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Occasional Note
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Comments on select aspects of the NHI White Paper

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In this Occasional Note we unpack the financing implications of the National Health Insurance (NHI) White Paper, released during December 2015. While the White Paper deals with many policy and practical aspects of the planned NHI, this Note only considers the financing requirements.

While the NHI is expected to yield universal coverage to all South Africans, and improve health outcomes, there are deep concerns about the affordability of such an ambitious programme. In this Note we show that the White Paper presents very little new financial information, compared to the earlier Green Paper.

We show that the financing estimates in the White Paper are based on optimistic GDP growth assumptions, and will probably require greater funding than anticipated.

In addition, the burden of disease should be taken into account in modelling expected demand shifts. Financing issues cannot be ignored as an underestimation of the costs will impact negatively on service delivery and the management of expectations under a NHI.

About ECONEX

ECONEX is an economics consultancy that offers in-depth economic analysis, covering competition economics, international trade, strategic analysis and regulatory work. The company was co-founded by Prof Nicola Theron and Prof Rachel Jafta during 2005. Both these economists have a wealth of consulting experience in the fields of competition and trade economics. They also teach courses in competition economics and international trade at Stellenbosch University. For more information on our services, as well as the economists and academic associates working at and with Econex, visit our website at www.econex.co.za.

This research has been commissioned by the Hospital Association of South Africa (HASA) and is being published to contribute constructively to the ongoing healthcare debate.

NHI White Paper Key Insights

Financial implications:

The **cost of implementing** the NHI is expected to increase healthcare costs from:

R121bn for the **2015/16** fiscal year ⟩ **R256bn** for the **2025/26** fiscal year

*(2010 Prices)

The level of **public spending** will increase roughly

4% of GDP to **6.2%** of GDP by 2025/26

NHI shortfall
(Econex assumptions, higher demand + lower GDP growth)

R200bn **2025/26** **vs** **R108bn** White Paper estimate for **2025/26**

The **annual health budget** would have to increase by

10.62% annually from **2019/20** to reach ⟩ **R256bn** in **2025/26**

*(in 2010 terms)

Implications for tax revenue:

NHI Funding shortfall in 2025/26

= **1/3** of personal income tax, or

= **75%** of corporate tax, or

= **51%** of VAT

1 Introduction

The Department of Health (DoH) published the much anticipated White Paper on the NHI ('National Health Insurance for SA – Towards Universal Health Coverage'[1]), on 10 December 2015. The White Paper provides a roadmap for the journey towards full implementation of the NHI in South Africa and covers many diverse areas such as rationale and benefits, population coverage, organisation of the health system, etc.

The aim of this note is to consider the macroeconomic implications of the NHI. More specifically, we evaluate the funding requirements and the assumptions made in the NHI White Paper. In addition to the large financial requirements, we show that there are currently severe supply constraints that need to be addressed before the implementation of a universal healthcare (UHC) system become a reality. While there are many other important issues covered in the White Paper, those are not explicitly dealt with here. The comments in this note therefore deal mainly with issues raised in Chapter 7 of the White Paper.

2 Financing on the NHI

The financing of the NHI is a controversial topic and much work has been done by various parties on income sources and funding scenarios. In fact, it is stated in the White Paper (para 250) that: "...it is not useful to focus on getting the exact number indicating estimated cost. This is because the evidence has shown that countries that have gone down this path have ended up tied to an endless cycle of revisions and efforts to dream up new revenue sources – thus focusing on issues that have more to do with tax policy than health policy." While one has sympathy with the complexities around financing scenarios, it does not mean that this aspect of the NHI planning can simply be ignored.

Currently, total annual health expenditure by the public and private healthcare sectors constitutes approximately 8.5% of Gross Domestic Product (GDP), of which 4.3% is accounted for by the private sector and 4.2% by the public sector.[2] Based on revised budget estimates for health expenditure published by National Treasury, which covers the period up until FY2018/19, there seems to be very little expected increases in the national health budget as a percentage of GDP over this period. As such, it seems that there is limited provision made for the NHI over the medium-term despite the NHI White Paper projections in this regard.

The aim of the NHI is to provide universal coverage for all South Africans. The cost of implementing the NHI is estimated to be R 134,324 million for the 2015/16 fiscal year, R 185,370 million for the 2020/21 fiscal year and R 255,815 million for 2025/26 fiscal year (2010 prices).[3] This implies that the average annual increase before 2015/16 is 4.1% while it is 6.7% thereafter.

These cost estimates indicate that the level of public health spending will increase from roughly 4% of GDP currently to 6.2% of GDP by 2025/26, assuming that the economy grows at an annual rate of 3.5%. Estimates obtained from the World Bank and the IMF, however, suggest that 3.5% is a grossly overestimated growth figure for South Africa, with the average forecasted growth rate over the next few years closer to 1%. Accordingly, spending on NHI as a percentage of GDP is expected to be higher than 6.2% by 2025/26. The White Paper's

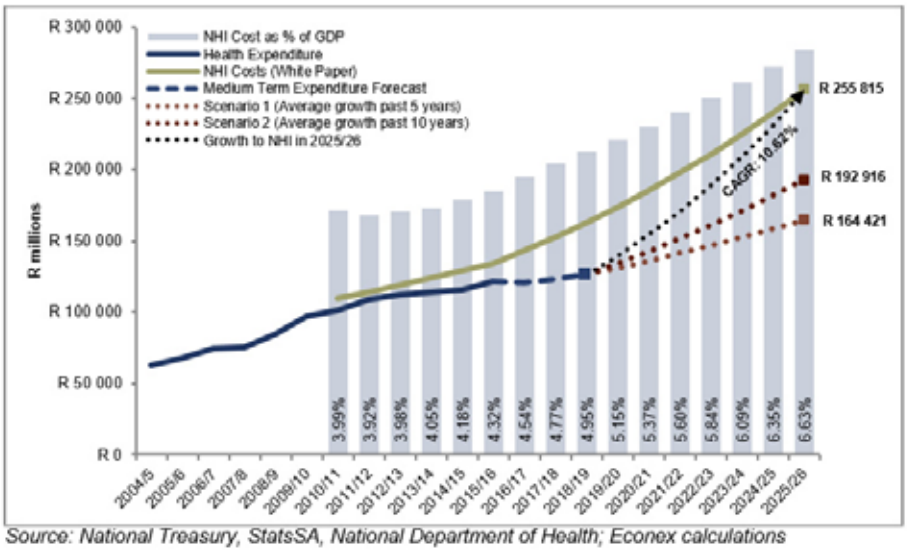
1. Department of Health of the Republic of South Africa. (2015). National Health Insurance for South Africa: Towards Universal Health Coverage. Version 40. Available at: http://www.bhfglobal.com/wp-content/uploads/2015/03/National_Health_Insurance_White_Paper_10Dec2015.pdf
   For the purpose of the report, utilisation is used as a collective term to describe changes in volume and case mix.
2. Medium-term estimates in the 2010/11 – 2016/17 Provincial Budgets and Expenditures Review
3. NHI White Paper

growth assumptions are dealt with in more detail later.

