A RESEARCH PAPER OF
THE EXTENT AND NATURE OF DEMAND AND SUPPLY OF MEDICAL PRACTITIONER'S HUMAN RESOURCES: A CASE OF THE EDUCATION AND TRAINING LANDSCAPE

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1. INTRODUCTION

The shortages of human resources in the health sector have been described as one of the most pressing global health issues of our time. The World Health Organization (WHO) estimates that the world faces a global shortage of almost 4.3 million doctors, midwives, nurses, and other healthcare professionals. There is a global undersupply of these professionals, and this threatens the quality and sustainability of health systems worldwide. The short supply of Medical Practitioners in South Africa (SA) is well known; the global doctor-to-patients ratio is 1:1000 while South Africa only has an estimated ratio of 1:3198. This means that the SA is not meeting the doctor-to-patient ratio as recommended by the World Health Organisation (WHO). This has continued to put a strain on the SA health system, especially at the time of implementing National Health Insurance (NHI). Therefore, in response to the documented skills shortages of medical practitioners, it is important to understand the extent of supply and demand of Medical Practitioners in SA. The aim of this study was to investigate the extent and nature of the supply and demand, and ratios and densities of Medical Practitioners in SA, and the challenges that exist pertaining to maintain the supply of these human resource and skills. It is important to note that this report highlights key findings of the study.

Research objectives

i. To investigate supply trends by examining the outputs of basic education in STEM fields (Mathematics, Physical Science, and Life Science)
ii. To investigate trends in higher education enrolment and output in the Bachelor of Medicine and Bachelor of Surgery (MBChB) degree and postgraduate qualification.
iii. To investigate trends in the supply of internships and community service, as well as supply challenges.
iv. To investigate the global and national ratios and densities.

2. LITERATURE REVIEW

Although South Africa's health education and training system is reckoned as one of the most advanced in the world, the supply fails to ensure the right skills mix and competency to address the burden of disease and for the delivery of quality universal health care

(UHC). The importance of linking health workforce education and training programmes to the needs of the population and that of the health system cannot be over-emphasized. Additionally, the SA 'can medical education and training system is currently covered by 10 public universities that offer training for medical practitioners. These include the following:

- University of Cape Town
- University of Witwatersrand
- Stellenbosch University
- University of KwaZulu Natal
- University of Pretoria
- University of the Free State
- University of Limpopo
- Walter Sisulu University
- University of Western Cape
- Nelson Mandela University

In 2008, the National Department of Health (NDoH) in South Africa (SA) introduced a new health profession of clinical associates (ClinAs). This was a response to a chronic shortage of healthcare workers, especially doctors. ClinAs are professional members of the healthcare system with the necessary skills and knowledge to function effectively mainly in primary healthcare settings such as clinics, community health centres (CHCs) and district hospitals. ClinAs are registered under the Health Professions Council of South Africa, with their scope of practice include but not limited to conduct consultations (history taking and physical examination), order and interpret investigations (e.g. electrocardiograms, laboratory tests, X-rays) and diagnose and treat common conditions. However, the limitation on these ClinAs is that in many public health care facilities they are not well accommodated. Laos some researchers also argue that the NDoH has not shown significant support for the profession of CLinAs since they were introduced. Due to the absence of a detailed scope of practice or job descriptions, which are necessary for determining an appropriate salary level for al professions. This resulted to the ClinAs being underpaid and overworked. Which this by many experts it has been categories as the implementation failure.

MBChB stands for Bachelor of Medicine, Bachelor of Surgery. It is an undergraduate medical degree awarded upon completion of a medical programme. The MBChB degree is equivalent to the MD (Doctor of Medicine) degree awarded in other countries. Medical practitioners play a crucial role in the healthcare system of South Africa, as they are the primary healthcare providers responsible for diagnosing, treating and managing various medical conditions. Within the Medical practitioner profession, we also have specialised Medical Practitioners that are specialising in different medical field. These specializations enable them to diagnose complex conditions. Currently, globally the demand for specialised healthcare services often exceeds the available supply, leading to longer waiting times and limited access to specialised care. There are several factors that contribute to a shortage of Medical Specialists which include but not limited to insufficient training opportunities for specialists. Also, brain drain which results to many highly trained Medical Specialists choose to migrate to other countries where they can find better career growth.

Furthermore, in addition to the training of medical practitioners at SA universities, the country has also been sending medical students to Cuba since 1997 under the Nelson Mandela-Fidel Castro training programme. The costs of this programme are carried by provincial health departments. The students usually spend their first year learning the Spanish language, followed by a five-year training period at Cuban medical schools. After returning to SA, they complete their training by undergoing an 18-month training programme. This is the case because the Cuban medical training model focuses on preventative and promotive healthcare services rather than the curative health care system.

Therefore, when looking at the supply of Medical Practitioners it is important to highlight career pathways for Medical Practitioners by linking it to their educational background. This also signals to us the investment time it takes to training Medical Practitioners in SA. The following table highlights the career pathways for Medical Practitioners from enrollment into a MBChB degree. The table below highlights a detailed pathway for Medical students until the practice as specialist.

