ACTUARIAL SOCIETY OF SOUTH AFRICA

Private Sector Hospital Capacity

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Topics

1. Introduction
2. Context
3. Current levels of bed supply
4. Current levels and nature of demand for hospital beds
5. The next tier of medical scheme membership
6. The impact of additional hospital bed demand
7. Knock on effects

1. Introduction

- This presentation is derived from a project undertaken for HASA for the forthcoming 2009 Private Hospital Review
- Data for the analysis was provided by Deloitte based on the data being used for the private hospital NHRPL process
- The analysis concerns the 2007 calendar year, for multidisciplinary acute hospitals open for the whole year
- Data come from Life Healthcare, Medi-Clinic, Netcare and one large independent hospital (87% market share)

2. Context

- There has been some discussion in the industry regarding the two topics of:
  - Expanding medical scheme membership and,
  - Spare hospital capacity

- The direction of these discussions lead to the conclusions that the private hospital sector can absorb the demand of a large surge in medical scheme uptake (4m – 7m)
- The purpose of this analysis is to tackle this question in some more detail

3. Current Private Hospital Bed Supply

- Recall basis: acute private hospitals open for full year 2007, Life Healthcare, Medi-Clinic, Netcare and one Independent hospital

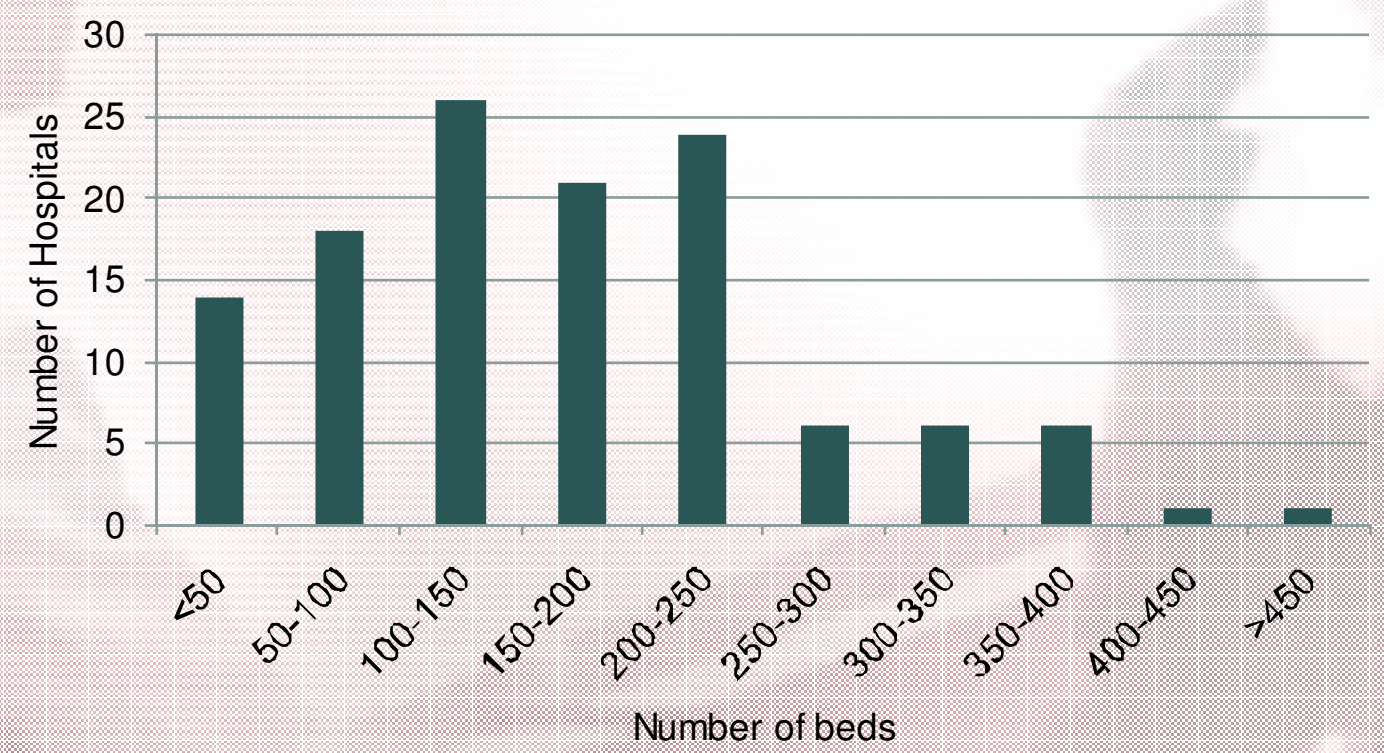
- Number of registered beds:

	Registered Beds
Gauteng	9,412
Kwazulu Natal	2,972
Western Cape	3,252
Other	4,830
Overall	20,466

- Translates to 7.5 million bed days per annum

3. Current Private Hospital Bed Supply

Distribution of hospital sizes:



Average Size: 168 beds

3. Current Private Hospital Bed Supply

- Other considerations of supply:
  - Occupancy levels will differ by ward type, and they are not substitutable
  - Regional variances in supply also cannot be substituted for any but the shortest travelling distances
  - This means bottlenecks in supply in certain areas will co-exist with excess capacity in other areas

4. Current level of Bed Demand for Private Hospital Beds

- Same basis as before
- Definition of Occupancy:

$$\frac{\text{Number of bed days used}}{\text{Number of bed days}}$$

- Overall 2007 occupancy in 2007: **62%**
  - *Note that indications are current occupancy levels are already higher than the 62%, but this data was not finalised in time for this study*