In order to provide an initial indication of how the current forecast of health expenditure compares with the projected costs of the NHI, we provide some scenarios in Figure 1 below. It shows national health expenditure in real terms for the period 2004/5 to 2018/19, which includes the forecasts from Treasury's Medium Term Expenditure Framework, as well as estimates of health expenditure until 2025/26, should current trends in annual health expenditure increases continue (the "Health Expenditure" line in the Figure 1). This projection was calculated using the average annual real increase in health expenditure from 2010/11 to 2015/16 (3.85% per year, termed "Scenario 1") as well as over the period 2005/6 to 2015/16 (6.25% per year, termed "Scenario 2"). We show both scenarios in the Figure 1.

Health expenditure with the implementation of the NHI plan is also illustrated for the period 2010/11 to 2025/26 (shown as "NHI Costs (White Paper)" in the Figure 1). This is the NHI expenditure path as shown in the White Paper and as such is not realised health expenditure, but rather estimated health expenditure using the same model as used in the Green Paper.[4] Note that the NHI expenditure path differs between the White Paper and the Green Paper, as the White Paper uses *"...more recent estimates of the costs of the NHI pilots and other reforms currently being implemented."*[5] Furthermore, the annual modelled costs of the NHI, while shown in the Green Paper, are not shown at a disaggregated level in the White Paper. As such, we calculated these at an annual level. We also show the NHI cost as a percentage of GDP. We use the nominal GDP figures of National Treasury for 2010/11 to 2014/15. We adjust these figures so that they are in constant 2010 terms (using StatsSA CPI data[6]). However, from 2015/16 onwards, we use updated real GDP growth rate assumptions, as the growth rates assumed in the White Paper are likely overstated.[7] This is also evident when comparing the growth rates in the NHI White Paper with National Treasury's most recent announcement of their (adjusted) forecasted real GDP growth rates, published in the February 2016 Budget Review. As such, the growth rates assumed by the NHI seem at odds with even those assumed

Figure 1: Comparison of realised/forecasted public health expenditure and estimated NHI White Paper cost (2010 terms), 2004/5 – 2025/26



Source: National Treasury, StatsSA, National Department of Health; Econex calculations

4. NHI White Paper, paragraph 252.
5. *Ibid.*
6. Note that we adjust the CPI such that it is expressed in financial years coinciding with the financial year of National Treasury (April to March) and to allow for a like-with-like comparison with the NHI White Paper. In particular, when we state that a value is expressed in constant 2010 terms, this means that it has been adjusted to have the 2010/11 financial year as a base year for the CPI index. We use the forecasted inflation provided by National Treasury to provide the index value from 2015/16 to 2018/19.
7. Specifically, between 2014/15 and 2016/17, we assume growth rates of 1.3%, 0.8% and 1.5%. These figures are the average growth rates between the World Bank and IMF's latest quoted real GDP growth forecasts. For 2017/18, we use the growth rate as quoted by the World Bank in their January 2016 Global Economic Prospects report (1.6%). For 2018/19 and 2019/20, we assume the annual growth to be 2.6%, based on the IMF's World Economic Outlook. From 2020/21 to 2025/26, we assume that the annual GDP growth rates are the average of the preceding 3 years, i.e. 2.3% per annum.

by Treasury.

Under these assumptions, we find that the total annual health budget will be R 164,421 million in 2025/26 under scenario 1 and R 192,916 million under scenario 2. Comparing these figures to the NHI budget in 2025/26, we find that the additional health expenditure (shortfall) resulting from the implementation of the NHI is R 91,394 million under scenario 1 and R 62,899 million under scenario 2. Note that for comparative purposes, these numbers are shown in 2010 terms. The equivalent shortfall under scenario 1 would be R 119,945 million and under scenario 2 would be R 82,549 million in present terms. When taking the above assumptions into account, we calculate that the annual health budget would have to increase by 10.62% annually (in 2010 terms) from the start of the 2019/20 fiscal year to reach R 256 billion in 2025/26.

With these figures in mind, the question to be answered is how this will be financed. However, before we turn to the funding implications, we consider whether the cost projections in the White Paper are sufficient. We elaborate on important factors that need to be taken into account in the modelling of NHI costs. These include the increased demand and utilisation that will result from the implementation of universal coverage and South Africa's unique burden of disease situation.

3 Demand, utilisation and the burden of disease

From the NHI Green Paper, the costing model used was adopted from the approach recommended by the International Labour Organisation (ILO). It supposes that total expenditure is a product of the user population, service utilisation rates and unit costs. As such, the costs are dependent on utilisation trends.

Universal health coverage aims to provide increased access to healthcare services for the previously uninsured population who currently have limited access. International evidence[8] indicates that such a policy change is expected to cause an increase in the demand and utilisation of healthcare services. In addition to this expected "insurance-induced" demand increase, we expect that South Africa's quadruple burden of disease will have the effect of increasing the quantity and intensity of care required by newly insured individuals (pent-up demand). From our understanding and interpretation of the estimated expenditure increases in the NHI White Paper (and Green Paper), some expected utilisation increases (as related to the factors mentioned here) were taken into account. However, due to South Africa's unique burden of disease, one cannot simply assume that the same demand increases will be realised here as in other countries. Specifically, we compare our burden of disease to that of Thailand's as the expected utilisation increases were modelled on their experience.