Table 1:Career Pathways

	Qualification Title	**MBChB degree**
	NQF level	8
	Duration	6 years (some institutions its 7 years)
	Year Levels	Year 1 - 6

Undergraduate Medical student (MBChB degree)	Entry Requirements	National Senior Certificate (UMALUSI) NQF level 4, with each of the following subjects at a minimum of 60%: • Mathematics • Life Sciences • Physical Sciences
Medical Intern	**Professional Registration Category**	**Medical Intern**
	Year level	After graduation
	Duration	2 Year
	Requirements	Placement at a public Hospital
Community service medical practitioner	**Professional Registration Category**	**Community service medical practitioner**
	Duration	1 Year
	Requirements	Placement at a public healthcare facility
Medical Practitioner	**Professional Registration Category**	**Medical Practitioner**
	Requirements	May join another medical practitioner's practice, open an independent practice or work in any public or private health facility
Specialisation and Sub specialisation on Medicine	**Qualification Title**	**Master's in medicine – Training in a specialisation field or Sub-Specialisation**
	NQF level	9
	Duration/Requirements	4 Years- one is employed as a register at a training hospital
	Qualification Title	Master of Philosophy (MPhil)- Training in a sub specialist field
	NQF level	9
	Duration/ Requirements	2 Years- one may be employed as a Senior Registrar at a training hospital

Additionally, the scarcity of literature on Human Resource for Health (HRH) planning in South Africa shows the absence of rigorous public-domain HRH planning, reflecting in the critical shortages of human resources. Needless to say, HRH planning should be continuous to prevent supply-demand gaps from emerging, which is evident in South Africa. The critical shortages and geographic maldistribution of human resources as well as the challenges regarding the interface between the medical training platform and the public service, point to the complexities regarding health workforce planning in the public-domain. The importance of good HRH planning cannot be over-emphasized as almost two-thirds of total public health expenditure goes towards this item on the budget.

In order for SA to meet the recommended ratios of medical professionals to population, well-coordinated HRH planning is required.

Global Comparison

HRH planning is usually done by dedicated agencies within governments or by governments themselves. Some examples of these are in which Japan applies the agency model. They use various commissions and expert panels, which are housed in their Department of Health. The mandate of this group is to conduct health workforce planning for different categories of healthcare workers. Their workforce estimation is often tested by academics who apply their own or independent models for estimations. Additionally, Australia had a dedicated national health workforce planning agency, called Health Workforce Australia, a statutory body that was active between 2008 and 2014. Since 2015 the function was transferred to the Department of Health. Furthermore, South Africa has most recently appointed a Ministerial Task team that worked on HRH planning and refining of the previous strategy. They were assisted by senior health managers from the National Department of Health and the nine Provincial Departments of Health. The Task Team also referred to other models conducted by entities such the Medical Research Council (MRC) and PERCEPT. The National Department of Health (NDoH) acknowledged that the establishment of a health workforce planning unit and the development of planning capacity envisaged in the previous strategic plans has not yet been realised. The department mentioned that it is difficult to conduct workforce planning in the absence of an integrated, accurate and timely HRH database, information system and a national model for estimations.

The above-mentioned literature shows the various approaches taken by various countries around the world to address HRH planning. Furthermore, there hasn't been a well-integrated HRH planning in SA, which should provide coherence accurate HRH data.

3. RESEARCH METHODOLOGY

The study was conducted through the following methods: (i) literature review; (ii) quantitative analysis of several secondary databases: and (iii) qualitative analysis of primary data collected through personal interviews with key experts and stakeholders who have in-depth knowledge of the health sector and the issues relevant to this study.

Sample

Purposive sampling was applied in the case of public training hospitals and private employers; this sampling technique refers to non-probability sampling in which units are selected because they have characteristics that you need in your sample. This approach ensures that the sample selected is most relevant to the research objectives thereby enhancing the study's focus and depth.

Target Population and Sample Size

The target population and sample for the study was as follows:

Table 2: target population and sample size

TARGETED POPULATION	SAMPLE SIZE	RESPONSES
Medical schools	10	9
Public training hospitals	10	5
Statutory Council and voluntary associations	6	6
National Department of Health	1	1
Manager of the Cuba programme	1	1
Medical practitioner who trained in Cuba and currently working in the public sector in South Africa	1	1
Private hospitals	2	2
Total	31	25

It is important to note that the NEHAWU strike was the reason the targeted sample size could not be met for public training hospitals. Some of the interviews planned were canceled due to the strike, as some of the participants were unavailable due to the strike.

Data Collection Instruments

The analysis of secondary data included the following data sources:

- Education Management Information System (EMIS) (data on Grade 12 learners who passed Mathematics, Physical Sciences and Life Sciences) (2012-2022).
- Higher Education Management Information System (HEMIS) (data on enrolment and completion of first four-year degrees in the medicine field) (2012-2021).
- Colleges of Medicine data on specialists and sub-specialist output, as well post-graduate diplomas (2012-2022).
- Workplace Skills Plans (2019).
- Statistics South Africa mid-year population estimates (2012-2022)

- World Health Organisation (WHO), Organisation for Economic Co-operation and Development (OECD) and Institute for Health Metrics and Evaluation (IHME) statistics and indicators.
- The interviews were conducted on a digital platform as well as face-to-face when requested.

4. DISCUSSION OF KEY FINDINGS

The following section will highlight the key findings of the study in line with the research objectives that were examined:

- To investigate supply trends by examining the outputs of basic education in STEM fields (Mathematics, Physical Science, and Life Science)
- To investigate trends in higher education enrolment and output in the Bachelor of Medicine and Bachelor of Surgery (MBChB) degree and postgraduate qualification.
- To investigate trends in the supply of internships and community service, as well as supply challenges.
- To investigate the global and national ratios and densities.

Objective 1: To investigate the trends in the supply of the outputs from Basic Education in Mathematics, Physical Science, and Life Science.

