

# The Human Resource Supply Constraint: The Case of Doctors

*This note is the second in our mini-series of research notes dealing with the issue of whether South Africa (SA) has adequate human resources for health (HRH). Here we assess the future supply of doctors (general practitioners (GPs) and specialists) over the next 10 years and find that, based on the current age profile and if similar training and attrition rates were to continue, there will be a decline in the total number of doctors actively working in SA. This should be seen in the context of significant unmet demand for quality healthcare services at the moment, as well as large expected increases in demand as underlying supply constraints are addressed.*

## 1 Introduction

The idea that SA has a severe shortage of healthcare professionals is not new. In this note we consider the supply side of this shortage for doctors specifically, i.e. we do not attempt to calculate a complicated needs- or demand-based model, but rather assess the supply of doctors up to 2020 if all factors remain constant. The scenario presented applies currently observed age profiles, training and attrition rates to determine

a base case for the future supply of doctors – the relevant assumptions are listed from section 3 onwards. No specific reforms are taken into account (nor are any suggested) since very few details in this regard has been announced publicly. Any future requirements will be directly dependent on the specific service delivery model finally chosen.

Our results suggest a decline in the absolute number of doctors in SA (see Figure 1) from

27,431 in 2010 to 23,849 in 2020. When assessing the impact of this expected decrease, one has to keep in mind that there is evidence of substantial pent-up demand for quality healthcare services,<sup>1</sup> largely because of supply constraints in the public sector. Should resourcing improve, one can expect large increases in demand – independent of whether the planned national health insurance (NHI) is introduced or not. SA does not have nearly enough doctors to deal

This research note forms part of a series of notes dealing with issues of health reform in South Africa. In the interest of constructively contributing to the NHI debate, the Hospital Association of South Africa (HASA) has commissioned this series of research notes which can be accessed on the Econex website: [www.econex.co.za](http://www.econex.co.za).

1. See NHI Note 3. Available at: [www.econex.co.za](http://www.econex.co.za)

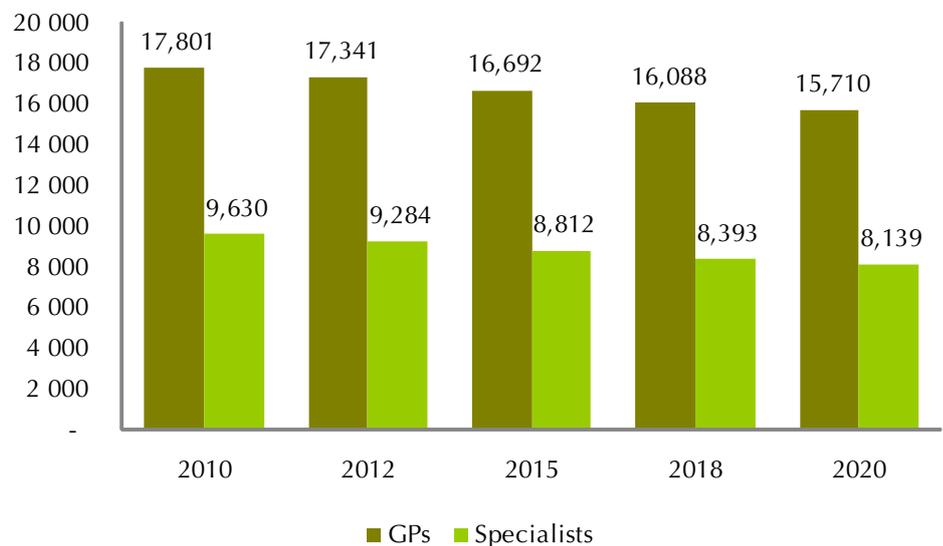
with current demand, and there exist large vacancy rates across the country (as the next section will show); a decrease in the number of doctors over the next 10 years would therefore be detrimental to the delivery of care for the entire population.

## 2 The *Status Quo*: Current Supply Constraints

In Health Reform Note 7 the existing stock of doctors was determined. Our estimates indicate that there are 17,801 GPs and 9,630 specialists actively working in SA at the moment (2010), i.e. 27,431 doctors in total.<sup>2</sup> This implies a doctor to population ratio of 55 per 100,000. Table 1 shows that this is a very low ratio compared to a number of other countries.

