# THE FUTURE OF MEDICAL WORK IN SOUTHERN AFRICA: CASE STUDY OF THE FUTURE OF MEDICAL WORK AND THE IMPACT

# OF THE COVID-19 PANDEMIC ON MEDICAL WORK IN SOUTH AFRICA

#### **DISCUSSION PAPER**

#### March 2022

**Courtney Price Ivins** Annie Liang Nicole Serfontein Pia Schneider Thulani Matsebula





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# Health, Nutrition, and Population Discussion Paper

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# Health, Nutrition, and Population (HNP) Discussion Paper

#### The Future of Medical Work in Southern Africa: Case Study on the Future of Medical Work and the Impact of the COVID-19 Pandemic on Medical Work in South Africa

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#### The study was funded by the World Bank Country Unit in South Africa.

Abstract: Major global trends such as economic integration, urbanization, climate change, demographic shifts, digital and technological advances, and rising consumerism will all affect population health and shape the future of medical work. In South Africa, these trends can be harnessed as opportunities, but this will require the government to take a strategic approach and to give its immediate attention to six health workforce issues: (i) the mismatch between the number and the skills of health graduates produced by the health education system and the number and specialties needed for future medical work; (ii) the unsustainable financing system for expensive medical education; (iii) the large numbers of foreign-trained medical graduates whose degrees are not being fully recognized in South Africa; (iv) high vacancy rates in health facilities coinciding with high unemployment and inadequate human resource management; (v) insufficient data on the health workforce; and (vi) the public sector's reluctance to collaborate with the private sector and international health labor. With more large-scale disasters looming, South Africa's experience with the COVID-19 pandemic will provide important lessons for the future of medical work. Based on the findings of this case study, we make recommendations on health education policy and human resource policy. These include (i) investing in highquality education and aligning investments in health education and medical research with future needs; (ii) looking for innovative ways to finance medical education; (iii) investing in the health workforce on the basis of health workforce planning and future projections of need: (iv) modernizing the human resource management in health facilities and facilitating the use of modern technology; (v) making substantial investments in the collection and analysis of data on the health workforce and using results in workforce planning; and (vi) expanding public-private sector collaboration and developing policies to manage the mobility of the health workforce to and from the private sector and abroad.

**Keywords**: Health workforce, future medical work, human resources for health, COVID-19, South Africa, Southern Africa

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# ACRONYMS

AIDS	Acquired immunodeficiency syndrome
ASSAf	Academy of Science of South Africa
CHW	Community health workers
EHR	Electronic health record
EKG	Electrocardiogram
EU	European Union
GDP	Gross domestic product
HIV	Human immunodeficiency virus
HPCSA	Health Professional Council of South Africa
HRH	Human Resources for Health
ICASA	Independent Communications Authority of South Africa
ICL	Income contingent loans
ICU	Intensive Care Unit
IMF	International Monetary Fund
NCDs	Noncommunicable diseases
NGO	Nongovernment organization
NGS-SA	Network for Genomic Surveillance in South Africa
NHI	National Health Insurance
NHS	National Health Service
NICD	National Institute for Communicable Diseases
OECD	Organisation for Economic Co-operation and Development
PERSAL	Personnel and Salary System
PHC	Primary health care
PPE	Personal protective equipment
QES	Quarterly Employment Survey
QLFS	Quarterly Labor Force Survey
SACMC	South African–Cuban Medical Collaboration
SADC	Southern African Development Community
SAMA	South African Medical Association
SAMED	South African Medical Technology Industry Association
SAMRC	South African Medical Research Council
SANC	South African Nursing Council
SE	Simulation education
ТВ	Tuberculosis
UCT	University of Cape Town
UK	United Kingdom
UMIC	Upper-middle-income country
US	United States
VSE	Virtual simulation education
WHO	World Health Organization
WISN	
WIGIN	Workload Indicators of Staffing Need

# **INTRODUCTION**

Several major global trends are expected to profoundly change the nature of work, including in the health sector. These trends include climate change, economic integration, urbanization, demographic shifts, digital and technological advances, and rising consumerism, to name just a few. These global trends are affecting population health around the world. Pandemics will increase in frequency and intensity because of migration, urbanization, degradation of the natural environment, and changes in land use. The magnitude and consequences of these global trends for population health will depend on how well health policy makers are able to harness these trends as opportunities.