The output from the secondary school system underlies the greater part of the skills supply to the sector. For example, a good Grade 12 pass, with Mathematics, Physical Sciences, and Life Sciences as subjects is a basic entry requirement into most of the health-related tertiary-level study programmes, of which Medicine is one. In broadening the STEM field (Mathematics, Physical Sciences, and Life Sciences as subjects), South Africa seeks "*to increase participation rates in Mathematics and Science*" (Human Resource Development Strategy 2009, p.37). The study shows in Figure 1 and 2 below that participation has a positive annual average growth rate over the four-year period (2018 - 2021) of 3.5% and 4.6% for those writing Mathematics and Physical Sciences towards obtaining the National Senior Certificate respectively. However, the share of distribution has been on the decline by 7% (from 46% to 37%) and 6% (34% to 28%) for those writing Mathematics and Physical Sciences for the NSC respectively. This indicates that more and

more students are not choosing the STEM fields within the Basic Education sub-system irrespective of the overall increasing annual average growth rate of 7.1% between 2017 and 2021 of those writing the NSC.

Figure 1 Proportion of learners writing Mathematics of the NSC, 2018-2021

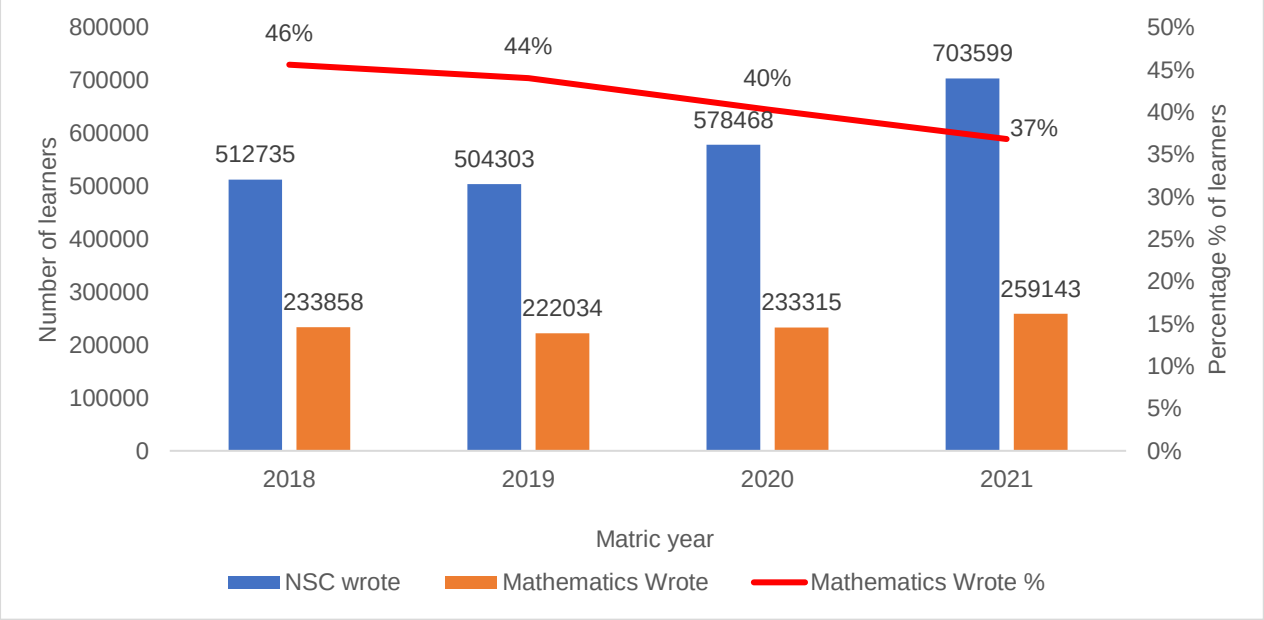
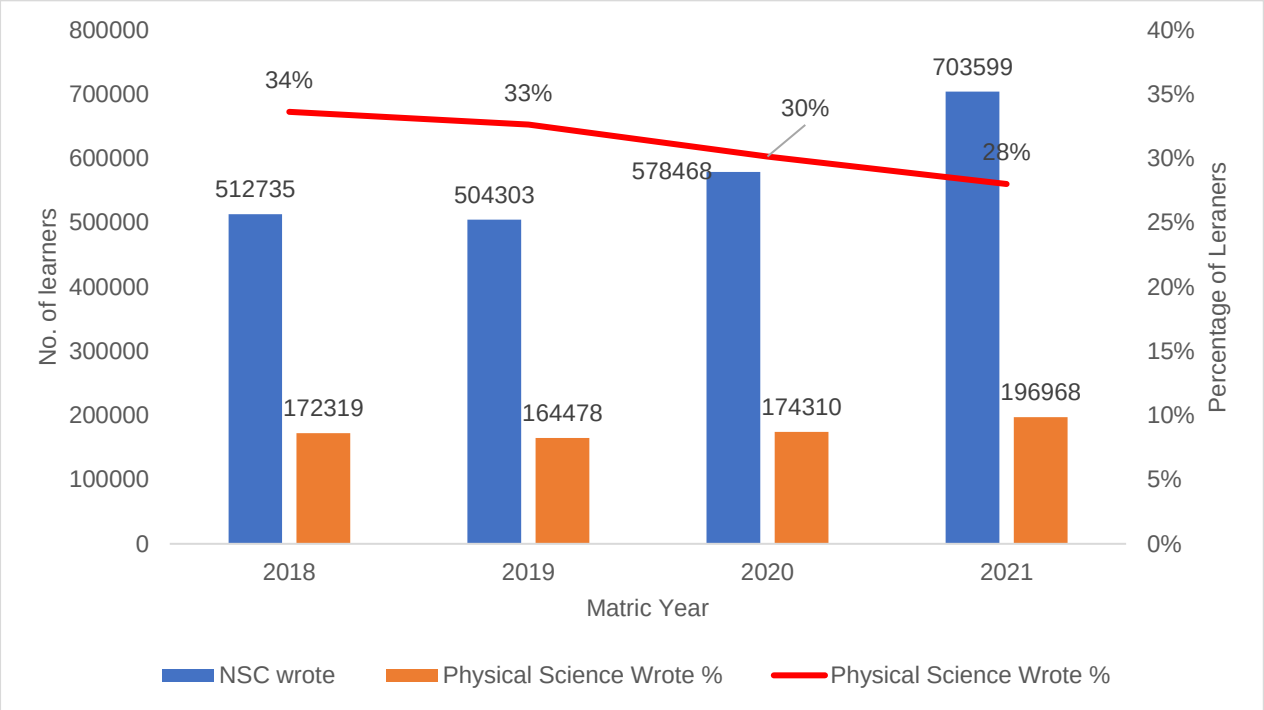