A widely accepted method used in quantifying a country's burden of disease is the Disability Adjusted Life Years, or DALYs[9]. The table below shows

Table 1: Breakdown of South Africa's DALYs per 100,000 of the population, 2000 and 2012

Group	2000	2012	2000 – 2012 (% change)
HIV/AIDS	20 009	22 599	13%
Other communicable diseases	14 869	12 105	-19%
Non-communicable diseases	20 003	22 201	11%
Injuries	5 720	5 515	-4%
All causes	**60 601**	**62 419**	**3%**

Source: World Health Organization; Econex calculations

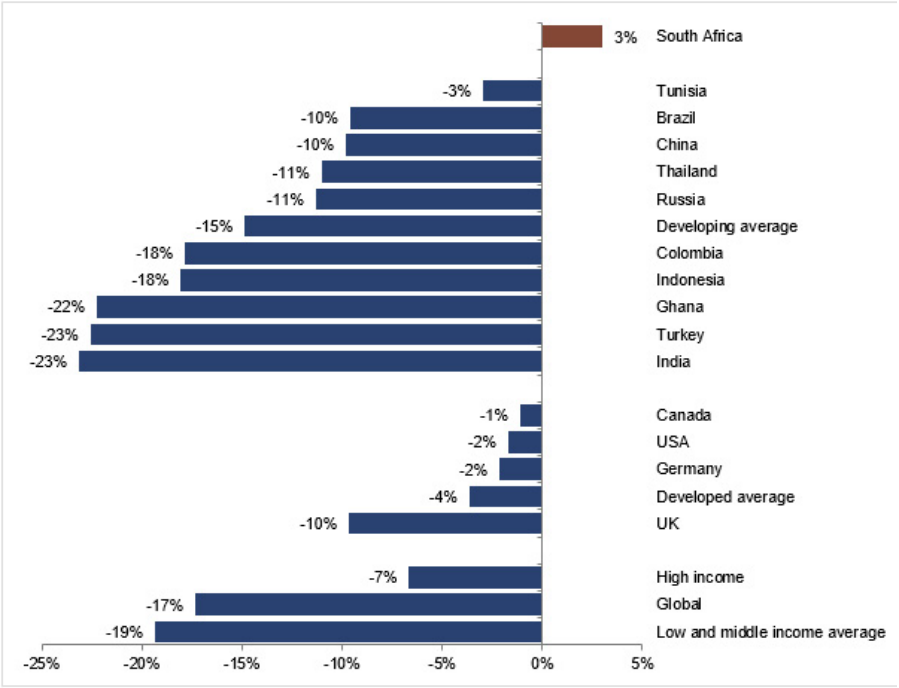
8. See Appendix A for case studies and references
9. The WHO defines a DALY as follows: *"One DALY can be thought of as one lost year of "healthy" life. The sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability. DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences."* Source: World Health Organization. 2016. Metrics: Disability-Adjusted Life Year (DALY). Available online: http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/

how South Africa's DALY count has changed between 2000 and 2012.

From the table, we can see that there was a 13% increase in the population-adjusted HIV/AIDS DALYs between 2000 and 2012, while non-communicable diseases increased by 11%. We note that there was a 19% decrease in other communicable diseases and a 4% decrease in injuries. However, in total, South Africa's DALY count increased by 3% over this period, which suggests that South Africa's burden of disease has worsened between 2000 and 2012. This is in stark contrast to international trends, which show that DALYs have generally decreased across developed and developing countries between 2000 and 2012, as seen in Figure 2.[10]

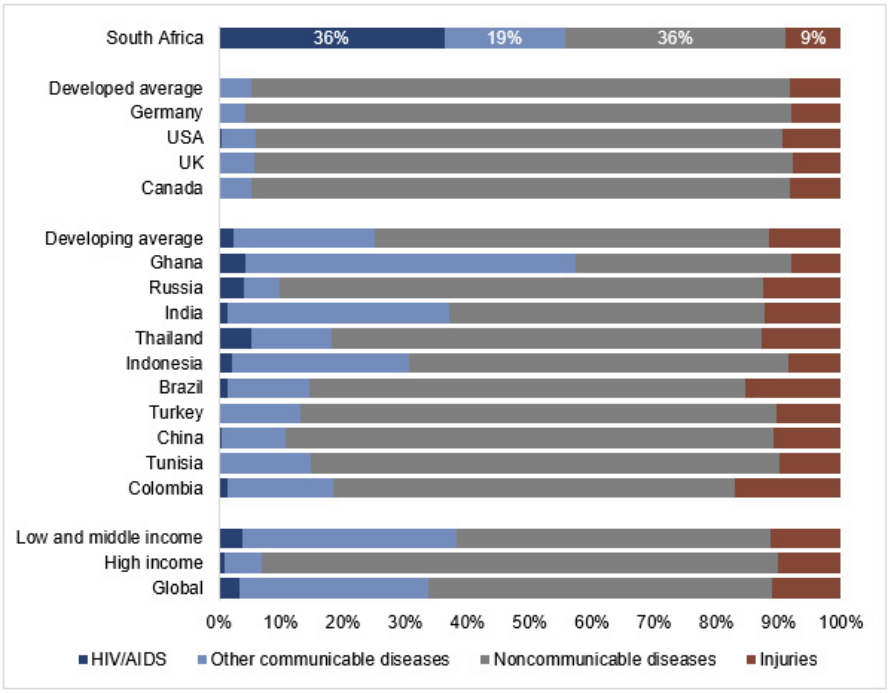
In addition to South Africa's differing experience w.r.t. the change in the DALY count between 2000 and 2012, it should be noted that it also has a much different DALY distribution, as shown in Figure 3. More specifically, it is clear that South Africa is suffering from a quadruple burden of disease, where most other countries only suffer from one or two burdens. South Africa's burden of disease situation is not only much more significant in terms of magnitude, but also in terms of the distribution between different diseases. This is summarised in the Figure 4. It is clear that developed countries have a much smaller total

Figure 2: Percentage change in DALY count for South Africa, developing countries, developed countries and income groups (per 100,000 population), 2000-2012



Source: World Health Organization; Econex calculations

Figure 3: DALY breakdown comparison between South Africa, developing countries and income groups, 2012



Source: World Health Organization

10. *Countries that have experienced a greater increase in their population-adjusted DALYs than South Africa include Armenia, Trinidad and Tobago, Brunei, Cuba, Japan, Mauritius and Malta*

burden of disease problem and that other developing countries have experienced a decrease in their DALY figures.

South Africa's quadruple burden of disease, in addition to large-scale pent-up demand, will ensure that providing full insurance coverage to the entire population will result in a large-scale increase in demand. The burden of disease therefore has strong implications for the proposed NHI plan. In a previous Econex research note[11], we discussed how South Africa's quadruple burden of disease would translate into greater resource requirements when implementing universal health coverage. We found that it was therefore not advisable to model a NHI model after the experience in other countries, since South Africa's BOD will result in unique demand conditions. We emphasise again that it is important to evaluate local patterns of demand and utilisation when considering the implementation of universal health coverage, as it has important funding implications. We discuss this in the next section.