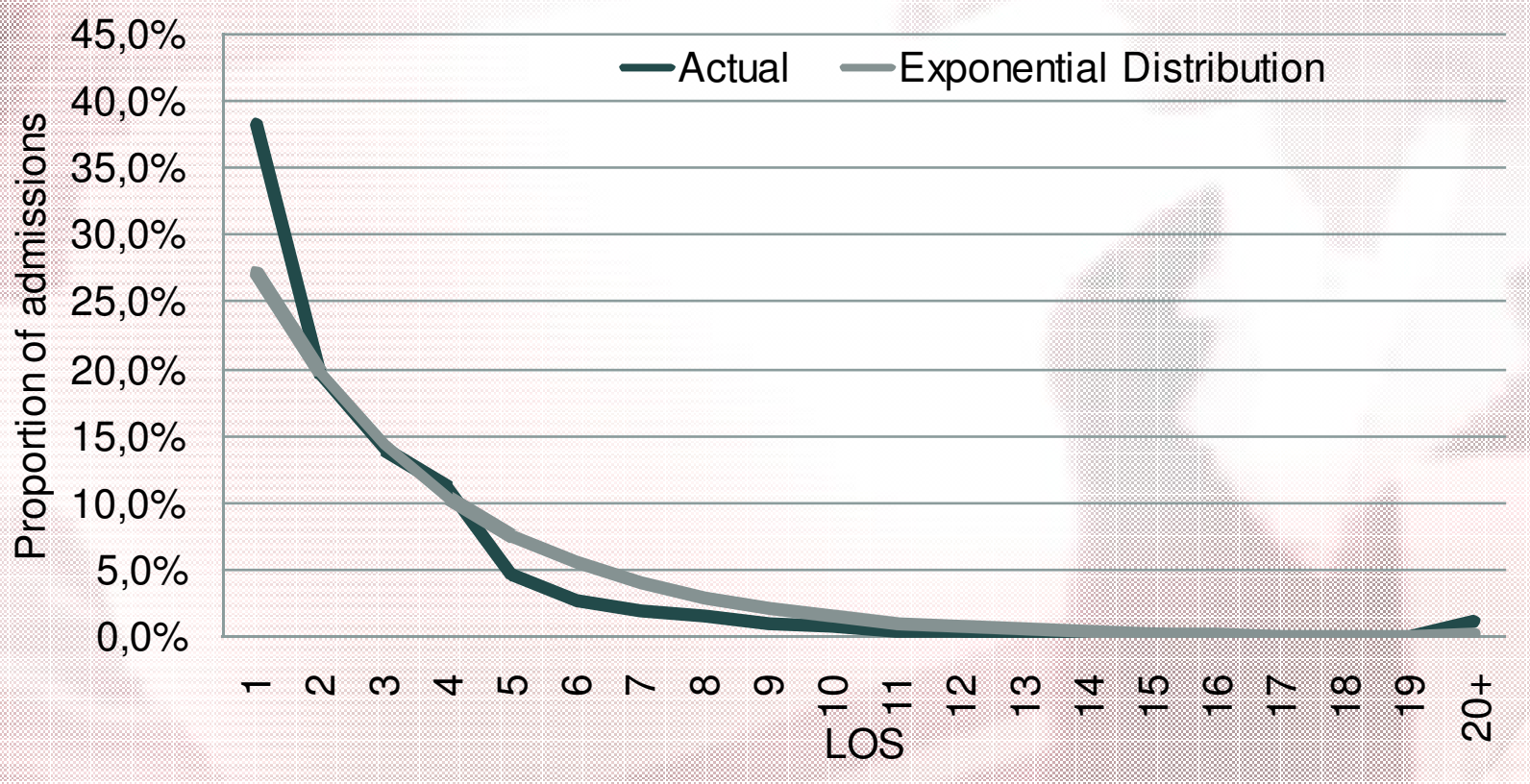
- Occupancy varies significantly by:
  - Day of the week (due mainly to Doctor admission preferences) and,
  - Month of the year (due mainly to holiday seasons)
  - Random variation adds to the volatility

4. Current level of Bed Demand for Private Hospital Beds

The Model used was as follows:

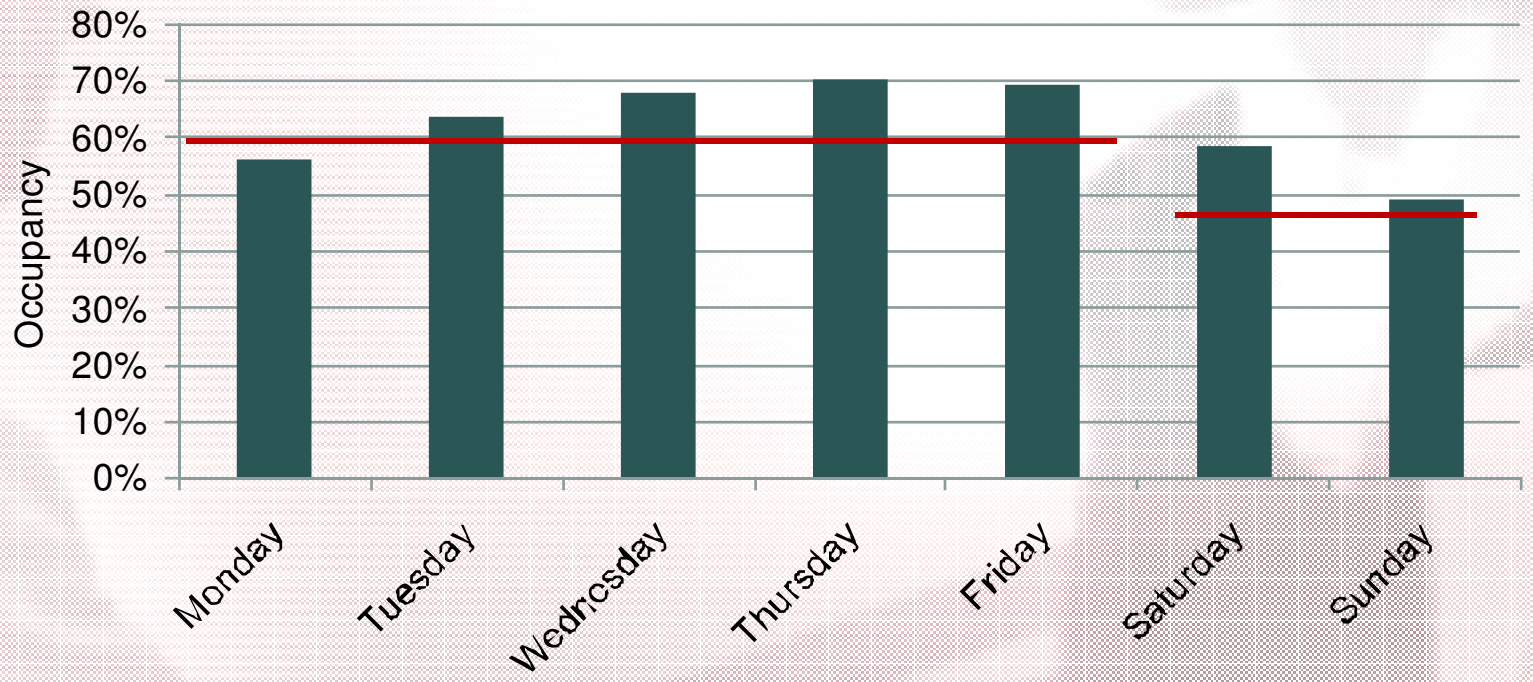
- Data provided was the number of patients admitted each day in each hospital for 2007, and the length of stay of these patients.
- A simulation was built on this data using the exponential distribution for the length of stay for each admission
- Results were scaled to the known overall occupancy level to remove random error
- The model makes no allowances for market reaction to additional demand (for example, the scheduling of surgeries over the weekend)

