

## The Population for Universal Coverage

*The purpose of this series of policy briefs on National Health Insurance (NHI) and the related IMSA web-site is to put in the public domain material and evidence that will progress the technical work of developing a National Health Insurance system in South Africa. This includes tools for costing NHI and evidence on where savings could be achieved in moving to a future mandatory system with universal coverage.*

In essence the costing for a medical scheme or a national health service requires evidence on the population to be covered and the cost of delivering healthcare to that population. This policy brief deals with the population that needs to be covered and how it is expected to evolve over time. The provinces are shown to have major differences which would impact the amount needed to be transferred to each province. Evidence is presented to show why all costing work must be done by at least age and gender.

### 1. Estimates of the Population

The establishment of an accurate population for South Africa and the nine provinces is not a simple matter and official figures are revised at times. Possible sources of population data and some brief features of each are discussed below and illustrated in Figure 1.

- **Census 2001 from StatsSA:** this was the latest full census and provides a single point estimate for 2001. A 10% sample is available for more detailed breakdowns. However this data is now eight years old and there are significant deficiencies in the census which need to be taken into account <sup>1</sup>. It is the most detailed provincial, district and municipal data but is not useful for medical scheme membership and income data is poor. The next Census is due in 2011 and future censuses are likely to be at ten year gaps, not five years as in the 1990s.
- **Community Survey 2007 (CS2007) from StatsSA:** this “mini-census” was much smaller than Census 2001 with a sample of 2.5% of households but is the largest survey conducted by StatsSA. Information was collected from some 247,000 households on population dynamics, disability and social grants, school attendance and educational attainment, labour force participation and income <sup>2</sup>. Some provinces had major changes in total population compared to Census 2001, for example the Western Cape showed a 16.7% increase. Provincial, district and municipal data are available but detailed use of figures at district level should be treated with great caution.
- **StatsSA Mid-Year Population Estimates:** these are produced annually and give estimates of the national and provincial populations as at 30 June each year. The latest estimate <sup>3</sup> contained a major revision of all historic figures from 2001 to 2008, using fertility, mortality and migration data derived from CS2007. Three “variants” of the historic total population have now been produced:
  - **Low variant:** 47.8 million (linked to Census 2001);
  - **Medium variant:** 48.7 million. “Best estimate” (lower out-migration for Whites, higher in-migration African and Asian, revised mortality and fertility Coloured); and
  - **High variant :** 49.0 million (CS2007 not adjusted by Census 2001 or 1996).

The mid-year estimates have provincial and ethnicity breakdowns by age and gender. There was a substantial adjustment to provincial estimates, informed by the findings of CS2007. These figures have the advantage of being the official population estimates in the country but projections beyond 2008 have not been released as yet.

- Actuarial Society of SA model (ASSA2003):** the Actuarial Society of South Africa (ASSA) has developed a demographic and AIDS model that makes use of data from several sources to project the potential course and demographic impact of the HIV/AIDS epidemic <sup>4</sup>. The model is modified as more data and epidemiological information becomes available. The latest version of the model, ASSA2003, was released in November 2005, calibrated with data up to and including the 2003 antenatal prevalence survey and registered deaths up to 2003. A series of nine provincial models was simultaneously released and made available to researchers. The population can be projected for each province from 1985 to a chosen date in the future, for example 2025 as used in this policy brief.
- General Household Surveys (GHS) and Income and Expenditure Surveys (IES) from StatsSA:** these are very small studies (GHS2005 had some 30,000 households) but they have many more variables and are thus useful in social security modelling. It is important to take account of the weighting used for these surveys, for example, the GHS2005 population is weighted using Census 2001 updated to July 2005. The GHS2005 has been used extensively for patterns in social security modelling and these are applied to more robust and more recent measures of the total population like the StatsSA mid-year estimates 2008 or the ASSA population projections.

While data from StatsSA is readily available, some of it needs to be used with caution and preferably with adjustments by professional demographers. For example, the Census 2001 data needs substantial adjustment before use <sup>1</sup>. This includes dealing with under-enumeration of the 0-4 year olds; too few foreigners identified; age misstatement, particularly age exaggeration (particularly across the pension age for both males and females); too few male in-migrants and/or significant male undercount (relative to the number of females); an excess of teenagers; potential significant undercount of the White population; and slightly greater than expected Coloured population.

