider all lives in the study and exclude admissions for maternity the impact ranges between 3,235 and 3,641 admissions per year
 - This is an reduction of **2.7% and 3.0%** in admissions for this group

Impact on Admissions

Comparing each rate of change category to the same starting point category, individuals who increased engagement in Vitality over three years showed 2,828 fewer admissions – a reduction of 2.8% for this cohort



Starting point category ↑		15,926 (E&A) Base line	16,640 (E) 15,788 (A) 852 fewer admissions	6,913 (E) 6,212 (A) 701 fewer admissions
		27,938 (E&A) Base line	9,945 (E) 9,323 (A) 622 fewer admissions	2,661 (E) 2,132 (A) 529 fewer admissions
		14,760 (E&A) Base line	8,811 (E) 8,082 (A) 729 fewer admissions	1,563 (E) 1,374 (A) 189 fewer admissions
		52,870 (E&A) Base line	32,910 (E) 32,616 (A) 294 fewer admissions	14,151 (E) 12,414 (A) 1,737 fewer admissions
Rate of change category →				

Notes on methodology ([see glossary of terms for more details](#))

- Model parameters are applied to actual admissions to create the expected deaths had these members engaged as if they were in the middle column

Impact on Admissions

Comparing each rate of change category to the same starting point category, individuals who increased engagement in Vitality over three years showed 3,154 fewer admissions – a reduction of 3.2% for this cohort

Starting point category ↑			15,926 (E&A) Base line	16,629 (E) 15,788 (A) 841 fewer admissions	7,010 (E) 6,212 (A) 798 fewer admissions
			27,938 (E&A) Base line	9,919 (E) 9,323 (A) 596 fewer admissions	2,528 (E) 2,132 (A) 396 fewer admissions
			14,760 (E&A) Base line	8,837 (E) 8,082 (A) 755 fewer admissions	1,563 (E) 1,374 (A) 189 fewer admissions
			52,870 (E&A) Base line	33,451 (E) 32,616 (A) 835 fewer admissions	14,310 (E) 12,414 (A) 1,896 fewer admissions
Rate of change category →					

Notes on methodology ([see glossary of terms for more details](#))

- Modelling parameters are calibrated to the demographic profile in each cell to obtain expected values

Impact on Admissions

Comparing each rate of change category to the same starting point category, individuals who increased engagement in Vitality over three years showed 3,235 fewer admissions – a reduction of 2.7% for this cohort

Starting point category ↑			16,281 (E&A) Base line	16,634 (E) 15,797(A) 837 fewer admissions	6,915 (E) 6,212 (A) 703 fewer admissions
			33,636 (E&A) Base line	10,196 (E) 9,645 (A) 551 fewer admissions	2,133 (E) 2,627 (A) 494 fewer admissions
			19,688 (E&A) Base line	10,003 (E) 9,173 (A) 831 fewer admissions	1,560 (E) 1,377 (A) 183 fewer admissions
			74,699 (E&A) Base line	43,336 (E) 42,359 (A) 977 fewer admissions	14,988 (E) 13,093 (A) 1,895 fewer admissions
			Rate of change category →		

Notes on methodology ([see glossary of terms for more details](#))

- Model parameters are applied to actual deaths to create the expected deaths would they have been in the middle column

Impact on Admissions

Comparing each rate of change category to the same starting point category, individuals who increased engagement in Vitality over three years showed 3,641 fewer admissions – a reduction of 3.0% for this cohort

Starting point category ↑			16,281 (E&A) Base line	16,630 (E) 15,797(A) 833 fewer admissions	7,013 (E) 6,212 (A) 703 fewer admissions
			33,636 (E&A) Base line	10,241 (E) 9,645 (A) 596 fewer admissions	2,515 (E) 2,627 (A) 494 fewer admissions
			19,688 (E&A) Base line	10,057 (E) 9,173 (A) 884 fewer admissions	1,570 (E) 1,377 (A) 183 fewer admissions
			74,699 (E&A) Base line	43,867 (E) 42,359 (A) 977 fewer admissions	15,179 (E) 13,093 (A) 1,895 fewer admissions
			Rate of change category →		

Notes on methodology ([see glossary of terms for more details](#))

- Modelling parameters are calibrated to the demographic profile in each cell to obtain expected values