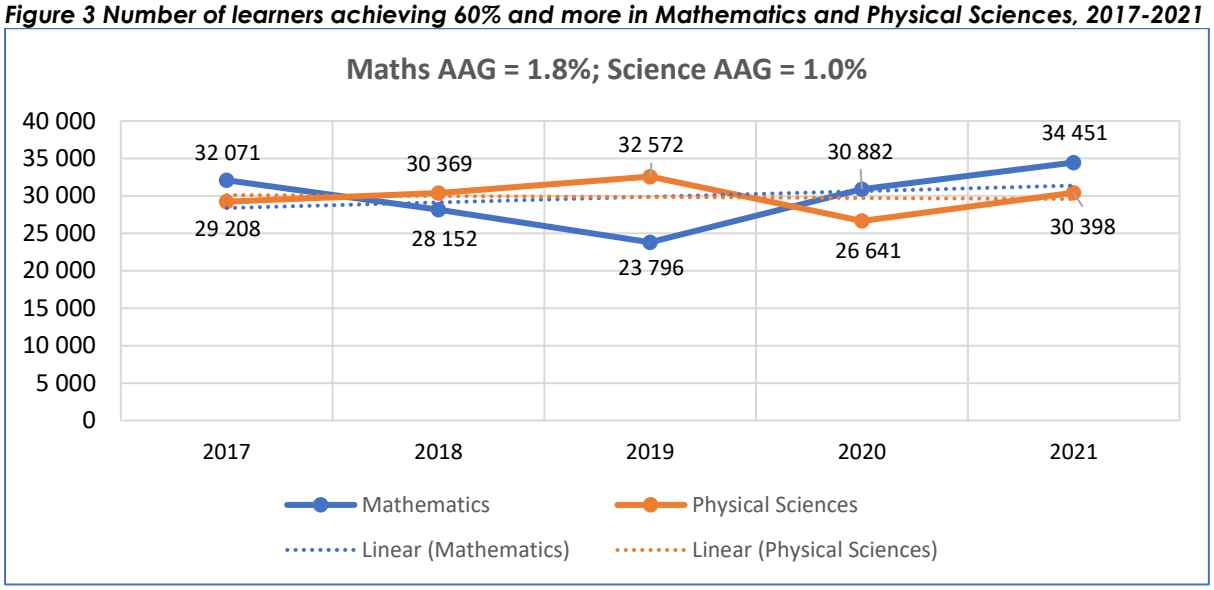
Figure 2 Proportion of learners writing Physical Sciences of the NSC, 2018-2021



South Africa seeks "*to increase the number of passes in grade 12 final examination with a 60% mark and above in Mathematics [and] physical sciences*" (Human Resource

Development Strategy 2009:36). Of the higher education institutions offering the Bachelor of Medicine and Surgery (MBCHB) in South Africa, both mathematics and physical science are a requirement at a minimum of 70% National Senior Certificate (NSC). In instances where the minimum requirement is 60% for mathematics, an aggregate of at least 70% for the National Senior Certificate (NSC) is still a requirement. Figure 3 below indicates an increase in the annual average growth rate of 1.8% and 1.0% in learner passes at and above 60% for mathematics and physical sciences NSC respectively. Importantly, these annual average growth rates are far below the annual average growth rates of learners writing mathematics (3.5%) and physical sciences (4.6%) NSC.

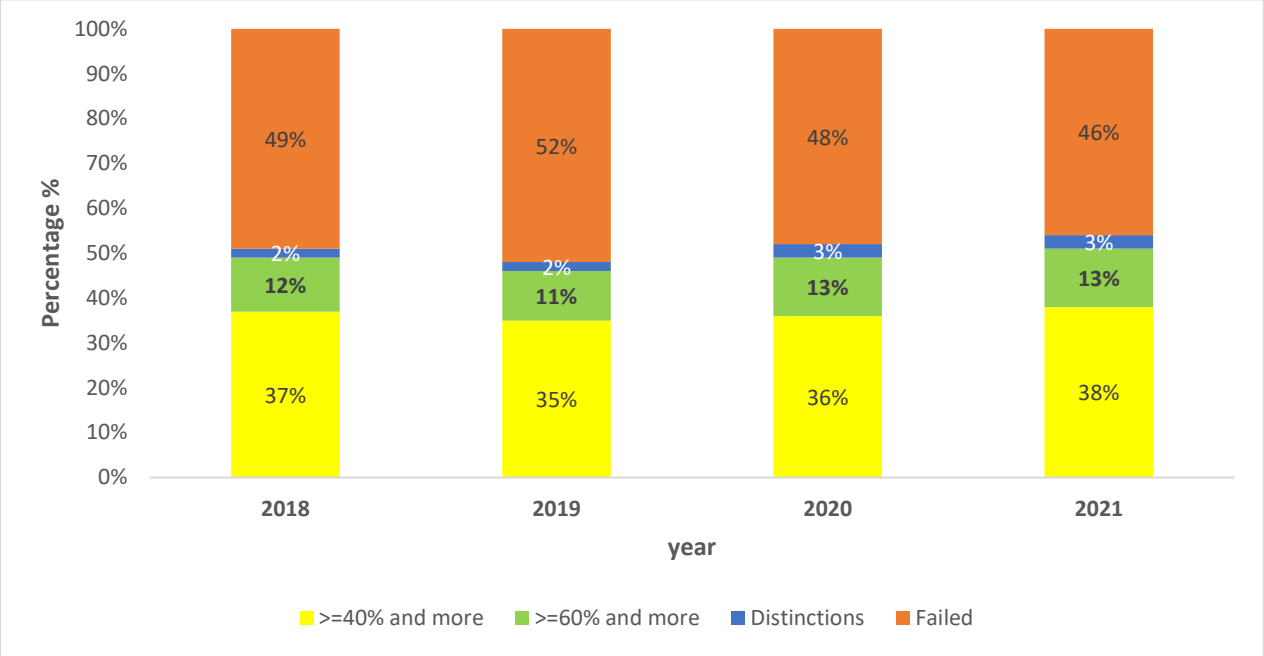
Figure 3 Number of learners achieving 60% and more in Mathematics and Physical Sciences, 2017-2021