The graph below compares the StatsSA population estimates for South Africa and the ASSA2003 projection to illustrate the differences in the estimates made at different points in time.

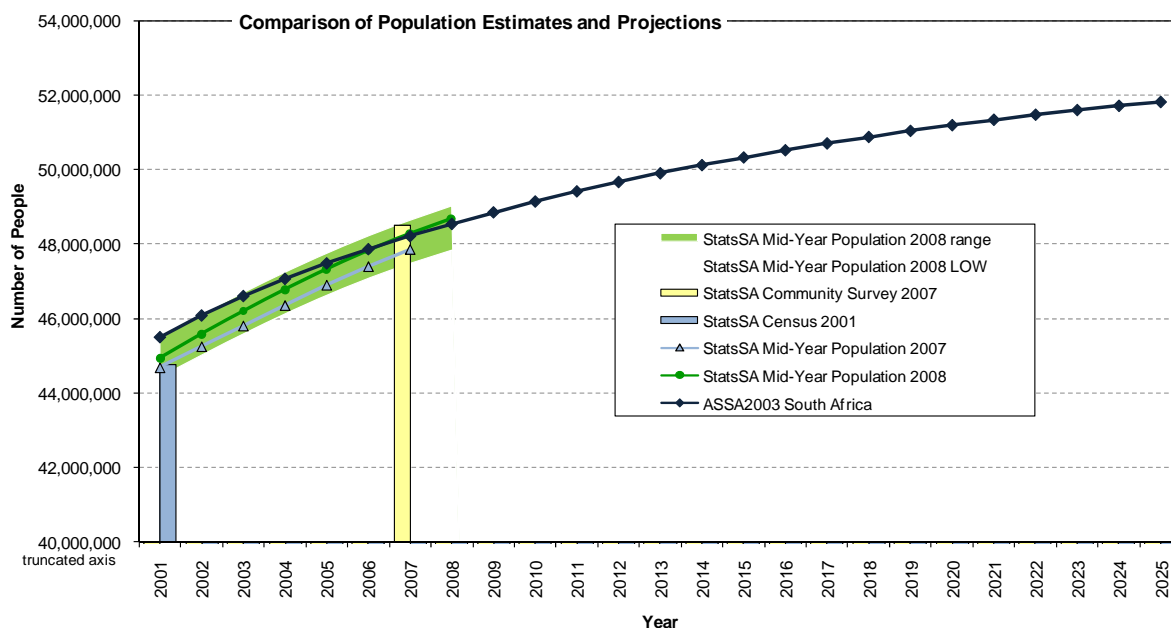


Figure 1: Comparison of Population Estimates and Projections for South Africa

The graph shows that there are considerable differences in the projections from StatsSA dated up to 2007 and the results from CS2007. As a result, the historic population was re-calculated back to 2001 and a range of projections given. The ASSA2003 model<sup>5</sup> is by far the most consistent and useful projection available. Despite not yet being adjusted for the findings of CS2007, the projected population is closer to the revised StatsSA 2008 figures than those produced by StatsSA up to 2007. An update of ASSA2003 is under consideration but has not yet begun and it seems unlikely there will be a revised model until late 2009 or perhaps early 2010. The ASSA2003 projection is of course available into the future which is essential for costing the implications of any NHI structure. The version being used allows for separate projections for each province.

The ASSA provincial model produces (amongst other results) the expected total population, the population structure by age and gender and expected total births. All of these can be used directly in models of National Health Insurance. The model also provides a projection of the numbers who are HIV+, the numbers of AIDS sick and the numbers expected to need anti-retroviral treatment. Projections of orphans are also directly available for social grant planning by the provinces.

**It is strongly recommended that all costing work on National Health Insurance be done using the ASSA2003 provincial model and that the costings be updated when a revision to the model is released.**

The ASSA2003 provincial tables by age and gender from 1985 to 2025, in an age format<sup>1</sup> needed for costing, can be downloaded from the IMSA web-site.