It is clear that SA fall far short of developed country ratios such as those found in the USA, Greece, the UK and Australia. However, we also do not compare favourably to countries on a similar economic development level such as Brazil and Mexico. Brazil is often mentioned as a suitable comparison to SA,

Figure 1: Scenario results – base case (current trends assumed), 2010-2020



Source: Econex calculations

Table 1: International comparative healthcare ratios, 2008

Doctors per 100,000 population	
High-income countries*	280
Middle-income countries*	180
Low-income countries*	50
<b>South Africa<sup>3</sup></b>	<b>55</b>
Lesotho	5
Brazil	185
Mexico	198
USA	256
Greece	500
UK	230
Australia	247

\*Refers to World Bank 2001 ratios quoted in Breler and Wilschut, 2006. "Doctors in a Divided Society," HSRC press

2. See Health Reform Note 7. Available at: [www.econex.co.za](http://www.econex.co.za)

3. South African numbers are for 2010 and refer to all doctors (GPs and specialists). See Econex Health Reform Note 7.

4. Please note that the WHO report provides a ratio of 77/100,000 for South Africa, hence similar over and under estimations are possible for other countries.

Source: Econex calculations and World Health Organisation 2008<sup>4</sup>

but should we try to achieve a similar ratio per 100,000 population, it implies that we currently have a shortage of more than 65,000 doctors.

## 2.1 Internal distribution

While SA's doctor to population ratio is inadequate compared to international norms, we also have a dramatically skewed internal distribution. The large variation in geographical distribution is shown in Figure 2, with certain provinces such as the Western Cape and Gauteng having significantly more doctors. Much of the disparities are due to urban concentration, but also to the location of South African public sector teaching hospitals. Moreover, it is a reflection of doctors (especially specialists) being concentrated where medical scheme members are, i.e. where the largest economic activity hubs are.

The regional distribution should be of concern as service delivery in healthcare is dependent on having the available personnel to deliver service in the necessary areas.

It is also an important issue to keep in mind when planning for future HRH requirements in the health sector.

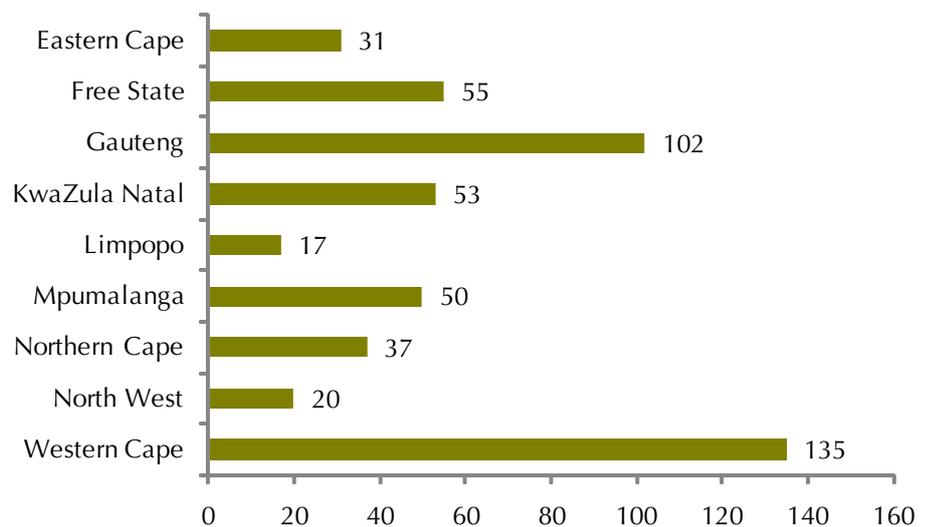
## 2.2 Vacancy rates

More evidence of the current supply constraint and severe shortage of doctors in SA, are the public sector vacancy rates. While vacancy rates do not only reflect absolute shortages of staff, they are reflective of at least a supply/demand mismatch. Vacancy rates in South Africa may also include frozen posts or posts left unfilled due to other

criteria being needed to fill them; it does not automatically imply that there is nobody qualified and willing to take the post.