Source: EMIS. 2017-2021.

It is worth noting that the supply of students from STEM fields from basic education does not necessarily imply that all will enroll in medicine. For these students, the health sector competes with other sectors. This demonstrates that we have a small pool of qualified students from the basic system. This further demonstrates the need for the basic education system to produce more STEM students. Figure 4 graphically illustrates how small the pool is of students that legitimately fall in the category of the health sector and other competing sectors. Between 2018 and 2021, on average, about 12% of the total number of learners who wrote Mathematics passed with 60% and more.

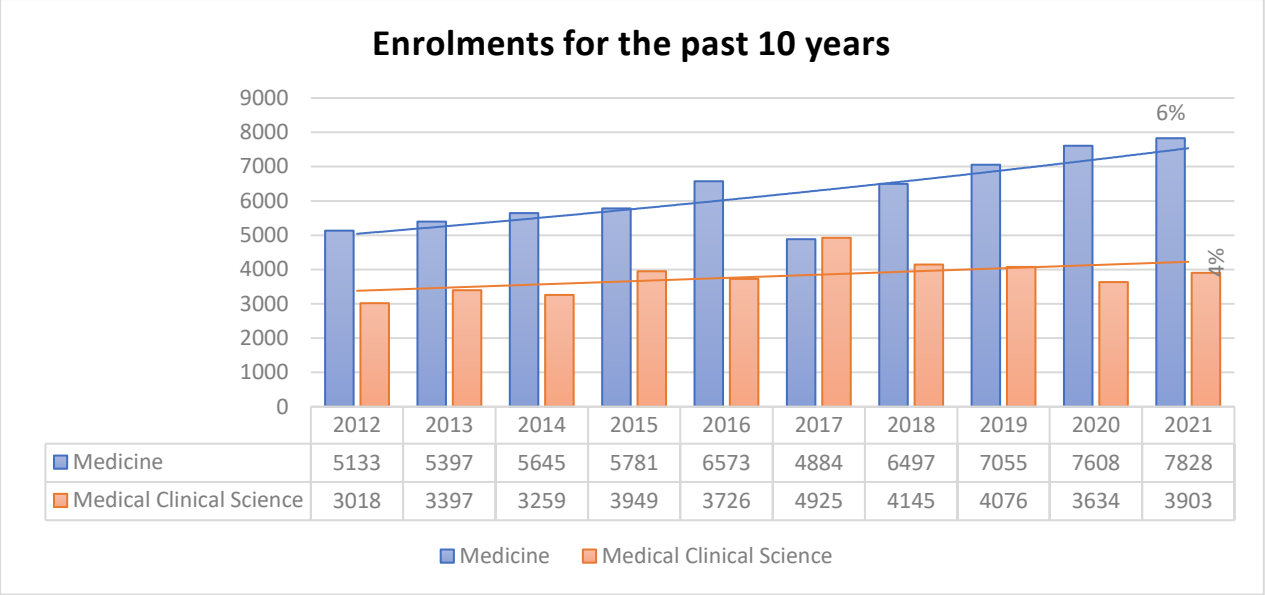
Figure 4 Distribution of learners' achievement in mathematics by achievement categories, 2018-2021



Objective 2: To investigate trends in the enrolment and output from higher education in the MBChB degree and post graduate qualification.

In answering to the above research objective, the following figure highlights enrolments of students to MBChB degree for the past 10 years. It is important to note that these numbers were taken from the Higher Education Management Information System (HEMIS) which reports information that has been submitted by higher education institutions. Additionally, the following figure provides information on the enrolment trends of medical students at the different medical schools over the 2012-2021 period. In 2012 there were 5 133 enrolments in the Medicine field increasing to 7 828 in the medicine field and 3 903 in the Medical Clinical Science field. On average there were 6 240 students enrolled per annum in the Medicine field, and 3 802 under the Medical Clinical Science field over the over the 10-year period. The Medical Clinical Sciences are included in this section because some institutions combine enrollment numbers when reporting to the Higher Education Management Information System (HEMIS).