## 2. The Price of Healthcare by Age and Gender

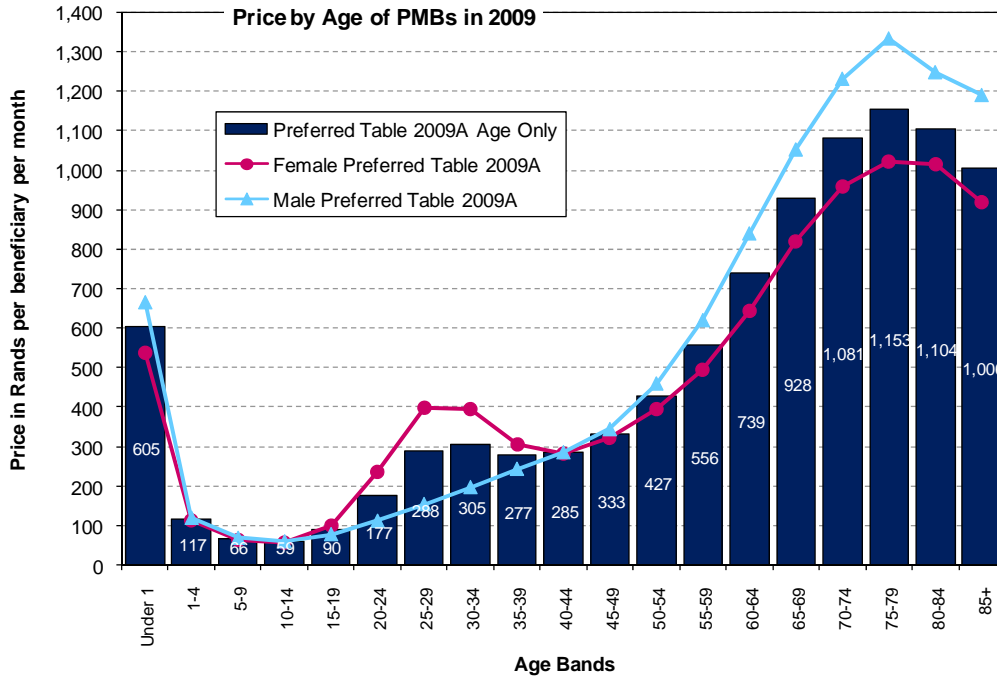
Figure 2 shows the very strong pattern by age and gender in the cost of healthcare. The costs are aggregated for a full calendar year for each age and gender group and this is the price that needs to be charged to cover the cost of healthcare benefits for that age and gender group. The package of benefits used for illustration is the Prescribed Minimum Benefits (PMBs)<sup>2</sup> required in all medical schemes.

Children under the age of 1 year are much more expensive than slightly older children. Not all Under 1s are expensive but there are a few very high cost babies, usually those born prematurely. Male babies are more expensive than female babies as they tend to be sicker and there may be costs of circumcision soon after birth. Children of school-going age are the lowest cost beneficiaries but as they leave school, costs escalate rapidly. Costs in the early adult years are influenced by maternity costs, vehicle accidents, substance-abuse and the consequences of violence. Female costs are much higher than male due to the "maternity bump" in the child-bearing years. At age 40 male and female costs are about equal and after age 40 the impact of lifestyle choices in early adulthood begin to show in the high costs for chronic disease. Male costs are higher than female from about age 40 onwards for the rest of life.

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<sup>1</sup> Some of the StatsSA data is in five year age bands, beginning with 0-5 and ending at age 80+. As shown in section 2, there is a significant difference between the costs of the Under 1s and those from 1-4. At the oldest ages the cost of healthcare begins to decrease and a distinction is made between 80-84 and 85+. These age bands are used by the Council for Medical Schemes for the collection of data from medical schemes, were used for the technical work on the Risk Equalisation Fund and are also typically used by the WHO. Technically, the definition used is "age last birthday on 1 January" so that people stay in one age category for the whole calendar year.