4 Macroeconomic considerations

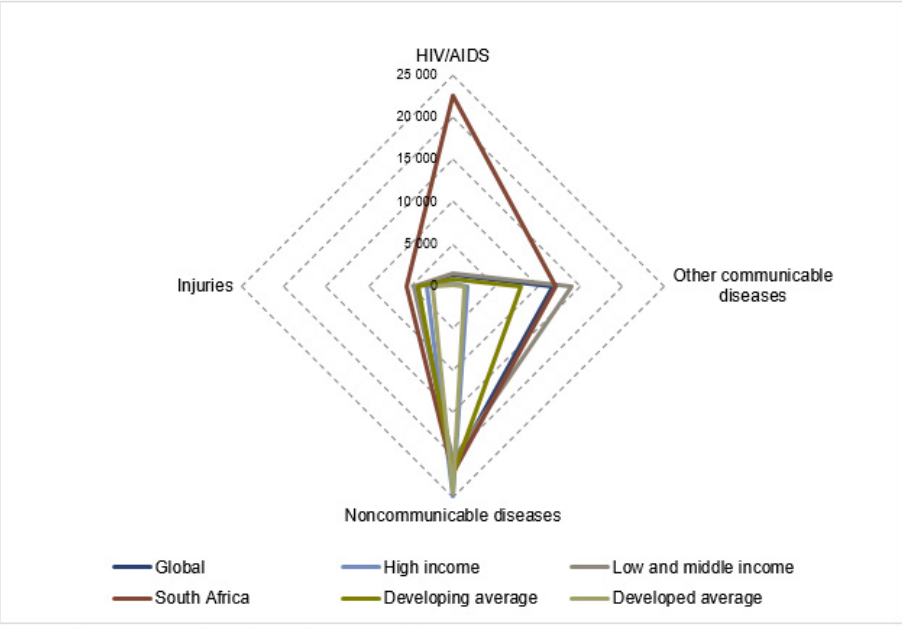
From the preceding section, we note that an increase in demand will have an impact on the level of funding required to finance the NHI. In this section we take this into account by adjusting the annual cost increases. In the White Paper, the NHI funding is expressed as a function of GDP growth. Three growth scenarios are presented, namely 2%, 3.5% and 5%. However, in this section, we evaluate the White Paper's chosen GDP growth scenarios given more recent GDP figures and forecasts.

4.1 GDP Growth Forecasts

It is shown that under the three macroeconomic growth paths in the White Paper (2%, 3.5% and 5%), the funding shortfall can range between R 27.6 billion and R 108 billion. However, given the availability of more recent GDP figures and adjusted forecasts, we dispute the reliability of the White Paper's GDP scenarios.

As such, we obtained the latest estimates of South African real GDP growth over the medium term from various credible sources. It is significant to note that there has recently been a downward adjustment in these growth forecasts. For instance, the IMF adjusted its forecast of real GDP growth from 2.1% to 1.8%, stating that South Africa's growth would be negatively affected by lower commodity prices and higher borrowing costs.[12] Similar adjustments have been made by the World Bank. We note that pursuant to these adjustments, it was re-

Figure 4: Comparison of DALY breakdown between South Africa, developing countries, developed countries and income groups (per 100,000 of the population), 2012



Source: World Health Organization; Econex calculations

11. Econex NHI Note 2. "South Africa's Burden of Disease." Available at: www.econex.co.za
12. International Monetary Fund. 2016. World Economic Outlook: Update. Available online: http://www.imf.org/external/pubs/ft/weo/2016/update/01/pdf/0116.pdf

cently announced that South Africa's GDP has contracted by 1.2% in the first quarter of 2016.

The White Paper's main illustrative scenario assumes 3.5% annual GDP growth up to 2025/26. This produces a funding shortfall of approximately R 72 billion. This scenario is consequently used to illustrate potential tax policy changes. However, since more recent GDP data are available, the scenarios should be updated to reflect these current forecasts. In what follows, we take into account the recent downward revisions to GDP growth, which provide a more accurate indication of the magnitude of the NHI's funding shortfall and the commensurate potential tax implications.

The current South African GDP growth outlook is much weaker than supposed in the NHI White Paper. This is evident both when considering external sources, as well as when considering the recent GDP growth forecasts published by National Treasury in the 2016 Budget Review.

As is clear from the table, there seems to be a consensus that real GDP growth in South Africa is expected to remain slow over the next few years. It is also interesting to note that the growth rates shown in the table above are much closer to those shown by Treasury in the 2016 Budget Review. We use the figures shown in the table above in our calculations in the following subsection. These average GDP growth rates will enable us to adjust the NHI White Paper scenarios to reflect a more recent and up-to-date GDP growth scenario.

Table 2: Year-on-year GDP growth forecasts, 2013/14 – 2025/26

		World Bank		IMF		
Year	Corresponding Fiscal Year	South Africa Economic Update – January 2016	Global Economic Prospects – January 2016	WEO Update January 2016	WEO October 2015	Average
2014	2013/14	1.5%		1.5%		1.5%
2015	2014/15	1.3%		1.3%		1.3%
2016	2015/16	0.8%		0.7%		0.8%
2017	2016/17	1.1%		1.8%		1.5%
2018	2017/18		1.6%			1.6%
2019	2018/19				2.6%	2.6%
2020	2019/20				2.6%	2.6%
	2020/21 – 2025/26 (Average growth rate for previous three years assumed)					2.3%

Sources: IMF, World Bank

4.2 NHI cost under various demand and GDP growth scenarios

In order to incorporate our discussions into the costing of the NHI, we make adjustments to the cost estimates used in the NHI White Paper. Using the most up-to-date figures on public health expenditure from the 2016/17 Budget Review, we note from the MTEF that public health expenditure will be R 126 billion in 2018/19 (in 2010 terms). In order to reach the R256 billion NHI cost in 2025/26, this figure will have to grow by 10.6% annually. This growth rate implicitly assumes a 70% and 80% increase in outpatient and inpatient utilisation, respectively, as stated in the NHI Green Paper.[13] This increase in utilisation is compared to that of Thailand after its implementation of UHC. However, from our earlier DALY analysis, we note that South Africa's burden of disease composition and magnitude is wholly different from and much more severe than Thailand's, which implies that there may be a much larger increase in utilisation than the (already high) rates used in the NHI costing model.