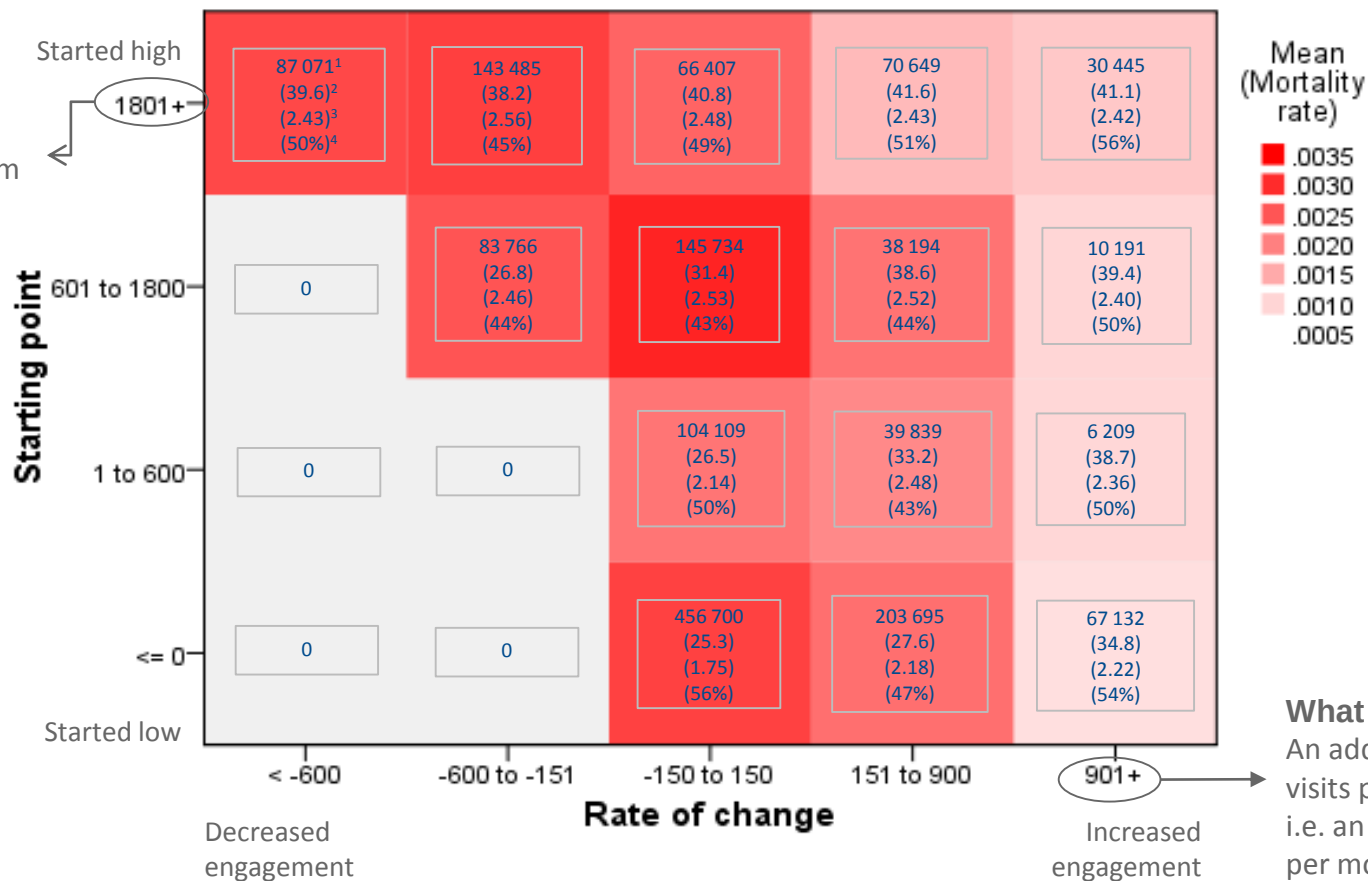
Agenda

1. Health Insurance in South Africa
2. Analysing the impact of increasing engagement on health outcomes
3. As an aside – some mortality analysis too....

Heat map of mortality rates with no risk adjustment

What does it mean?

Minimum of two gym visits per month, 12 visits in a semester



What does it mean?