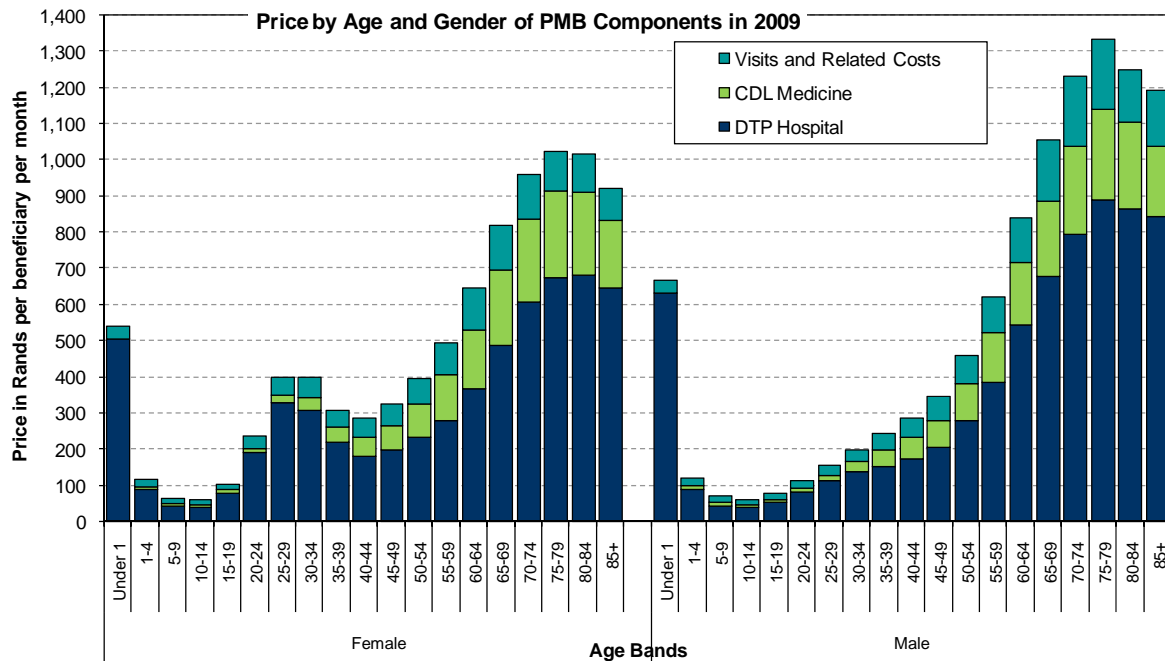
<sup>2</sup> The Prescribed Minimum Benefit package is a list of some 270 diagnosis-treatment pairs (DTPs) primarily offered in hospital (introduced January 2000); all emergency medical conditions (defined January 2003); diagnosis, treatment and medicine according to therapeutic algorithms for 25 defined chronic conditions on the Chronic Disease List (CDLs) (introduced January 2004).



**Figure 2: Price by Age and Gender of Prescribed Minimum Benefits in 2009**

Legislation may modify how healthcare is charged, for example the community-rating provisions of the Medical Schemes Act require that each option (package of benefits) charges a flat community rate, not differentiated by age or gender or state of health. If a province receives an amount specified as per person, then this is effectively a community rate being paid to the province. The same concept lies behind the capitation fee used when paying groups of doctors.

The graph below shows the price by age and gender split into component parts: hospital costs (the diagnosis-treatment pairs or DTPs); the medicine for the chronic diseases in the Chronic Disease List (CDL) and the visits to GPs, specialists and related diagnostic and monitoring tests required by minimum benefits.



**Figure 3: Price by Age and Gender of PMB Components in 2009**

There are as yet no publicly available costings of public sector healthcare by age and gender. In the sections that follow, the price by age and gender for PMBs is used as a proxy measure to enable the demographic factors to be illustrated. How reliable is using the PMBs as a proxy for health costs?

- The shape by age and gender shown in Figure 2 is consistent with that seen in many other countries.
- The major difference is that in South Africa there is a higher cost of maternity due to the very high Caesarean rates in the private sector <sup>6</sup>.
- The PMBs cover only about 50% of a comprehensive healthcare package <sup>7</sup>.
- The cost of delivery in the public sector may be lower than in the private sector but there are no authoritative studies on the extent to which costs differ. A rough rule of thumb was thought <sup>8</sup> to be that the public sector might be 70% of the private sector cost.
- The HIV epidemic is greater in the public sector population than the medical scheme population used to develop the PMB pricing.

While the PMB price is not very reliable for estimating public sector costs, the general shapes by age and gender are likely to be broadly similar. The thoroughly-researched PMB shape <sup>9</sup> is thus used, updated using the same methodology to 2009 <sup>10,11</sup>, to estimate the effect there might be in South Africa as a whole due to changes in the age and gender structure of the population.

### 3. Provincial Differences in the Amount Needed for Healthcare

There are substantial differences in the age and gender profile between the provinces which will affect the price or capitated amount needed for healthcare. The Western Cape and Gauteng have more working-age adults and the provinces with fewer economic opportunities have many more children, as shown below.