As a result, we postulate that a variety of annual growth rates can materialise over the implementation period (from 2019/20 to 2025/26). In addition to the 10.6% growth rate that will yield R 256 billion in 2025/26, we have assumed growth rates of 12%, 14% and 16% (scenarios named "Econex

13. NHI Green Paper, para. 121.

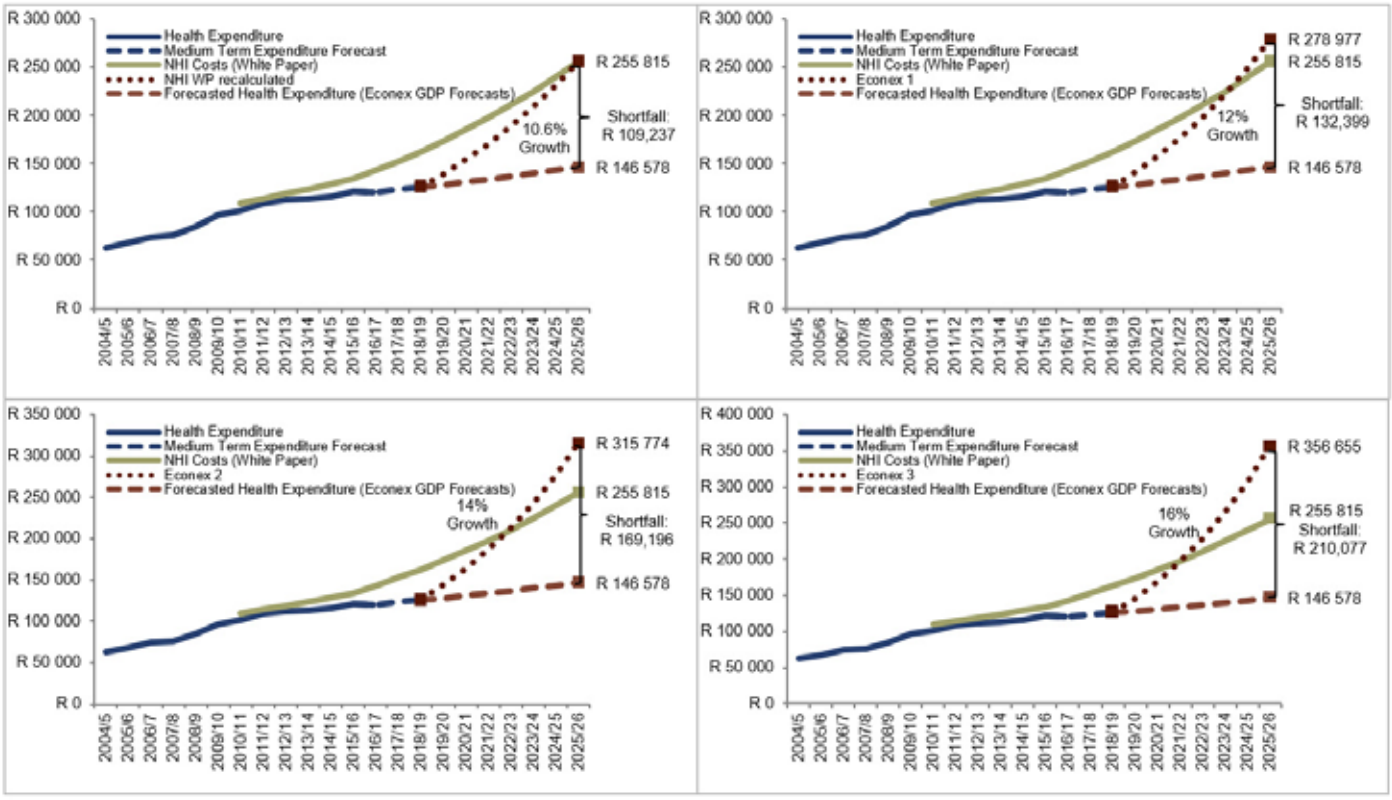
1", "Econex 2" and "Econex 3", respectively) to illustrate the impact of a higher NHI cost growth rate that may result from increased demand and utilisation following the implementation of NHI.

We assume that consolidated public healthcare expenditure will stay constant at 3.8% of real GDP.[14] In this vein, it is stated in the White Paper[15] that *"...over the long run, the pace of economic growth is an important indicator of the overall growth rate in health expenditure."* Since public healthcare expenditure will be used to fund the NHI costs, we assume that the NHI's financing will be a function of GDP. Consequently, we apply the different GDP growth rates from the White Paper as well as more up-to-date real GDP growth estimates, shown in Table 2 above. Changing the rate of the annual cost increases as well as the GDP growth rates will therefore provide several potential shortfalls in funding the NHI system.

We look at each scenario in more detail and include the figures below which illustrate the shortfall between the NHI costs (under the 10.6%, 12%, 14% and 16% annual increase scenarios) and public health expenditure, assuming that it is a function of our actual GDP/forecast scenario.

Assuming that growth follows the actual GDP/forecasts scenario (Table 2), public health expenditure will be R 147 billion (without NHI implementation). Therefore, the NHI cost in 2025/26 of R 256 billion will result in a shortfall of R 109 billion (top left in Figure 5). For a 12% annual increase in NHI costs, the final cost amounts to R 279 billion, yielding a funding shortfall of approximately R 132 bil-

Figure 5: NHI cost projects under different demand and GDP assumptions (R millions)



Note: Top left: NHI WP recalculated; top right: Econex 1; bottom left: Econex 2; bottom right: Econex 3

14. We calculate this as the average of consolidated health expenditure as a percentage of real GDP since 2011/12, which has consistently been approximately 3.8%.
15. NHI White Paper, para 257.

lion (top right in Figure 5). Under the 14% annual increase in NHI costs, the final cost amounts to R 316 billion which will result in a R 169 billion shortfall (bottom left in Figure 5). Lastly, for a 16% annual increase in NHI costs, the final cost amounts to R 357 billion, which implies that there will be a funding shortfall of approximately R 210 billion (bottom right in Figure 5).

We note that the actual GDP/ forecasts growth scenario is more in line with the 2% scenario shown in the White Paper and not the 3.5% scenario which is used as the illustrative scenario. Although the model is based on assumptions that the costs may increase at a higher rate than proposed in the NHI White Paper, we find that South Africa's unique burden of disease and the heavily constrained supply of healthcare resources (discussed in section 4.3) may bring the additional scenarios to fruition, which implies that the funding shortfall may be larger than proposed in the White Paper.

According to the White Paper, the NHI will be funded by general tax revenue and mandatory NHI contributions, although the exact mixture and amounts are yet to be finalised.

We consequently examine some of the fiscal requirements that may result from the implementation of the NHI system.