4. Current level of Bed Demand for Private Hospital Beds



- Not a perfect fit, but concession made to allow easier parameterisation based on data available
- The model underestimates the true variance in occupancy, and some results may differ from some already published statistics due to methodological differences

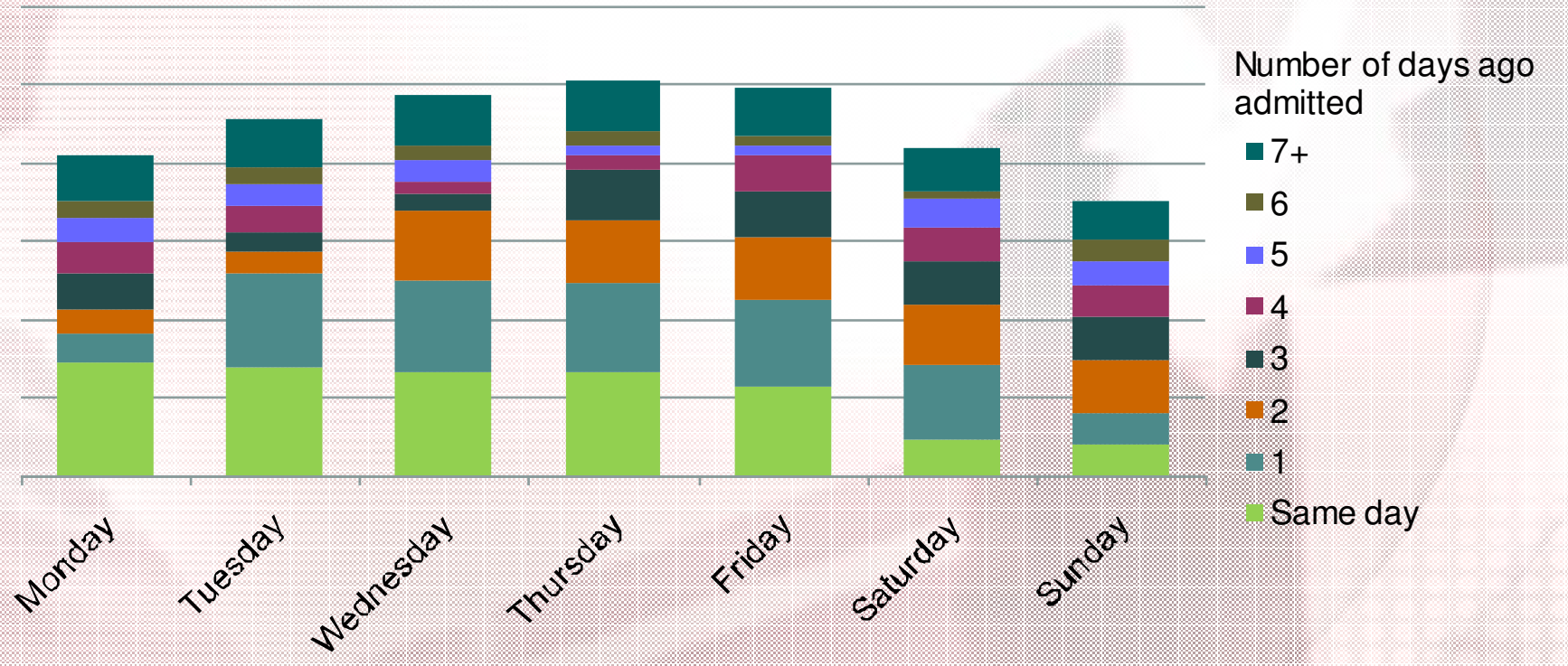
4. Current level of Bed Demand for Private Hospital Beds