Figure 3 shows the public sector vacancy rates for GPs, specialists and all healthcare professionals (including GPs and specialists) for each of SA's nine provinces and also the country as a whole. While the national weighted averages are 49% (GPs), 44% (specialists) and 42.5% (all healthcare professionals), Limpopo has the highest vacancy rates: over 80% for GPs and specialists.

Figure 2: South Africa's regional distribution of doctors per 100,000 (public & private), 2010

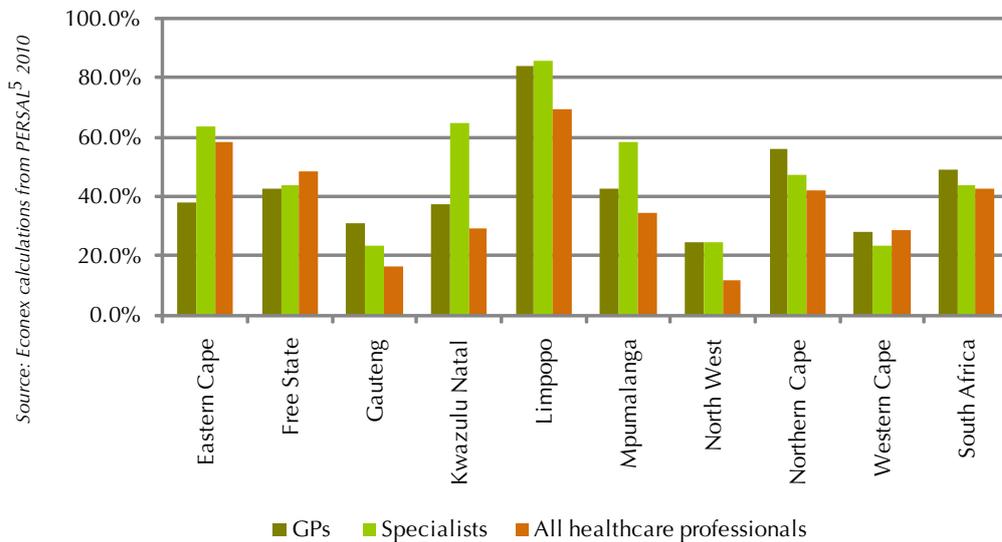


Source: Econex calculation based on HPCSA 2010 and StatsSA (P0302, 2010)

## 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 Dr. 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. Director, Cobus Venter, who joined the company during 2008, is also a Senior Economist at the Bureau for Economic Research (BER) in Stellenbosch. 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](http://www.econex.co.za).

Figure 3: Provincial vacancy rates (public sector), March 2010



Given these extremely large levels of vacancies within the public sector, and the assumption that these posts are currently available,<sup>6</sup> it is crucial to understand the underlying reasons as to why they are vacant. Hence, the rest of this note is dedicated to understanding the inherent supply constraints which form the basic assumptions for our model calculating the future supply of doctors up to 2020. Each of the following sections will discuss different trends and/or assumptions before presenting the results and a simplified needs-based scenario.

### 3 Assumption 1: Training

We begin our analysis by looking at the existing capacity to train doctors in SA. For GPs, the latest data indicate that the total number of MBChB degrees awarded at 8 South African medical schools decreased somewhat from 2006 to 2007 with 1,402 and 1,108 degrees awarded in each respective year; while 1,349 degrees were awarded in 2008.<sup>7</sup> We assumed therefore, that the maximum possible capacity for training GPs is 1,400 graduates per year.