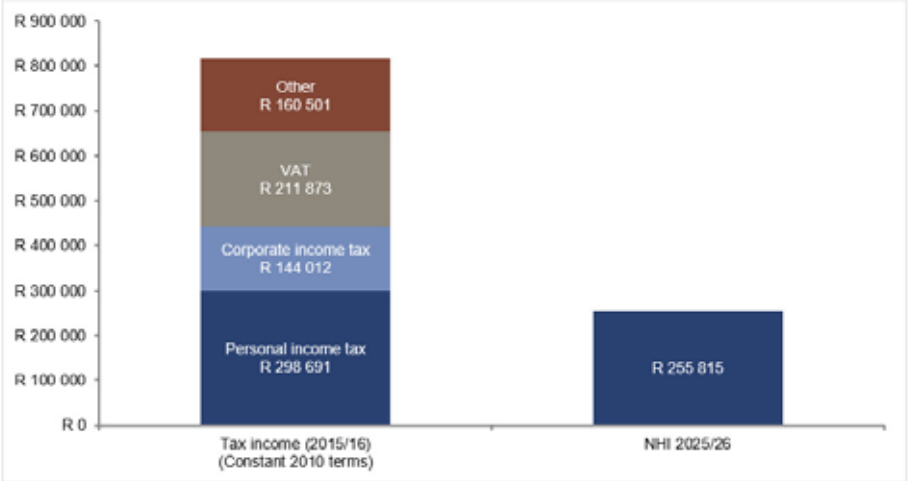
4.3 Fiscal requirements

The shortfall in funding the NHI system will have to be financed from other revenue sources and/or government departments. The subsections that follow discuss this funding requirement as well as the potential implications for the national budget and tax policy. The consolidated South Africa tax revenue for all spheres of government (national, provincial and local government) was estimated to be 26.3% of GDP, or R 1,069,700 million in 2015/16. This figure has been relatively consistent over time. Consequently, given Treasury's and Econex's estimates, we find the following:

- If the final figure for the NHI (based on the GDP growth forecast shown in Table 2) of 6.56% of GDP is compared to the current health budget of 4.1% (estimated by Treasury), this implies that an additional 2.46% will have to originate from tax sources.
- If the final figure for the NHI (based on the GDP growth forecast shown in Table 2) of 6.56% of GDP is compared to the current health budget of 3.76% (estimated by Econex), this implies that an additional 2.66% will have to originate from tax sources.
- In other words, tax revenue would have to increase by more or less 10% (based on either the Treasury or Econex estimate).

Figure 6 shows how the size of the NHI in 2025/26 compares to the current budget tax revenue. As is clear from the figure, the total amount required to fund the NHI in 2025/26 is almost as large as the estimated total revenue generated from personal income tax (0.9 times) in the 2015/16 fiscal year and is larger than any of the other tax income categories. For example, it is 1.7 times larger than

Figure 6: NHI relative to current budgeted tax revenue items in real 2010 terms, R millions

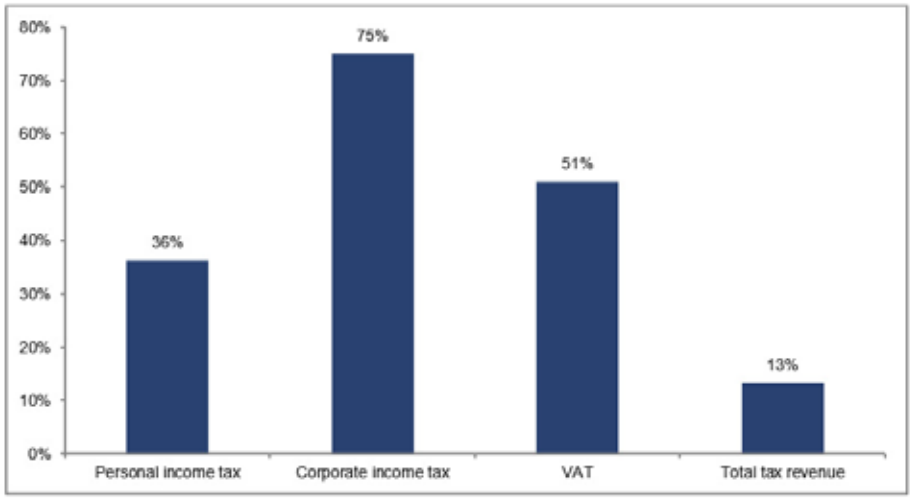


Source: National Department of Health, South African Revenue Services, StatsSA, Econex calculations

corporate income tax, 1.2 times larger than VAT and 5.1 times larger than 'other' tax income categories.

As noted in the NHI White Paper, there will be a funding shortfall of R 108,080 million in 2025/26 if GDP is assumed to grow by 2% per year. To put this in perspective, Figure 7 shows this shortfall as a percentage of the different tax revenue categories.

Figure 7: NHI Shortfall of R 108,080 million (under 2% GDP growth) as percentage of tax revenue in the 2015/16 budget (2010 terms)



Source: National Department of Health, South African Revenue Services, StatsSA, Econex calculations

The funding shortfall in 2025/26 (expressed in 2010 terms), assuming a growth rate of 2% per annum, would equal more than a third of tax revenue generated from personal income tax, 75% of corporate income tax or 51% of VAT. In total, the funding shortfall under this scenario is projected to be 13% of total tax revenue generated in the 2015/16 fiscal year. Having considered the funding shortfall relative to available revenue sources, we next consider supply constraints which may place a further burden on the feasibility of the implementation of the NHI.

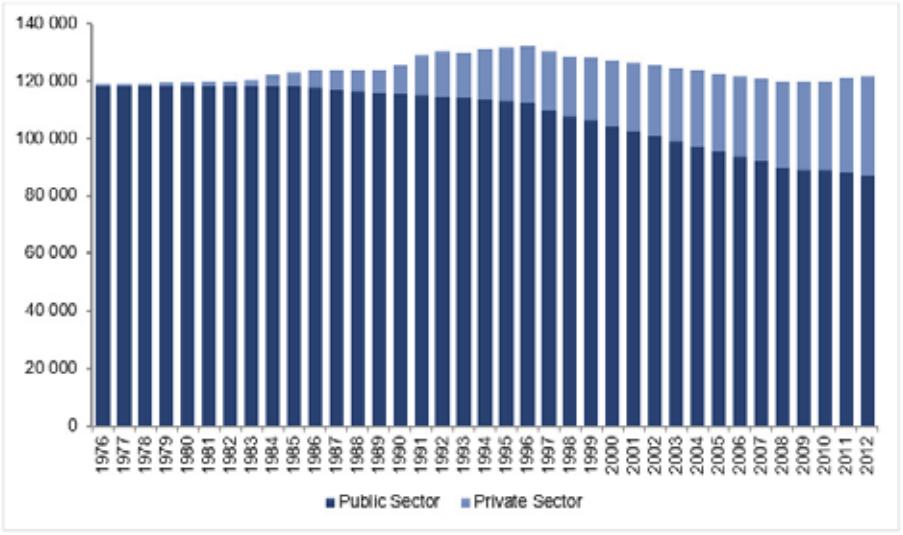
5 Supply constraints

The simulations in the previous section do not take supply constraints into account. Given the substantial anticipated increase in the demand for visits to doctors and specialists and the constraints relating to these and other resources, it is unlikely that the South African system will be able to meet this increased demand. In particular, we consider the availability of hospital beds, high and rising occupancy rates and the shortage of healthcare professionals.