Figure 5: Enrolments for the past 10 years

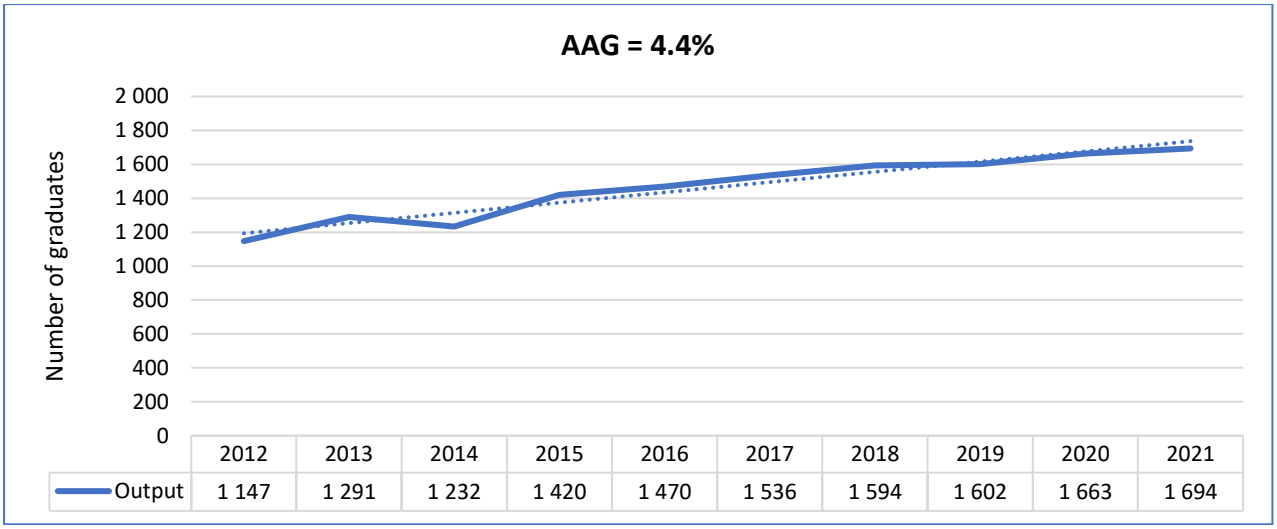


Source: HEMIS 2012 to 2021

The figure above can only be used as a signal for enrolment as these number does not mean enrolment from 1st year. These are enrolments to the program each year for all academic levels. Additionally, the following figure highlights the output of medical graduates. Furthermore, over the period, the average annual increase in intake was 4.4%. (From 1 147 in 2012 to 1 694 in 2021). Over the 10-year period, there were slightly more than 1 400 medical graduates per year on average. Over the years, there has been concern about the insufficient number of medical students who complete their studies.

As shown in the next figure there is a low output which is insufficient to meet the needs of the population. As mentioned in the preceding literature, the SA education and training system is currently served by ten public universities that provide medical practitioner training and the need to increase the capacity of training spaces has been on the top of agenda. As mentioned in the literature the country has also been sending medical students to Cuba since 1997 under the Nelson Mandela-Fidel Castro training programme. Despite efforts to increase the output of medical students, the information shows that there is a need to accelerate output in order to meet current demands.

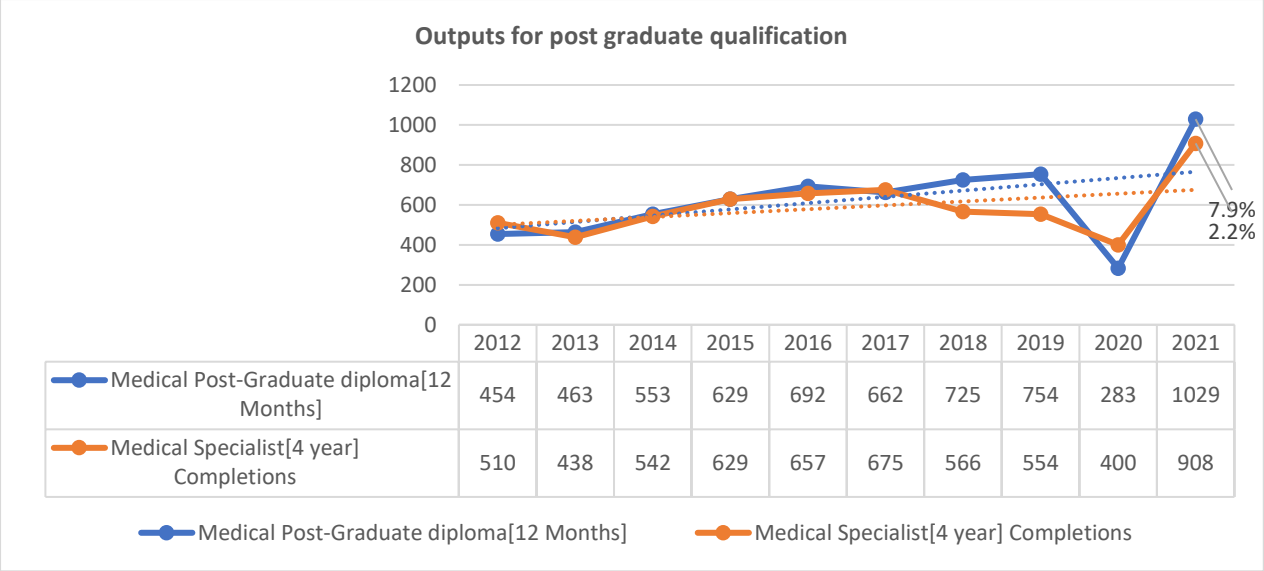
Figure 6: Output of Medical graduates,2012-2021



Source: HEMIS 2012-2021

In understanding the supply of medical practitioner from the higher education institutions the preliminary findings also revealed that some medical students after qualifying to be General practitioners GPs enroll for a post-graduate diploma or medical specialist degree which is 4 years. The duration of this training is 12-months full-time at an accredited hospital under an approved supervisor. The entry requirements are the following: registered as an independent medical practitioner at the HPCSA; consulting ambulatory patients; providing first-contact medical care; and working as a medical generalist. Since 2012, 7 218 practitioners completed post-graduate diplomas across different sub-disciplines. The average annual growth over this period was 7.9%, with 454 completions in 2021 compared to 974 in 2022. Whereas for medical specialist completions their average annual growth was 2.2%, from 510 to 908 in 2021. The drop in 2020 was due to the Covid-19 pandemic; there was only one exam in the first semester, therefore the increase in completions in 2021 for both the postgraduate diploma students and medical specialist degree.