In terms of specialists, the College of Medicines of South Africa (CMSA)<sup>8</sup> completed a survey among the different teaching academies and found that there were 2,446 filled registrar<sup>9</sup> posts in July 2009. There were also 829 vacant posts, which would imply that the total available posts for specialists-in-training were 3,275 in that year. Since the minimum duration for specialist training is four years, we divided the total number of filled posts (2,446) by 4 in order to determine the annual maximum capacity for training specialists, i.e. 612 (which was rounded to 610). As our base case scenario only models the future supply of doctors if existing trends were to continue, we did not use the 3,275 available posts to calculate specialist training capacity, but rather the number of filled posts. Importantly, one cannot merely add the total number of GP and specialist graduates to determine the total annual increase in the supply of doctors. Since an addition to specialists necessarily implies a reduction in GPs, we assume that

5. The government's public sector Personnel and Salary Administration System (PERSAL).

6. It is unclear whether these posts are actually budgeted for, i.e. they might be frozen.

7. Eighty20 data and presentation, 2009. "Health Professionals in South Africa – A Review of Available Data."

8. Strachan, B., 2009. "Meeting South Africa's Needs: A Preliminary Report of an Investigation into Specialist Training and Development," *The Colleges of Medicine in South Africa*.

9. A registrar is a fully qualified doctor that is specializing (i.e. training to be a specialist).

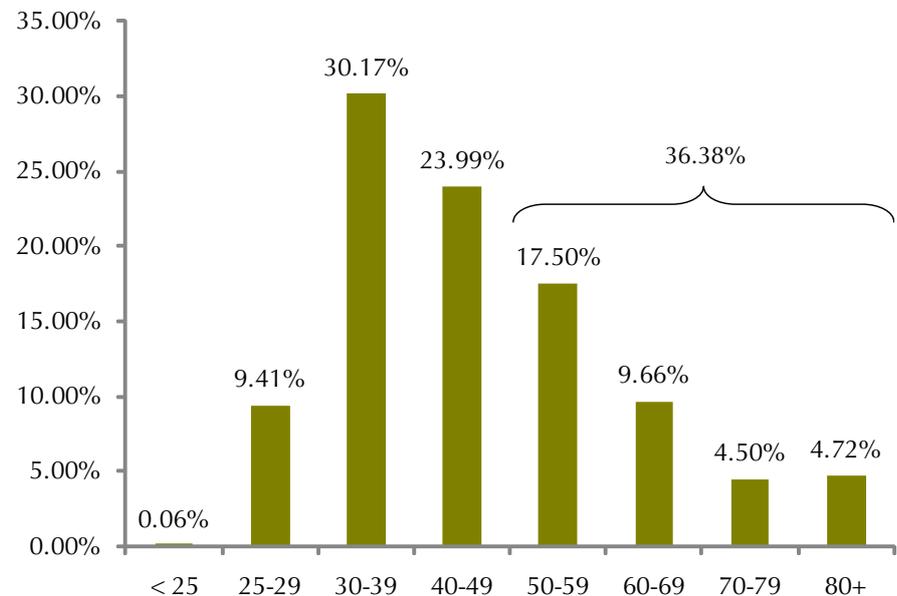
there is a potential total net addition of 1,400 doctors per year, split between GPs (790) and specialists (610).<sup>10</sup>

#### 4 Assumption 2: Age Profile

Assessing the current age profile of doctors will assist in determining the absolute number of retirees each year. A balanced age distribution is also required to maintain quantity and quality over time. Although problematic, we begin by looking at the Health Professions Council of South Africa (HPCSA) data,<sup>11</sup> only to obtain an indicative age profile of all doctors in the public and private sectors (see Figure 4).

From the HPCSA data it seems that 36.4% of doctors are above the age of 50. However, for our model we need to obtain the different age distributions between GPs and specialists. Table 2 gives the respective age profiles according to the PERSAL database. As mentioned before, these figures are only for the public sector and one should keep in mind that this age profile is greatly influenced by the number of mostly young doctors under-

Figure 4: Age profile of all registered doctors, 2009



\*Refers to World Bank 2001 ratios quoted in Breler and Wilschut, 2006. "Doctors in a Divided Society," HSRC press

going their in-service training or community service years, as well as those specialising.