5.1 Hospitals

Figure 8 shows how the number

Figure 8: Private and public sector beds, 1976-2012[16]



Source: Van den Heever (2010); Health Systems Trust; Annual statements of private hospitals, Econex Market Concentration trends in the Private Healthcare Industry, Occasional Note, March 2014

16. For the private sector, we only include hospital bed numbers up to 2012, since this is the most up to date verified number we have at our disposal. We note that from HASA's own data, there were 30,636 private hospital beds in 2016. However, it was communicated that this may not be a comprehensive list, and thus we are not able to verify this number. For the public sector hospital beds, we only have data available for 2010 (88,920 beds) and 2014 (85,362 beds). Therefore, to arrive at 2011 and 2012 values, we used linear interpolation.

of hospital beds in South Africa has changed since 1976. Importantly, although the total number of hospital beds was at a high in 1996, it stood at approximately the same level in 2012 as in 1976. We also note that the composition has changed over time, with private hospitals continually contributing more beds. From these figures, we note that although the total number of beds has stayed relatively constant over time, the private sector has managed to grow its bed numbers[17], while the public sector's beds has decreased over the same period[18]. In 2012 there were 87,141 beds in the public sector and 34,600 in the private sector, a total of 121,741 beds countrywide.

If we consider the number of available hospital beds relative to South Africa's more or less 52.3 million[19] residents in 2012, we find that there are 2.3 beds per 1,000 of the population, which is half of the OECD average of 4.6 beds per 1,000 of the population. This estimate would be even lower without the beds in the private sector, which have been increasing over time. The private sector's hospital beds therefore lessens the load on the public sector's beds, which has seen a consistent decrease since 1976. We note that according to international standards, South Africa has a relatively low number of hospital beds, imposing a significant constraint on service delivery. In the face of this total shortage of hospital beds, we note that this will only be exacerbated by the demand increase that will follow the implementation of the NHI system.

Given that the growth in hospital beds has been outpaced by population growth and the increasing burden of disease, stagnant growth in the total number of hospital beds places pressure on the occupancy rates which are already at high levels in both the private and public sector.[20] It should be kept in mind that occupancy rates are expressed as a percentage of registered beds, but occupancy can never exceed the number of operational beds (which often is less than total registered beds). Additionally, higher occupancy rates are specifically constraining given the current shortage of medical professionals.[21]

The 2009 Private Hospital Review indicates that the average hospital occupancy across the industry, calculated as the ratio of bed days used to bed days available, was 65.5% in 2008.[22] In more recent years, this rate has been somewhat higher with the occupancy ratio of the three largest hospital groups in South Africa (Life, Netcare and Mediclinic) all exceeding 70% (when only considering Netcare's full-week rate).

As mentioned above, the implementation of the NHI will result in a large inflow of newly insured patients, which will put further strain on the already high occupancy rates in the private sector. This is especially true since a similar trend is observed for public sector occupancy rates. More specifically, we note that the total inpatient bed utilisation rate in the public sector has increased from an average of 68% in 2003 to 72% in

17. For the private sector, we only include hospital bed numbers up to 2012, since this is the most up to date verified number we have at our disposal. We note that from HASA's own data, there were 30,636 private hospital beds in 2016. However, it was communicated that this may not be a comprehensive list, and thus we are not able to verify this number.
18. For the public sector hospital beds, we only have data available for 2010 (88,920 beds) and 2014 (85,362 beds). Therefore, to arrive at 2011 and 2012 values, we used linear interpolation.
19. Statistics SA mid-year estimate for 2012 (revised).
20. When interpreting occupancy rates/levels, there are many factors to keep in mind. Firstly, a 100% occupancy rate is neither practical nor possible. All hospitals require vacant beds at all times in order to accommodate emergency admissions. Furthermore, quoted occupancy rates are calculated as an average which included periods of abnormally low occupancy (such as weekends and holiday seasons). High occupancy rates (of over 80%) place significant strain on the hospital support services (cleaning, linen, catering, administration and security) and increases the pressure on nursing staff and patient care, resulting in a relative or absolute decline in staff to patient ratios. In addition, it has been suggested in the literature that occupancy levels approaching 90% increase the risk of adverse events (such as skin lesions, falls, medication errors and others). A further major concern at high occupancy levels is infection control. These risks to clinical quality have added financial implications as well.
21. HASA. (2008). Private Hospital Review 2008: Examination of factors impacting on private hospitals.
22. As mentioned in Econex Health Reform note 4, these figures include weekends and public holidays (i.e. occupancy ratios are calculated over all days of the year) and are based on licensed beds, not actual beds.

2014. If the number of total hospital beds in the country is not increased sufficiently, it will be very difficult for both the public and private hospitals to function optimally when occupancy rates increase as expected with the introduction of the NHI.

5.2 Human resources for health (HRH)

In addition to the shortage of beds and the increasing occupancy rates, South Africa has an acute shortage of qualified medical professionals, specifically general practitioners, medical specialists and nurses. The number of these professionals are shown in Table 3 for the private and public sectors (filled posts) as well as the combined total. The last row in the table looks at the number of respective medical professionals per 100,000 of the total South African population.

To put these numbers into context, we compare it with international precedents. We note that South Africa is significantly supply constrained compared to its peer countries. More specifically, while South Africa has 64 doctors per 100,000 of the total population[23], countries such as Brazil, Russia, China and OECD countries do not have similar supply constraints in terms of human resources.