Figure 7:output post graduate degrees and diplomas



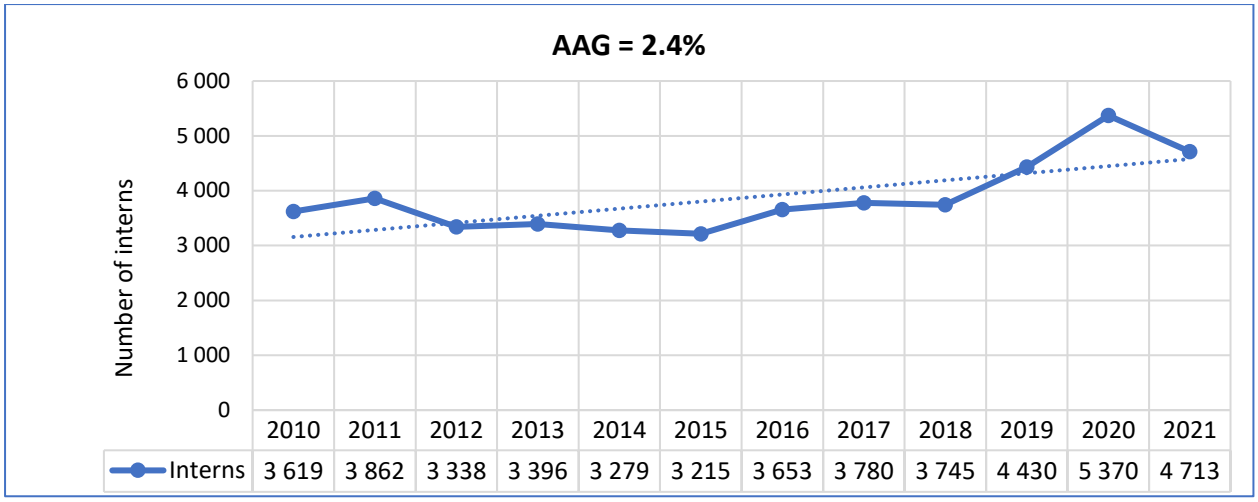
Source: Colleges of Medicine, 2012-2022.

Additionally, even though the above figure shows us an increase in completions for the specialist the numbers still do not match the current demand of specialist. According to who, the global density of physicians per 10,000 people should be at least 20.7. However, according to the literature, SA is only at 8.1 per 10,000 people in 2019. This means that if current supply is not increased to meet world health standards, SA will struggle to achieve universal health coverage.

Objective 3: To investigate the trends in the supply of internships and community service and challenges regarding the supply

The supply of interns is very important in the production pipeline of general practitioners as this is their final year of training. After completion of their internships and their compulsory community service year they can register as independent medical practitioners at the HPCSA. The figure below shows the number of interns over the 2010-2021 period. The average annual growth for interns was 2.4% over the period. The drop in the number of interns in 2021 is noteworthy; the lack of availability of intern positions is currently a huge challenge for the National Department of Health.

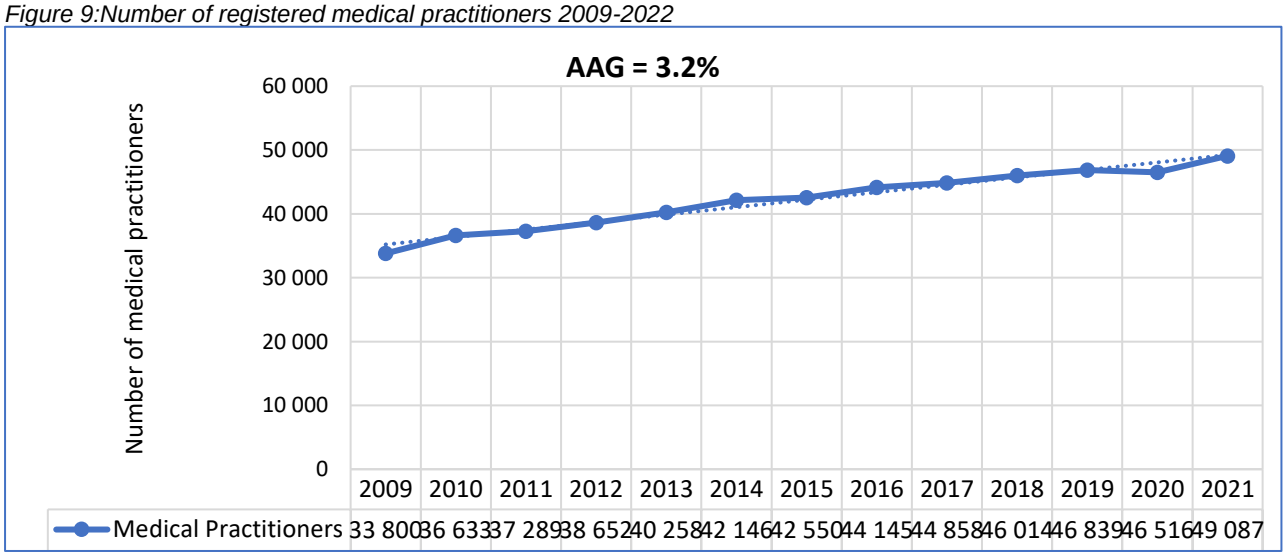
Figure 8: **Number of medical interns, 2001-2022**



Source: HPCSA,2010-2021

In terms of the supply of registered medical practitioners (including GPs and MSs), the trend over the 2009-2021 period shows that the average annual growth was 3.2%, with 33 800 registrations in 2009, increasing to 49 087 in 2021 (see figure below). Additionally, the figure below shows us the current supply in the SA labour market of medical practitioners. This further shows us that even the current supply in our labour market is not enough to meet up the current medical needs of our population.