While there is little information available on the age profile of doctors in the private sector, two of the large hospital groups in SA (Medi-Clinic and

Netcare) recently completed surveys among specialists delivering care to their patients – this is used as a proxy for the private sector. The results are presented in Table 3 and point to the fact that the specialist population is ageing and not necessarily being replenished

Table 2: Age distribution of doctors (public sector), 2006

	<30	30-50	>50 years old
General practitioners	31.9%	52.7%	15.4%
Specialists (fully qualified)	0.9%	60.8%	38.0%

10. We realise that there will be a lag of at least 4 years between the 790 GPs who are added and the 610 specialists, but since we are not tracking individual doctors this would have no effect in our model. Each year 790 GPs and 610 specialists will be added to the total stock of doctors, albeit from different year groups.

11. We acknowledge that using HPCSA data has limitations as discussed in Health Reform Note 7.

sufficiently with young doctors to take over from those retiring.

As expected, specialists working in the private sector tend to be older than those in the public sector. Adding the last two rows in Table 3 indicate that 44.6% of specialists in the private sector are above the age of 50, compared to 38% in the public sector. Based on the public/private sector split of specialists estimated in Health Reform Note 7 (i.e. 43.8% and 56.2% of specialists work in the public and private sectors respectively), and knowing the relative percentages of specialists above the age of 50 in each sector, we

assume that **there is a weighted average percentage of 41.7% of all specialists working in SA who are older than 50.**

Although we do not have a specific age distribution for private sector GPs, one can infer the average percentage of all GPs that are above the age of 50. According to the HPC-SA data in Figure 4, 36.4% of all GPs and specialists are older than 50. Using this figure, and assuming that 41.7% of all specialists are above 50, it follows that once the relative numbers of GPs and specialists are taken into account, we can assume that on average 33.5% of all GPs are older than 50.<sup>12</sup>

Based on the age profile calculated in the previous section, we assume that all doctors presently above the age of 50 will retire within the next 15 years. For simplicity sake we assume a constant rate of retirement. In other words, we divided the number of doctors above 50 by 15 for GPs and specialists in order to determine the number of doctors retiring each year. Hence, we assume that **398 GPs and 268 specialists retire each year.**

In addition to those retiring, **2.8% of all specialists exit the profession due to illness and death.**<sup>13</sup> A further 1% exit due to other reasons not including emigration, such as pursuing different career opportunities.<sup>14</sup> Due to the fact that we cannot make an informed estimate of how many GPs exit due to illness and death we have taken a conservative 50% of the rate for specialists, i.e. **1.4% of GPs exit each year because of illness and death.** However, we assume that the same percentage of GPs leave the medical profession due to other reasons. The assumption

Table 3: Age distribution of specialists (private sector), 2010

Age group	% of total specialists
<30	2.6%
30-40	17.4%
41-50	35.2%
51-55	16.8%
56+	27.8%

Source: Medi-Clinic and Netcare

### 5 Assumptions 3 & 4: Retirement & Exiting

Attrition rates are influenced by many different factors, including emigration, illness, death or simply other exists where doctors choose to pursue different occupations. In the next section emigration is discussed as a separate assumption while we consider retirement and other reasons for exiting here.

12. We acknowledge that the different age distributions in Figure 4, Table 2 and Table 3 are for different years. Since these are all percentages and not absolute figures, it was assumed that the age profile stayed relatively constant over the various years and therefore the same percentages were applied to the 2010 figures.

13. Financial & Fiscal Commission: Submission for the Division of Revenue 2007/2008.

14. See footnote 13.

Table 4: Distribution of SA health professionals abroad, 2006

	Doctors	Nurses	Other health professionals	Total
Australia	1,114	1,085	1,297	3,496
Canada	1,345	330	685	2,360
New Zealand	555	423	618	1,596
United Kingdom	3,625	2,923	2,451	8,999
United States	2,828	2,083	2,591	6,956
<b>TOTAL</b>	<b>8,921</b>	<b>6,844</b>	<b>7,642</b>	<b>23,407</b>

Source: Strachan, B., 2009. 15

professionals emigrated to. As emigration is notoriously difficult to measure, it can be assumed that this is probably an underestimation of the situation.