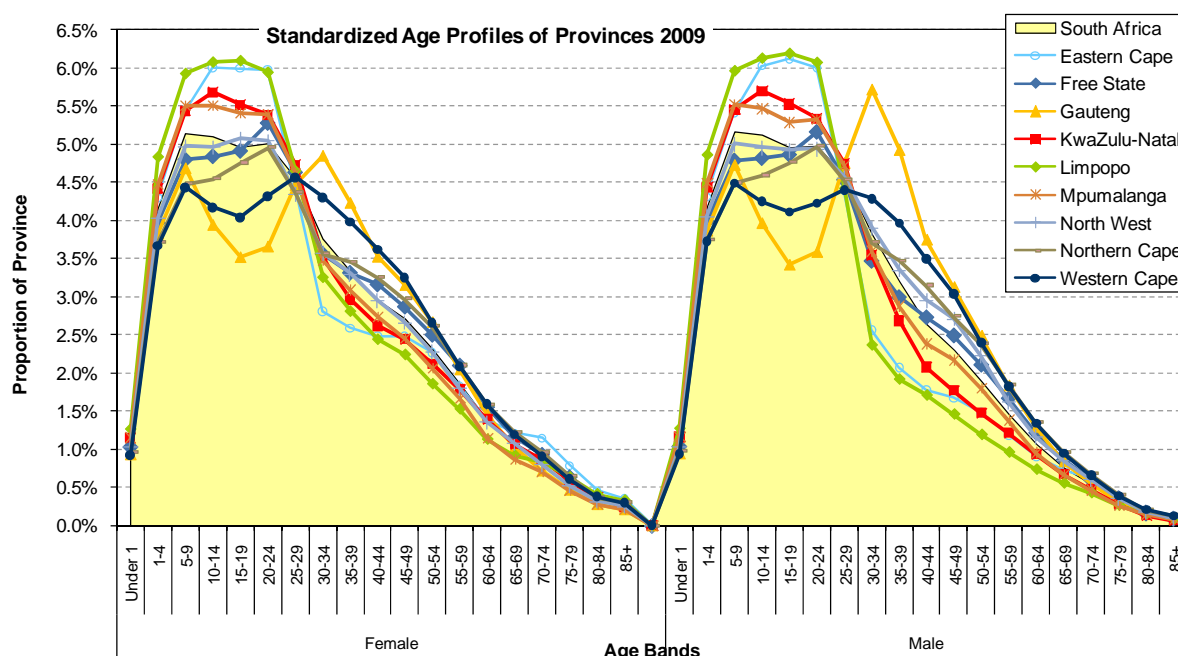


Figure 4: Comparison of Age Profiles of Provinces in 2009

The Western Cape has a much older profile, with fewer children and more middle to older age adults than the other provinces. This translates in the table below to a price difference of 9.4% more needed in the Western Cape than the price for the country as a whole. By comparison, Limpopo province has a very young profile with many children and few working age and older adults, thus needing 9.2% less for healthcare than the price for the country as a whole.