Table 3: Number of medical professionals working in the private and public sectors by profession, 2014

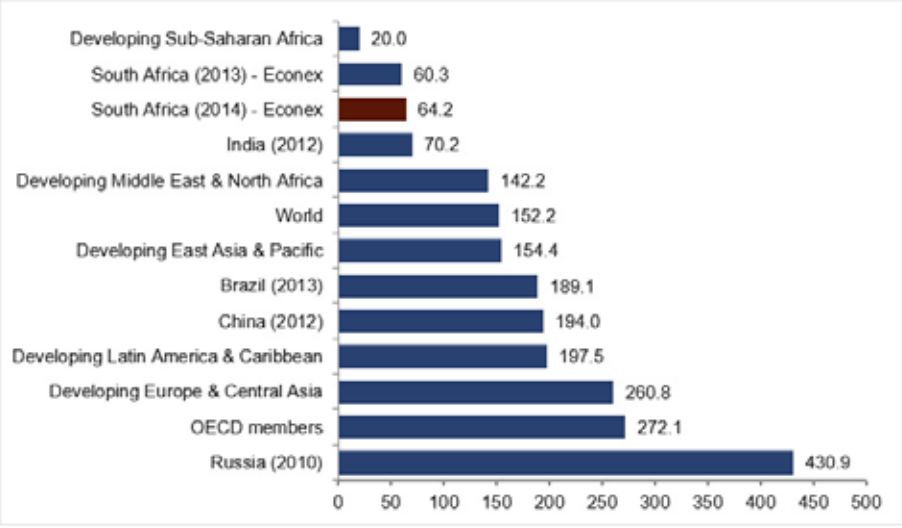
Sector	General Practitioners	Medical Specialists	Total doctors	Total Nurses
Private	8 234	7 418	15 652	89 328
Public	14 097	4 920	19 017	132 430
Total in SA	22 331	12 338	34 669	221 758
Per 100,000 of the total population	41	23	64	410

Source: Econex calculations using data provided by private medical scheme administrators and Persa data

Although the ratios quoted here are representative of the country as a whole, geographical disparities imply that the ratios may look very different between the various provinces. Although we only have public sector data available for the provincial comparison, we note that adding the private sector data would exacerbate the disparities between the provinces, since private sector medical practitioners and medical specialists are more prevalent in and around the country's economic hubs (i.e. Johannesburg, Cape Town, Durban, etc.) where most of the medical scheme beneficiaries also reside.

Given the geographic disparities illustrated by the public sector ratios, one can assume that the aggregate ratios (including the private sector distributions) are worse in some of the less populated regions of the country. In addition to these supply constraints, the utilisation of benefits that would be available under an NHI type system should be considered carefully. In other words, the rationing of services and limited resources need to be considered carefully. The shortage of doctors is even more pronounced when looking at the vacancy rates in the

Figure 9: All physicians per 100,000 of the population, 2014



Source: World Health Organization

23. From Econex presentation at 2014 HASA conference. *Doctors in South Africa – status quo.* Available online: http://www.hasa.co.za/wp-content/uploads/2014/10/HASA-Conference-Marine-Erasmus1.pdf

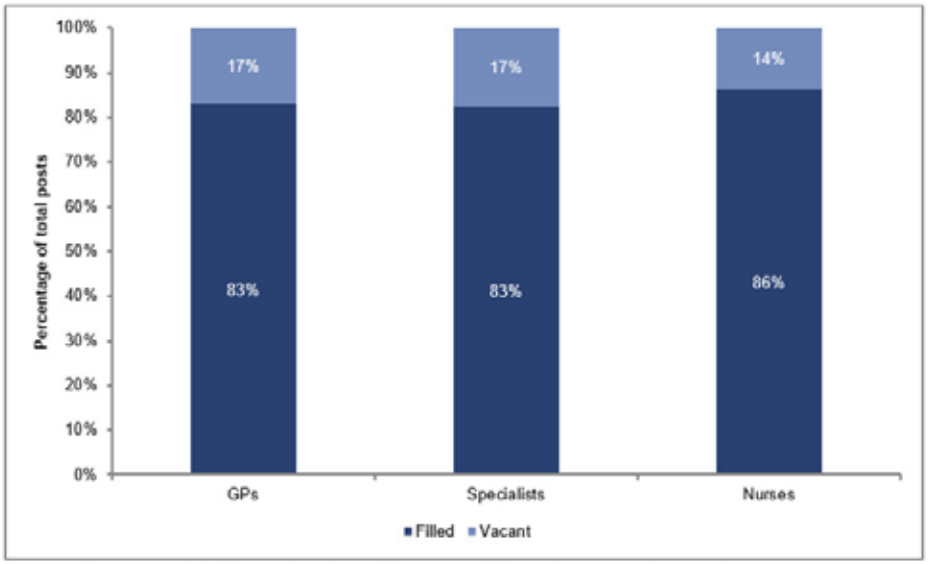
public health sector. The figure shows that the vacancy rate for GPs and specialists was 17% in 2014, while the vacancy rate for all nurses (RNs, ENs and ENAs) was 14% in 2014.

6 Conclusion

In conclusion, our analysis shows that South Africa faces a significant supply constraint. Internationally, South Africa's hospital bed availability is far lower than that of its peer countries. This situation has resulted from stagnant growth in hospital beds since 1976, which has ultimately contributed to more pressure on rising occupancy rates. This supply constraint also holds for human resources.

The availability of physicians per 100,000 of the population shows that South Africa fares poorly against other countries/ regions. Although this is less problematic for nursing, South Africa still performs poorly by international standards. In addition, the provincial distribution of the public health sector's human resources indicates that there is a maldistribution of medical professionals which exacerbates the supply constraints in rural areas.

Figure 10: Proportion of filled and vacant posts in the public sector, 2014



Source: Econex calculations using Persal Personnel Administration System data

It is important to note that the implementation of a NHI plan will have to overcome all of these supply constraints, in addition to the significant increase in demand that will materialise as a result of South Africa's rising disease burden. Ultimately, this will translate into added financial pressure.

TURN TO VIEW SUMMARY

IN SUMMARY

1. **The public health budget is projected to increase** from 4.1% of GDP to 6.6%.

2. **To finance the estimated cost of R256 billion of the NHI in 2025/26,** the public health budget will have to increase with more than 10% annually (between 2019/20 and 2025/26).

3. **There is no evidence of large budget increases for NHI funding in the near future,** as the February 2016 medium-term budget expenditure estimates show very little expected increases in the national health budget as a percentage of GDP up to 2018/19 in real terms.

4. **The funding shortfall in the White Paper is estimated at R 108 billion by 2025/26,** assuming a GDP growth rate of 2%. This is equivalent to 80% of the current budget. Revised estimates, assuming greater increases in demand and updated GDP growth forecasts, indicate that the shortfall may exceed R 200 billion by 2025/26.

5. **Funding the R 108 billion shortfall will require total government revenue to increase** by more than 10% by 2025/26.

6. Given the literature on insurance-induced demand, pent-up demand and South Africa's unique quadruple burden of disease, much larger utilisation increases are to be expected than current assumptions allow for. **The expected increases in demand and utilisation associated with the introduction of the NHI are not sufficient.**

7. **Existing supply constraints such as health facilities and human resources present a significant challenge,** especially under a NHI scenario that will impose an even greater burden on these scarce resources.

8. **Expected increases in both demand and supply are therefore not adequately accounted for in the NHI White Paper costing model.** It implies that the financial implications of the NHI will be even greater than currently anticipated.

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