There are various reasons for people emigrating to other countries which one can discuss in detail, but that is not the present focus. Overall, the CMSA estimates that 25% of all doctors trained in SA are no longer working here.<sup>16</sup> In accordance with their estimate, we assume that **25% of those GPs and specialists added to the stock each year will emigrate.**

## 7 The Future Supply Scenario

Using each of the assumptions discussed throughout this note, we created a base case scenario for the next 10 years

therefore is that **1% of all doctors exit due to reasons other than retirement or illness and death.**

## 6 Assumption 5: Emigration

While the aim of this research note is to provide an overview of the current reality, rather

than an analysis of why it has developed, the exiting from the profession and/or emigration of SA-trained professionals permeates nearly all the latest literature. The National Department of Health estimated that in 2006 there were more than 23,000 health professionals working abroad. Table 4 gives an indication of where these

## ECONEX Services

Econex has extensive experience in competition economics, international trade and regulatory analysis. Strategic analysis was recently added as practice area. We have an established reputation for providing expert economic advice for high profile mergers and complaints that appear before the competition authorities. Some of the more recent highlights include the complaint against British American Tobacco, the merger between MTN and iTalk, the complaint against Senwes and the acquisition of KayaFM by Primedia. Apart from competition work we have also been involved in trade matters which included analyses of the effects of tariffs, export taxes and anti-dumping tariffs.

As a result of our work in competition analysis we also have invaluable experience in some of the sectors of the South African economy where regulation continues to play a role, e.g. the telecommunications, health and energy sectors. We use economic knowledge of these sectors to analyse specific problems for some of the larger telecommunications, health and energy companies.

15. See footnote 8.

16. See footnote 8.

in order to highlight what could possibly transpire given what we know about the supply of GPs and specialists at the moment. In other words, the results presented in Table 5 show what the future supply of doctors may look like if current trends are applied up to 2020, and no doctors are imported from abroad. As with all scenarios, these estimates serve as indicator only of the future, *ceteris paribus*.

The results presented in the base case scenario portray a future where the absolute volume of GPs decline from 17,801 currently to 15,710 in a decade (a

12% net reduction). GPs as a ratio to the population decline from an already low 35.9 to just 30.2 per 100,000 population by 2010. Specialist numbers reduce from 9,630 in 2010 to 8,139 in 2020 (a net reduction of almost 16%). The population ratio declines from 19.4 to 15.6 specialists per 100,000 population in 2020. (See Figure 1 for a graphic description of these results.)

Of course these supply side figures are only one side of the coin and it is difficult to put these in context without a proper analysis of the demand for healthcare services

delivered by doctors. While we do not attempt to make any predictions of the demand side here, we know that the ANC expects a 70-80% increase in demand, following the implementation of the proposed NHI scheme.<sup>18</sup> As mentioned before, evidence of currently unmet demand suggests that there is already a shortage in the supply of GPs and specialists at present. Any reduction to the stock of doctors would thus be very concerning in light of these expected increases – irrespective of whether the NHI is implemented or not.

## 8 An Alternative Scenario

Without trying to create a complicated needs-based model to determine the expected shortages of doctors in the near future, we include a short alternative scenario for illustrative purposes only.

Table 1 indicates that a ratio of 180 doctors per 100,000 population is the international average/norm for middle income countries. In that same table it is shown that the doctor to population ratio for SA (also a middle income country) is currently at 55 per 100,000. It is clearly

Table 5: Econex base case supply scenario of doctors, 2010-2020

Year	2010	2012	2015	2018	2020
SA Population <sup>17</sup>	49,567,103	50,064,013	50,818,734	51,584,833	52,101,971
GPs (Base scenario)	17,801	17,341	16,692	16,088	15,710
Specialists (Base scenario)	9,630	9,284	8,812	8,393	8,139
<b>Total Doctors</b>	<b>27,431</b>	<b>26,625</b>	<b>25,504</b>	<b>24,481</b>	<b>23,848</b>
<b>Ratios per 100,000 population</b>					
GPs	35.9	34.6	32.8	31.2	30.2
Specialists	19.4	18.5	17.3	16.3	15.6
<b>Total Doctors</b>	<b>55.3</b>	<b>53.2</b>	<b>50.2</b>	<b>47.5</b>	<b>45.8</b>