Weekend occupancy 18% below weekday occupancy

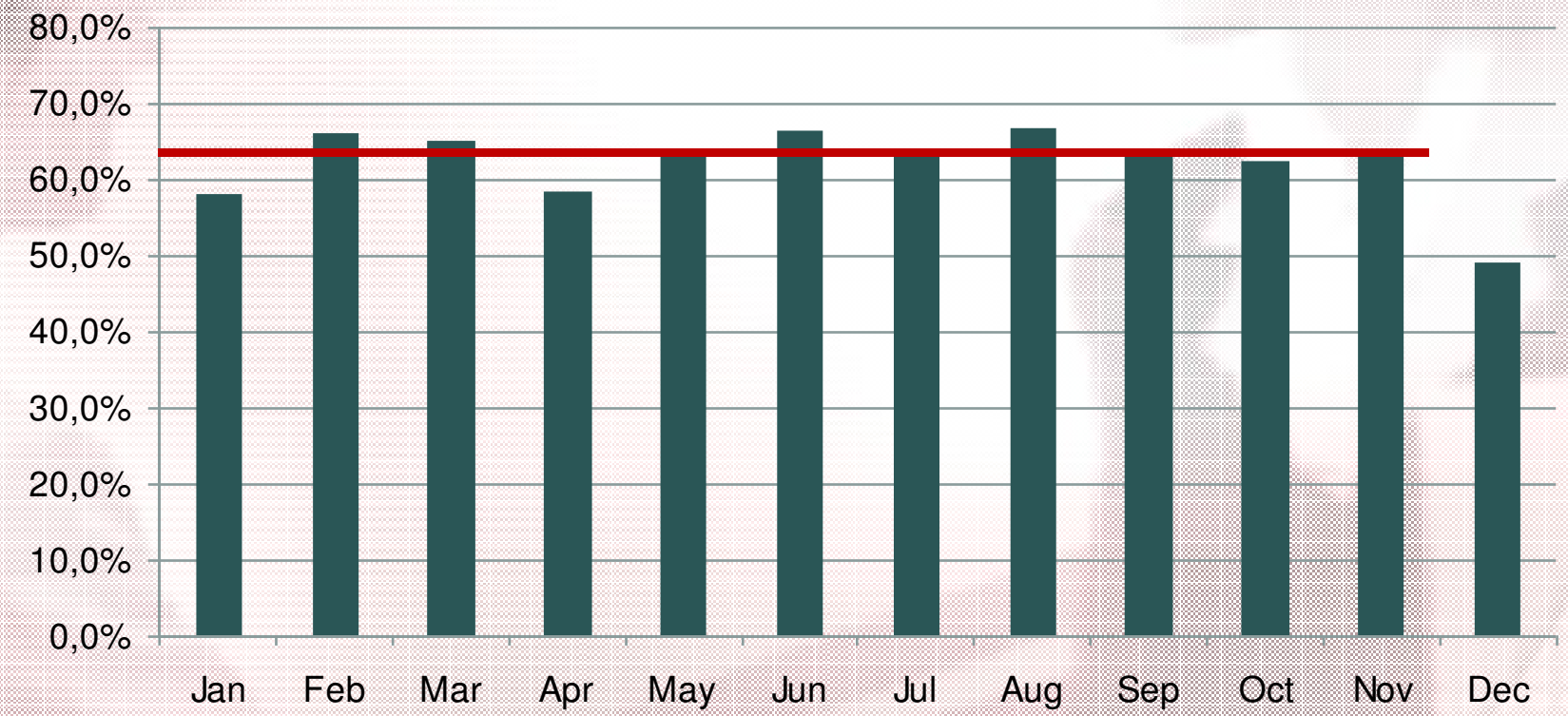
4. Current level of Bed Demand for Private Hospital Beds

The makeup of patients in hospital on a given day



- 14% of patients in a hospital on a given day were admitted more than a week ago

4. Current level of Bed Demand for Private Hospital Beds

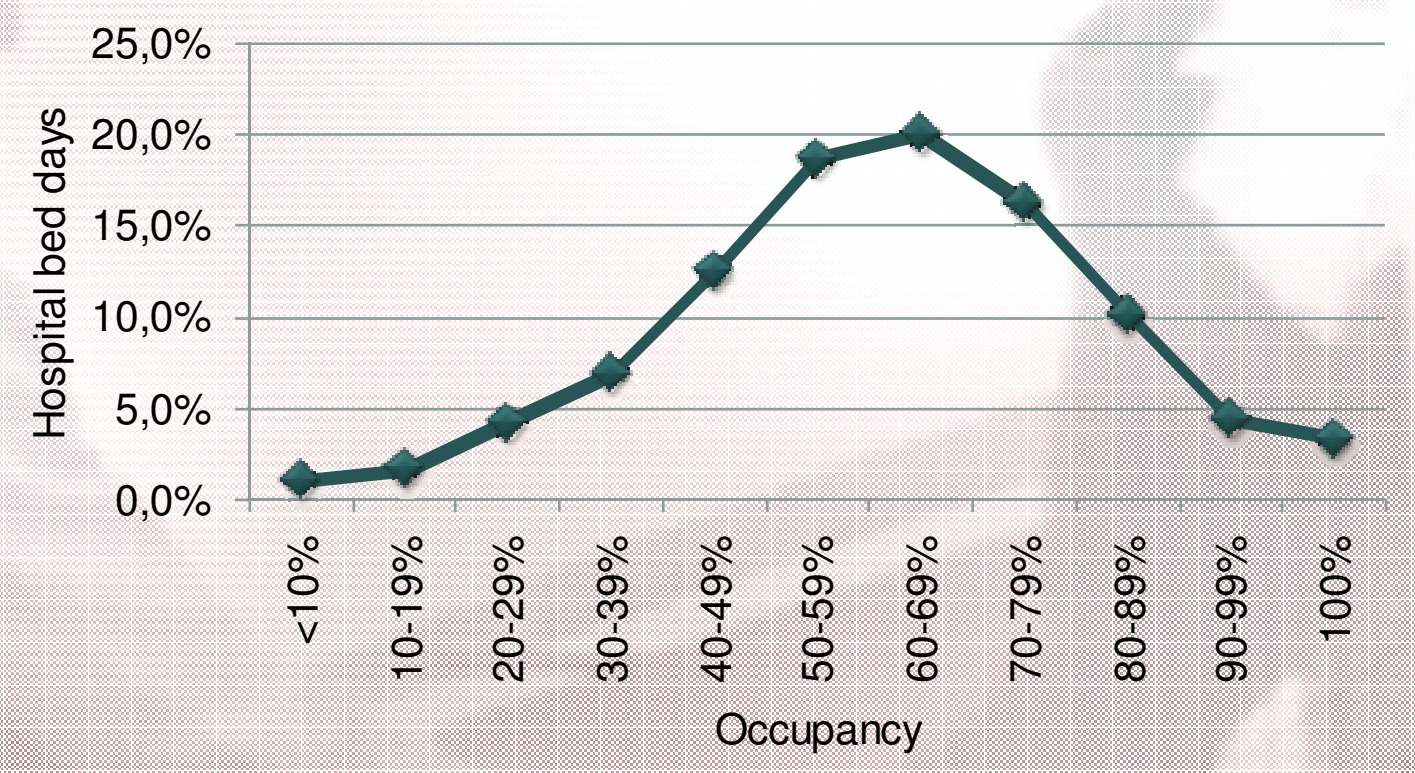


December occupancy 23% lower than other months

4. Current level of Bed Demand for Private Hospital Beds

Distribution of Occupancy

(proportion of *hospital days* at various levels of capacity)