An additional 6 gym visits per semester – i.e. an extra gym visit per month

Notes:

1 - number of lives in each cell

2 - average age of each cell's population

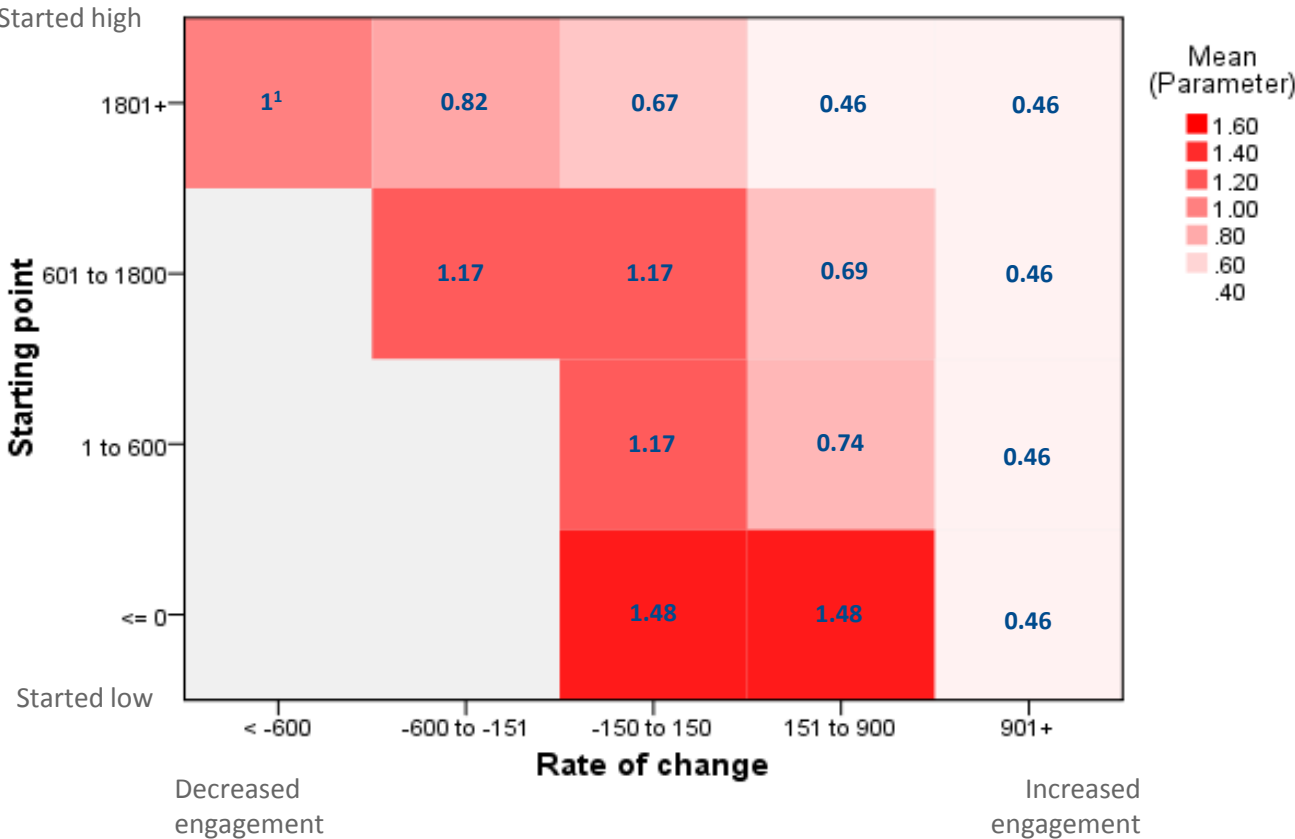
3 - average RUB of each cell's population

4 - % of males in each cell

Starting level refers to the intercept of the straight line

Rate of change refers to the slope of the line, where the line refers to the regression fitted on each individual's VEM

Heat map of relative effect on mortality



Notes:
1 - estimated parameter for each cell
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Concluding remarks

1. Both demand and supply side causes of medical inflation in South Africa
2. Incentivised wellness programme is one of the potential solutions
3. We observe the impact of both selection and behaviour change
4. Increased engagement in wellness activities is associated with significantly lower mortality and morbidity risks
5. The combined financial impact of positive risk selection / retention and health engagement generate significant financial benefits for members of medical schemes
6. But also leads to significant mortality improvements over time....

BOTTOM LINE: YOU SHOULD EXERCISE MORE AND MORE AND MORE!!!

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