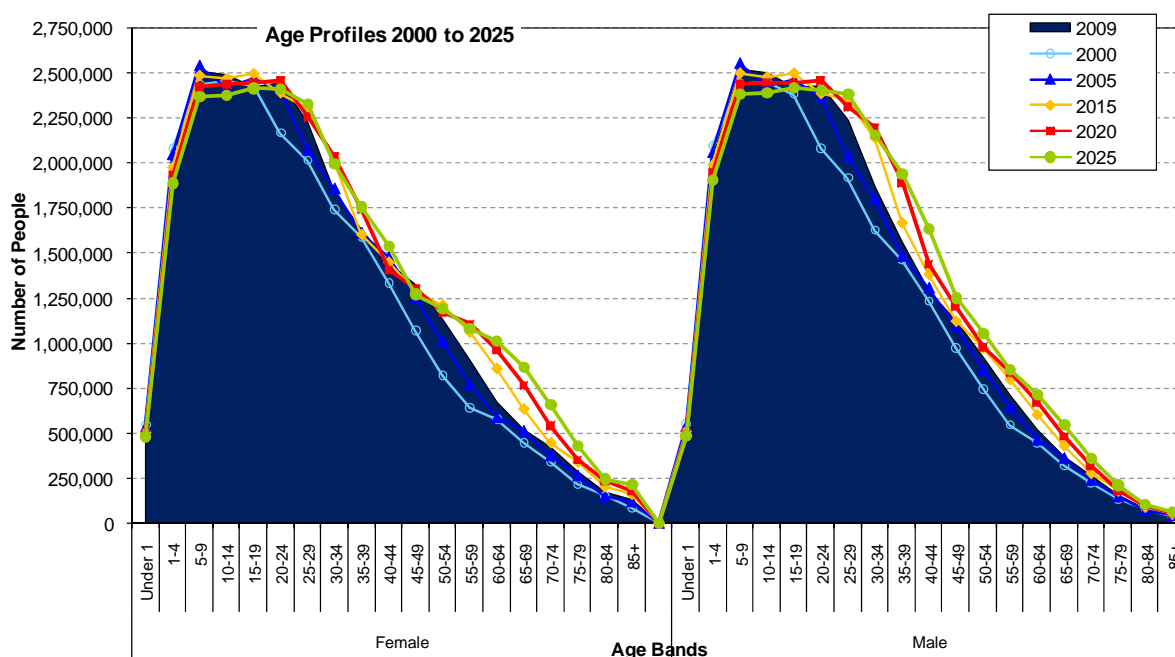
**Table 1: Impact on Price of Healthcare of Provincial Age and Gender Differences**

Value in 2009 Rand terms	Eastern Cape 2009	Free State 2009	Gauteng 2009	KwaZulu-Natal 2009	Limpopo 2009	Mpumalanga 2009	North West 2009	Northern Cape 2009	Western Cape 2009	South Africa 2009
DTP Hospital	177.06	187.69	191.84	174.38	167.74	172.81	183.51	192.78	196.18	181.51
CDL Medicine	40.36	44.53	46.42	38.81	35.53	38.13	43.10	47.04	48.07	41.94
Visits and Related	40.71	44.00	45.68	40.23	37.97	40.06	43.14	45.53	46.42	42.33
<b>Total Prescribed Minimum Benefits</b>	<b>258.13</b>	<b>276.22</b>	<b>283.94</b>	<b>253.42</b>	<b>241.24</b>	<b>251.00</b>	<b>269.76</b>	<b>285.35</b>	<b>290.67</b>	<b>265.78</b>
Adjustment relative to South Africa	97.1%	103.9%	106.8%	95.3%	90.8%	94.4%	101.5%	107.4%	109.4%	100.0%

The table shows that each province is expected to need a different amount for the same package of healthcare, due entirely to differences in the age and gender structure. It would also be useful to consider the burden of disease in each province and particularly the differences in HIV prevalence. The technical issue of disease-based payment to providers and provinces is scheduled for discussion in a later policy brief.

#### 4. Aging of the Population

The graph below illustrates the expected population of South Africa at five year intervals to 2025, compared to the age and gender structure in 2009.



**Figure 5: Age Profiles for South Africa from 2000 to 2025 using ASSA2003**

The graph shows the reduction in the number of children, the increase in those in the working years, the increase in those near retirement age and particularly the increase of older women. This illustrates the importance of projections by both age and gender, as the gender mix in each age band is not static over time. Some diseases are more prevalent in females than males and this will affect the future need for specialists in those fields and for particular categories of medicines. The shift is rapid over the horizon of our planning process. In absolute terms, the increases in some age bands are very meaningful e.g. Females age 65-69 grow from some 521,000 in 2009 to 865,000 by 2025, or a 66% increase. This has important implications for future medicine and hospital usage.

The table below uses the Managed Care version of the Preferred Table 2009<sup>3</sup> to isolate the effect of the aging demographics on the cost of healthcare for the country as a whole.

**Table 2: Impact on Price of Healthcare of Age and Gender Differences to 2025**

Value in 2009 Rand terms	South Africa 2000	South Africa 2005	South Africa 2009	South Africa 2015	South Africa 2020	South Africa 2025
DTP Hospital	175.56	178.50	181.51	186.96	191.99	197.55
CDL Medicine	38.88	40.50	41.94	44.39	46.64	48.94
Visits and Related Costs	40.51	41.48	42.33	43.76	45.05	46.35
<b>Total Prescribed Minimum Benefits</b>	<b>254.95</b>	<b>260.47</b>	<b>265.78</b>	<b>275.11</b>	<b>283.68</b>	<b>292.84</b>
Change from 2009 due to age and gender	-4.1%	-2.0%	0.0%	3.5%	6.7%	10.2%

The change in age and gender profiles alone would have increased the price of healthcare by 4.1% from 2000 to now in 2009. The price of healthcare would be expected to increase by 10.2% by 2025, given the age and gender differences alone. This table has used the same price of healthcare going back in time and forward in time. However to be more realistic, a price table should be developed for each year taking into account the growing HIV epidemic. The effect would be to make both the historic and future increases larger than quoted.