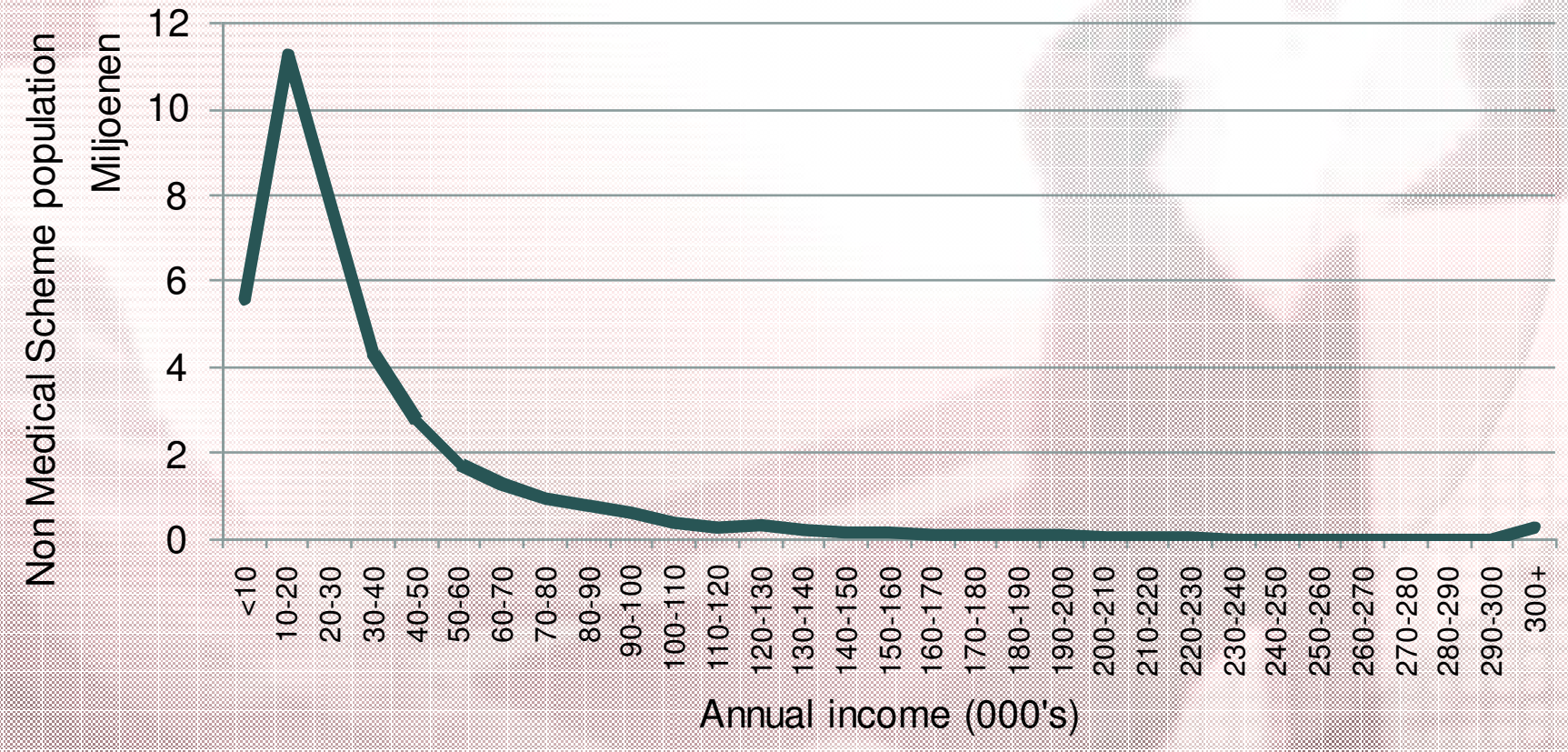


5. The next tier of medical scheme membership

- Source: Statssa Income and Expenditure survey 2006/2007
- Medical scheme membership is heavily dependant on income:

5. The next tier of medical scheme membership

- Massively skewed income distribution make problem difficult to solve



5. The next tier of medical scheme membership

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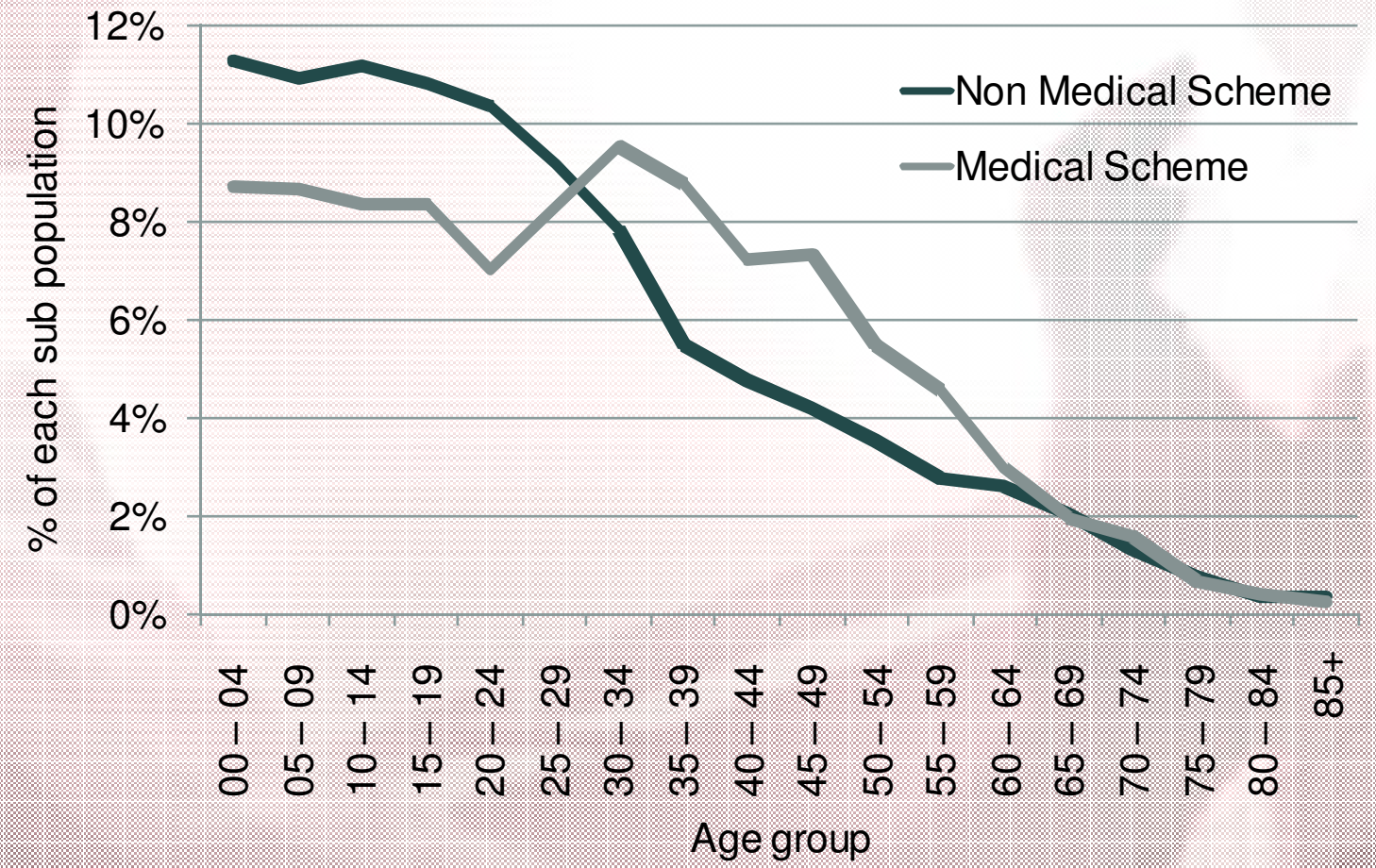
Size of tiers:

Annual Household Income	Population in Households without medical scheme membership
>400,000	164,993
300,000-399,999	143,737
200,000-299,999	388,286
130,000-199,999	1,090,980
80,000-129,999	2,410,952
Total	4,198,947

5. The next tier of medical scheme membership

Demographics:

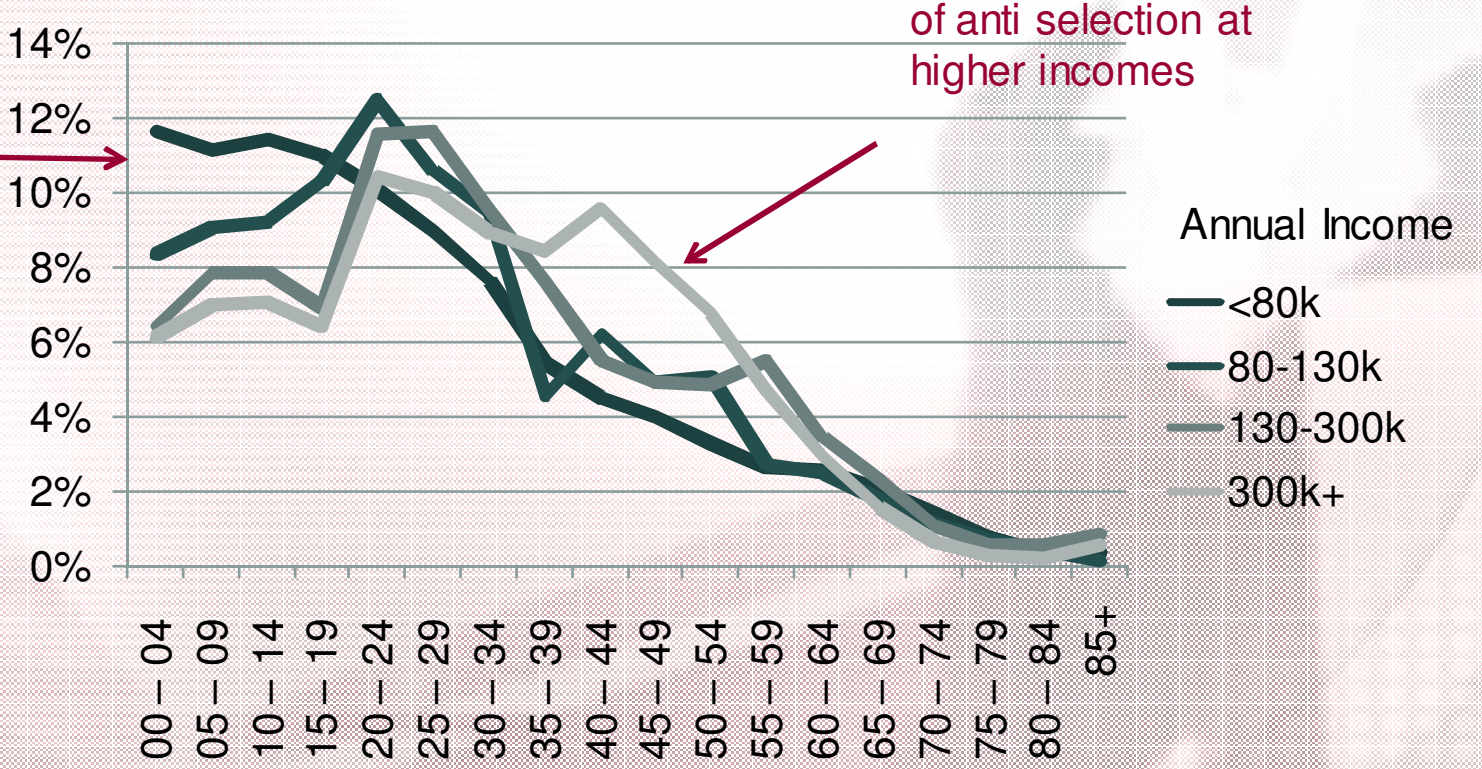


5. The next tier of medical scheme membership

Demographics of Non Medical scheme group:

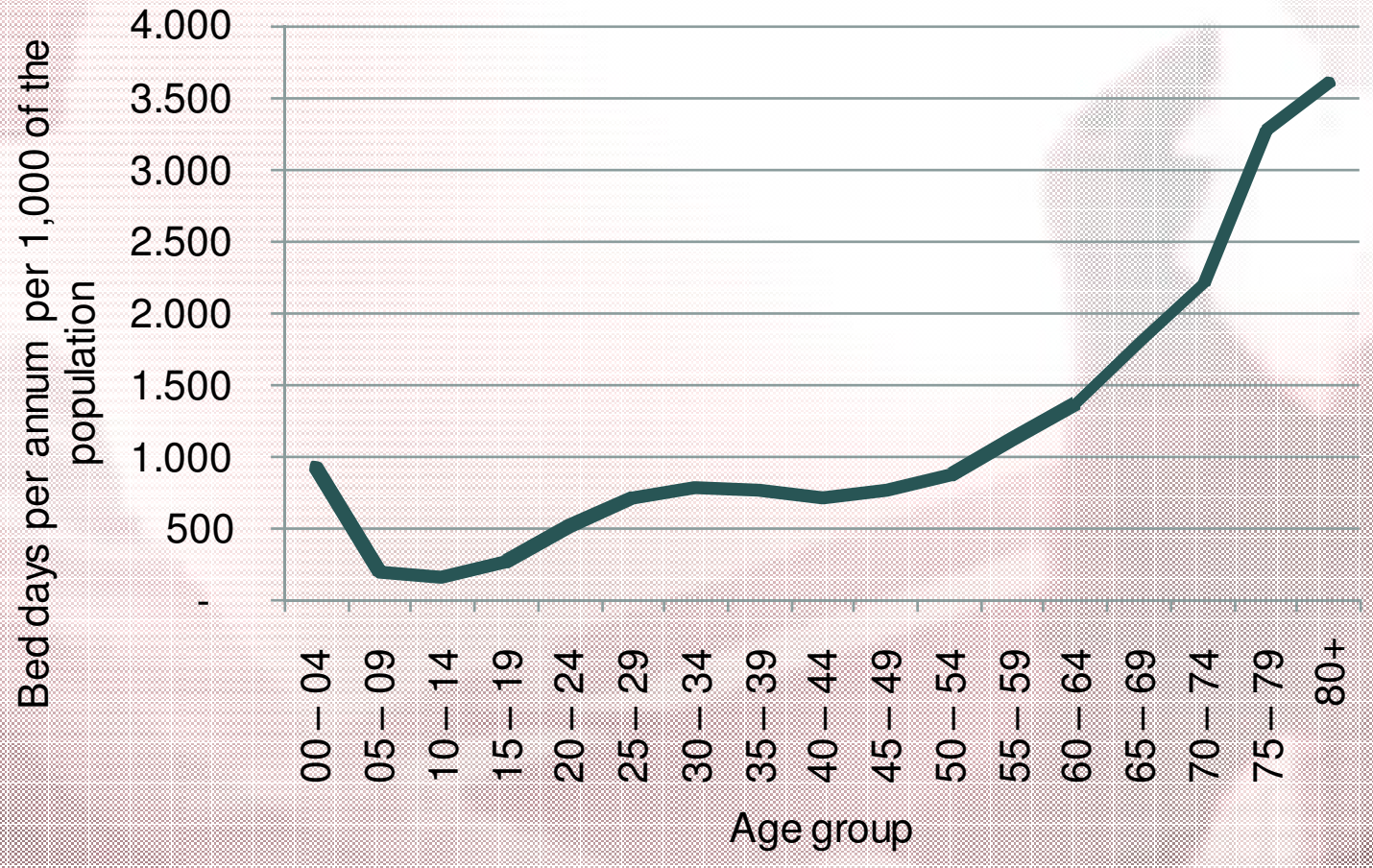
High proportion at young ages dominated by lower end of income distribution

Reinforced evidence of anti selection at higher incomes



5. The next tier of medical scheme membership

Shape of demand for bed days:



5. The next tier of medical scheme membership

- Overall result is **10.5%** lower demand in bed days per 1,000 for non medical scheme population
- Difference is smaller than what might have been expected:
  - Flatter bed days per 1,000 shape between 25-50
  - High bed days per 1,000 shape at very low ages
- Currently low income options have lower hospital utilisation than other options (over and above what the demographics would predict).
- It is not always clear to what extent this is driven by:
  - Selection
  - Benefit design and managed interventions
  - Lower demand at lower income levels
- Various scenarios have been considered to address this point

6. Impact of additional hospital bed demand

Additional bed days used per annum:

	Demand Scenario				
New Covered Lives	No Adjustment	5% Lower	10% Lower	15% Lower	20% Lower
500,000	294,822	280,081	265,340	250,599	235,858
1,000,000	589,644	560,162	530,680	501,198	471,715
1,500,000	884,466	840,243	796,020	751,796	707,573
2,000,000	1,179,288	1,120,324	1,061,360	1,002,395	943,431

Note that these figures correspond to the bed day denominator in the model

6. Impact of additional hospital bed demand

Additional occupancy as a %:

	Demand Scenario				
New Covered Lives	No Adjustment	5% Lower	10% Lower	15% Lower	20% Lower
500,000	3.9%	3.7%	3.6%	3.4%	3.2%
1,000,000	7.9%	7.5%	7.1%	6.7%	6.3%
1,500,000	11.8%	11.2%	10.7%	10.1%	9.5%
2,000,000	15.8%	15.0%	14.2%	13.4%	12.6%