Figure 9:Number of registered medical practitioners 2009-2022



Source: HPCSA, 2009-2022

With the current supply issues of interns some of the study, participants indicated there is a need for a well-coordinated process for placing the interns if this can be done at the national level rather than the provincial where there can be posts existing in advance before the interns come. This will avoid appointing interns with no pay or no post created. Another suggestion was made in dealing with the issue of intern placement which is a

possible collaboration with the private sector to place medical students for clinical training.

Objective 4: To investigate the global and national ratios and densities.

In understanding the demand of medical practitioners, it is important to look at the current ratios in SA. For instance, the preliminary findings also revealed that the current SA doctor-to-patient ratio was at 8.1 per 10 000 population based on registration numbers. In line with the recommended ratio by WHO, the ratio should be 20.7 per 10 000 population (table 3 below). This further proves the extent of demand for medical practitioners in SA.

Table 3: **Minimum density thresholds per 10 000 population for achieving UHC 80 (2019)**

Health professional	Threshold for UHC 80 (per 10 000 population)
Physician	20.7

Source: GBD, World Health Statistics 2022: Monitoring Health for the SDGs

There is a growing demand for medical practitioners and the current supply is unable to meet these demands. Especially in rural areas where many medical practitioners do not want to work there for a long time due to other external factors such as poor infrastructure, limited water supply (basic municipal services), and limited schools with good infrastructure just to mention a few. This calls for multi-governmental partnerships that require Public Private Partnerships (PPPs) in addressing the issues of road infrastructure, provision of water and sanitation, and schools with poor infrastructure.

Additionally, the NDoH emphasizes the fact that the public sector health system in South Africa is predominantly nurse-driven, especially in provinces such as the Eastern Cape where nurses constitute 63.9% of the health workforce in the public sector. However, proportions differ across provinces: Limpopo: 4.3%'; Mpumalanga: 6.1%); Northwest: 6.1%; Gauteng: 11.6%; and the Western Cape: 14.6%. Whereas, nationally about 8.6% of the health workforce are medical practitioners, but 30.9% of the salary bill is allocated to them. The department mentions the value of using more mid-level workers such as assistant medical officers trained in certain specialist fields. This demonstrates that the current demand for medical practitioners exceeds the current supply.

Furthermore, the table below compares the national averages with the provinces with the highest, third-highest, middle, and lowest densities respectively. The inequality for MSs

shows that the Western Cape has 25.8 MSs per 100 000 public sector population compared to only 1.36 per 100 000 in Limpopo. This also demonstrates that the current supply of specialists is insufficient to serve the current population, particularly due to its uneven distribution across provinces.

Table 4: ***Inter-provincial variation in staffing ratios per 100 000 public sector population***

HW Category	National average	1st Rank Province	3rd Rank Province	5th Rank Province	9th Rank Province
GPs	33.11	NC: 45.25	KZN: 37.42	GP: 31.89	LP: 25.94
MSs	9.96	WC: 25.81	FS: 12.99	NW: 3.66	LP: 1.36

Source: NDoH, 2030 Human Resources for Health Strategy, 2020 (Persal data).

This further shows us that the SA Public health structure is grossly under-capacitated, yet most of the population uses these facilities which further increases the current existing inequalities.

Conclusions and recommendations

In conclusion, the above preliminary findings show us that the current supply of medical practitioners is not enough to meet up the current demand in line with the health needs of our population. It further shows us that SA has a long way to go in meeting up the global WHO-recommended health standards for our population. Among other factors, the study highlights that low participation rates (slightly above a quarter) of learners in mathematics and physical science NSC reduce the pool for a possible pathway toward medical practitioners. Further, low pass rates in mathematics and physical science of NSC at 60% and above indicate how low quality in basic education constrains efforts to broaden the STEM fields pool. Thus, a need for a well-coordinated HRH is highlighted, which also talks to the need of having sufficient and reliable human resource planning information from our higher education institutions to the labour market. Another notable challenge was the lack of posts for internships and community service as one of the biggest concerns currently affecting the supply of medical practitioners to the country. The participants all agreed that involving private hospitals in the training of medical practitioners is a good idea and would help to alleviate the shortage, particularly where the provision of posts is concerned. A caution made by almost all the interviewees was that involving private providers would require careful regulation, governance, and monitoring.

Recommendations:

- More medical schools will be needed to eventually increase intake, and the existing schools will require funding to increase their capacity in terms of staff, infrastructure, and facilities.
- Involve the private institutions in training, in particular where posts for internships and community service are concerned there should be regulation and compliance to monitor this.
- Funding should be made available for schools that have extended training platforms to the regional and district hospitals, to capacitate them further. HWSETA could assist with bursary funding for current undergraduate or post-graduate students.
- Many of the schools' facilities are stretched so they need assistance in both increasing and upgrading infrastructure and equipment.