The provinces will also each have a different experience of aging. The Western Cape and Gauteng are expected to have the greatest growth in older people relative to children. Thus the impact of increased chronic disease (excluding HIV) will be highest in these provinces.

## 5. Conclusions and Implications for NHI

Studies of healthcare costs to do pricing for a future NHI would usually be done using historic data. If the historic data is not analysed by age and gender, then applying it to today would already be too low as the population has changed shape this decade. Applying the historic cost to the future, without considering age and gender, will likewise produce an estimate that is too low. Studies are also typically done on a small part of the population. If these results are not produced by age and gender, then the cost of healthcare may be very different when the whole population is enrolled. This policy brief has shown how important it is to work by at least age and gender in any costings and when working with the population.

This policy brief has also shown how different the age and gender profiles are for each province. Any allocation of funds to the provinces should take into account at least the differences in age and gender, but preferably also the disease burden of each province. This begins to hint at the need for risk-adjusted payments to the provinces or any other pools in a future NHI. The issue is the same one encountered in the multiple pools in medical schemes: pools have very different structures by age and gender and risk-adjusted payments need to be made on at least an age and gender basis in order to charge everyone the same community rate for the minimum benefit package.

<sup>3</sup> Developed using identical methodology to the REF Contribution Table [Base 2005, Use 2007] which was published by the Council for Medical Schemes. The Preferred tables have been produced using the REF Study 2005 data as a starting point and the same consistent methodology. This Preferred series thus gives a consistent historic series which can be used for research, pricing, risk analysis and managed care pricing. The tables are produced by Heather McLeod and updated annually.

The policy brief has also demonstrated the future age and gender profiles that have been projected through to 2025. It is important to look further forward than just a typically five year planning horizon to see some of the longer term demographic changes that might be expected. The implication of the aging of the population is that there will be greater future demand for both chronic medicine and for hospitalisation, as both these are strongly related to age. There are distinctive curves for females and males, as commonly found in other countries, and work needs to be done by both age and gender.

There is much research effort needed to produce reliable curves of the cost of healthcare in the public sector by age and gender. Work is also expected to be underway soon with a new costing of PMBs and possibly expansions of the PMB package. This work too must be done by age and gender. The costing of care for the low income market (LIMS) <sup>12</sup> did not produce tables by age and gender, making it difficult to determine the cost when the package is applied to the whole potential LIMS population. Researchers are strongly urged to take this into account in preparing future costings of healthcare in any setting: work by age and gender.

Produced for IMSA by  
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24 April 2009

## Resources on the IMSA Web-site

The following are available on the NHI section of the IMSA web-site: [www.imsa.org.za](http://www.imsa.org.za)

- The slides and tables used in this policy brief [PowerPoint slides].
- The tables of the population by age and gender for South Africa and the nine provinces, from 1985 to 2025 [Excel spreadsheet]
- The tables of PMB price for 2009 by REF risk factors and subsets [Excel spreadsheet].
- The tables of PMB price by age and gender and service type (hospital, medicine and visits and related costs) for 2009 [Excel spreadsheet].
- A glossary of healthcare terms with explanations which will be updated as further policy briefs are added.

As the purpose of this series is to put in the public domain material and evidence that will progress the technical work of developing a National Health Insurance system, we would be delighted if you make use of it in other research and publications. All material produced for the IMSA NHI Policy Brief series and made available on the web-site may be freely used, provided the source is acknowledged. The material is produced under a Creative Commons Attribution-Noncommercial-Share Alike licence.



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**Innovative Medicines South Africa (IMSA)** is a pharmaceutical industry association promoting the value of medicine innovation in healthcare. IMSA and its member companies are working towards the development of a National Health Insurance system with universal coverage and sustainable access to innovative research-based healthcare.

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