6. Impact of additional hospital bed demand

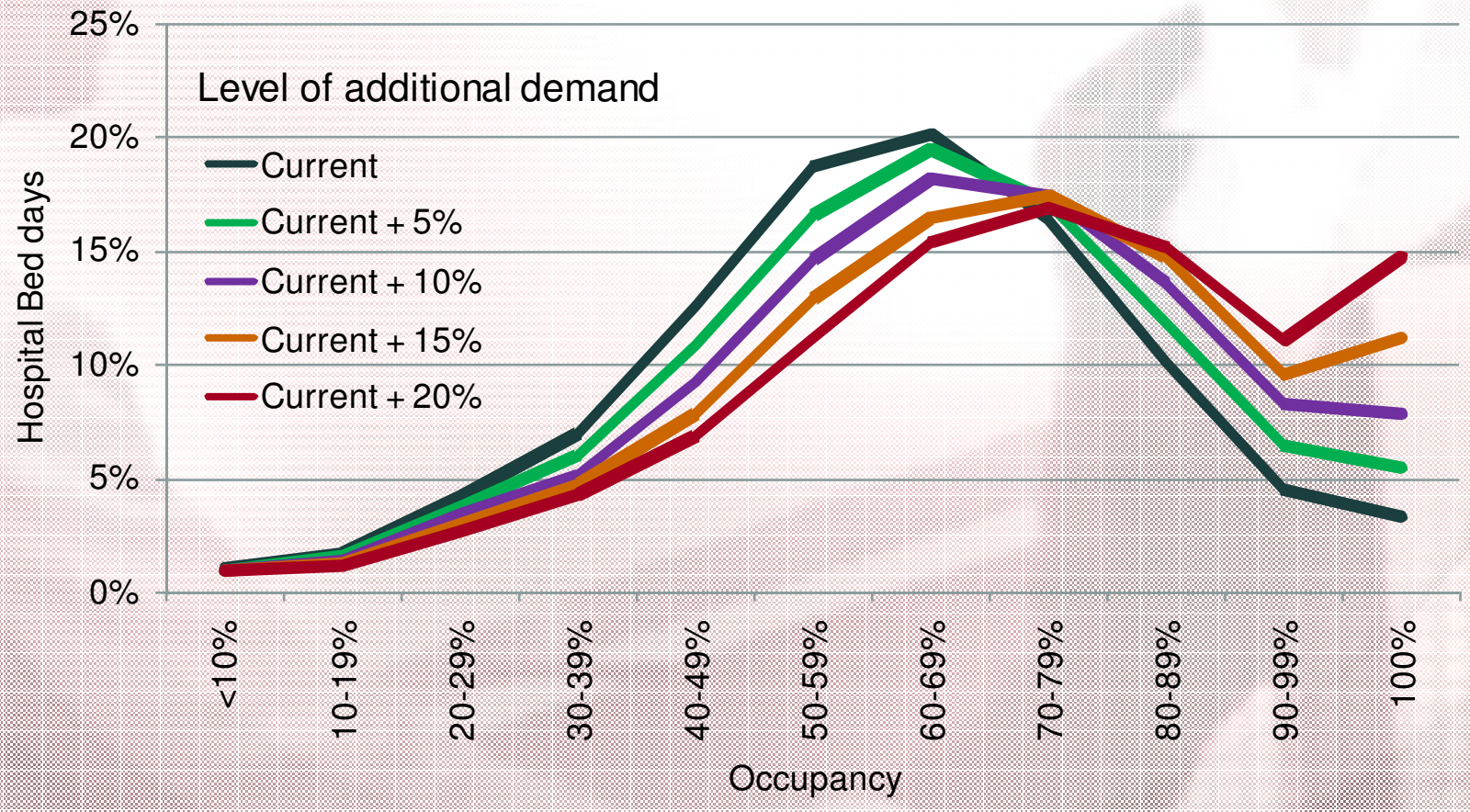
Overall revised estimates of occupancy:

	Demand Scenario				
New Covered Lives	No Adjustment	5% Lower	10% Lower	15% Lower	20% Lower
500,000	66.1%	65.9%	65.7%	65.5%	65.3%
1,000,000	70.1%	69.7%	69.3%	68.9%	68.5%
1,500,000	74.0%	73.4%	72.8%	72.2%	71.6%
2,000,000	77.9%	77.2%	76.4%	75.6%	74.8%

We must also consider the impact on the distribution of occupancy

6. Impact of additional hospital bed demand

Distribution of Occupancy under additional demand scenarios (proportion of *hospital days* at various levels of capacity)



6. Impact of additional hospital bed demand

- Considering the proportion of *hospital days* at various levels of 'fullness':

Occupancy	Current	Current+ 5%	Current+ 10%	Current+ 15%	Current+ 20%
Over 80%	18%	24%	30%	35%	41%
Over 90%	8%	12%	16%	21%	26%
100%	3%	5%	8%	11%	15%

- In other words, if the demand for private hospital beds increased by 15%, the probability of patients arriving at full hospitals would more than triple, from 3% to 11%
- The PHR 2008 cites various issues with occupancy levels over 80% including strain on support services, infection control, strained nursing ratios and higher risks of adverse events (skin lesions etc)

6. Impact of additional hospital bed demand

- In context of the potential market size and characteristics then:
  - 2 million additional lives
  - At 10% lower demand than predicted by the demographics

Would translate into:

- 14% higher overall occupancy (i.e. 76% overall average occupancy)

and roughly

- 35% proportion of hospital days operating at over 80% occupancy
- 21% proportion of hospital days operating at over 90% occupancy
- 11% proportion of hospital days operating at 100%+ occupancy

6. Impact of additional hospital bed demand

- In context of the potential market size and characteristics then:
  - 4 million additional lives
  - At 20% lower demand than predicted by the demographics

Would translate into:

- 25% higher overall occupancy (i.e. 87% overall average occupancy)

and roughly

- 46% proportion of hospital days operating at over 80% occupancy
- 31% proportion of hospital days operating at over 90% occupancy
- 19% proportion of hospital days operating at 100%+ occupancy

7. Knock on Effects

- Additional hospital days require additional health staff – nurses and doctors in particular
- Estimates of nursing shortages in the public sector range from 60-100k.
- Nurse to patient ratios are critical to maintain (or improve) in order to avoid compromising quality of care

Rough estimates:

- Using a fixed relationship between bed days and nurses (full time equivalents) we can estimate the number of additional nurses required to service the additional demand
  - 2m lives @10% lower demand: 3.700 more Nurses required
  - 4m lives @ 20% lower demand: 6.700 more Nurses required

In Conclusion

- Pre emptive considerations of spare private hospital capacity may have overestimated the size of the market that could be absorbed without an expansion of infrastructure

- Alternatively, innovative solutions will need to be found to:
  - keep demand in check for new entrants into the market (once the expected initial inertia is overcome)
  - and smooth out volatility in hospital bed usage bearing in mind doctor and nursing shortages

- Without solutions for these issues, the likely outcome will be hospital waiting lists in the private sector

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