17. Bureau for Economic Research, Long Term Scenarios, December 2009.

18. ANC National General Council 2010, Additional Discussion Documents. Released September 2010. Available at:

Table 6: Alternative scenario, 2010-2020: Target doctor to population ratio of 90/100,000

Year	2010	2012	2015	2018	2020
SA Population	49,567,103	49,814,938	50,064,013	50,314,333	50,565,904
Specialist ratio of 24.4/100,000	12,094	12,216	12,400	12,587	12,713
Required increase to existing total stock in 2010 (not annually)	2,464	2,932	3,587	4,194	4,574
GP ratio of 65.6/100,000	32,516	32,842	33,337	33,840	34,179
Required increase to existing total stock in 2010 (not annually)	14,714	15,501	16,645	17,751	18,469

not possible in the short term to increase doctor levels to ratios comparable with other middle income countries through internal methods alone (i.e. not importing). Since we are not assuming any increase in the local stock of doctors from abroad, half of the ratio for middle income countries was chosen as a possible desired outcome. I.e. this alternative scenario determines the shortage or need for doctors over the next 10 years if a ratio of 90 doctors per 100,000 were to be achieved.

In order to determine the respective ratios for GPs and specialists, we use the CMSA estimate for specialists in their “pragmatic growth” scenario. In calculating the required increase

to the output of specialists that will better serve SA’s needs, the CMSA (presumably the most authoritative body to determine needs) states responsibly that they chose pragmatic levels above ideal levels of growth as targets since “this is not realistic for cost reasons and for the reason that it is necessary to develop specialists in relation to the local context and need.”<sup>19</sup> Accordingly, they determine that a ratio of 24.4 specialists per 100,000 population is desirable for the country as a whole.

Assuming an overall target of 90 doctors per 100,000 population of which 24.4 should be specialists according to the CMSA estimates, it implies that the target for GPs should be

65.6 per 100,000. (These are already much higher than the current ratios of 35.6 and 19.3 per 100,000 population for GPs and specialists respectively.) The results of the alternative scenario are presented in Table 6.

**The alternative scenario (based on the conservative ratio of only 90 doctors per 100,000 population) shows that large increases to the stock of doctors will be required. This scenario implies that by 2020 we would need to add over 4,500 specialists to the existing stock, but more concerning is that we would need to more than double the current stock of GPs by adding almost 18,500 at the end of the next decade. This will only**

19. See footnote 8. (p.37)

20. See footnote 17.

21. Required increases are calculated by subtracting the supply of GPs/specialists in each year as indicated by the base case supply scenario, from the suggested total requirement based on the chosen ratios in the alternative scenario.

**bring SA halfway to the average ratio for middle income countries. When one considers that it takes a minimum of 5 years to train a GP and closer to 10 years for a specialist, it seems that any plans for a large increase in demand for healthcare would be up against an almost immediate supply constraint.**

## 9 Conclusion

This note described the current supply constraints to delivering quality healthcare services to the entire population by considering regional disparities in the distribution of doctors and vacancy rates in the public sector specifically. A base case supply

scenario was then developed by taking into account underlying trends influencing the local supply of GPs and specialists. The results indicated a net reduction of 12% to the stock of GPs and 16% to the stock of specialists over the next 10 years. These results should be seen in the face of large expected increases in demand and high levels of currently unmet demand for GP and specialist services.

It was stated that this note will not try to provide any recommendation as to what the future architecture of healthcare provision in South Africa should look like. Rather, the most important message is that there are certain structural issues in the composition and training

of SA's HRH that require urgent attention if the future is to be secured with adequate supplies of quality, trained professionals. Whatever system will be in place will be sourcing from the same pool – namely doctors currently practising in South Africa as well as in training, or those that will emerge from the training institutions in the future.

The final structure of healthcare reforms will play a central part in the required numbers, but it is unlikely that South Africa will be able to reach desired levels of care without a substantial and maintained addition to HRH. This is relevant no matter what the delivery model for the provision of healthcare to South Africa is.

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