**Few studies have so far examined how global trends will impact the future of medical work**. Most of the existing studies are from high-income countries and conclude that future changes in health will require enhancing service delivery models, improving health labor market policies, updating education and training, and harnessing valuable technological developments.<sup>1</sup> Despite its importance, this topic has so far not been analyzed in African countries. The topic is particularly important for South Africa, as the country's health system is one of the most advanced but also most unequal in Africa. It is characterized by an overburdened public sector, a budding private health and research sector, persistently high human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) and tuberculosis (TB) rates, and a growing burden of noncommunicable diseases (NCDs).

This is the first analysis of the future of medical work in South Africa. The three-part study as a whole takes a case study approach and covers Eswatini, Lesotho, and South Africa (Box 1). Based on our findings, we offer a series of recommendations to the government of South Africa. The study was conceived before COVID-19 disrupted health systems and economies around the world. We conclude that these health systems will recover, but the impact of global changes may be accelerated by the experience of COVID-19. To examine this process, this case study includes an analysis of the effect of the COVID-19 pandemic on the health workforce in South Africa. With more large-scale disasters looming, South Africa's experience with the COVID-19 pandemic will provide important lessons for the future of medical work.

<sup>1</sup> ILO 2019.

#### Box 1: Methodology: A Country Case Study Approach

The three countries covered by this study-Eswatini, Lesotho, and South Africa-were selected because they illustrate different aspects of future trends in the health sector. Taking a threecountry approach has made it possible to carry out in-depth analysis of how future trends are likely to affect (i) medical and nursing education. (ii) health workforce management. (iii) government stewardship, and (iv) collaboration with the private sector and with other countries. The case studies focus on these four areas instead of the health system as a whole, as this has already been analyzed elsewhere. Each case study assesses the extent to which the health workforce is prepared for future trends. Key informants were interviewed in each country, including health and education experts (Annex 1); and data were collected from the government, universities, nursing schools, and hospitals, and supplemented by data from international sources (WHO and the World Bank), and from available literature. The interviews for the South Africa case study were conducted in person and by phone between June 2020 and February 2021. In addition, semi-structured interviews were carried out with health experts on the impact of COVID-19 on the health system. The case studies followed a standardized protocol that covered how prepared the health workforce is for future trends. These case studies are not meant to be representative of the Africa region as a whole. Data limitations were the main constraint for this study; we compensated by consulting government data and available literature, and by triangulating the data from gualitative interviews with the secondary data collected in countries.

Source: Authors.

The South African government has been fighting to protect its population and the health workforce from the novel coronavirus SARS-CoV-2 ("COVID-19"). South Africa is one of the countries in Africa that has been hardest hit by the pandemic. By December 2021, more than 3.3 million laboratory-confirmed positive cases had been reported with over 90,000 fatalities, and significant excess mortality occurred between May 2020 and December 2021.<sup>2,3</sup> Life expectancy has dropped by three years.<sup>4</sup> Actuarial estimates suggest that, by August 2021, about 80 percent of the population may have already been infected with the virus.<sup>5</sup> By November 2021, about 9,540 health care workers had been hospitalized due to COVID-19, and 1,224 had died (12.8 percent of those admitted to hospital), most of them in Gauteng and Kwa-Zulu Natal Provinces.<sup>6</sup> About 65 percent of health staff who died had reported having a comorbid disease, and 30 percent had more than one comorbidity such as asthma, diabetes, or obesity. However, actual mortality rates among health workers are likely to be much higher. In May 2021, WHO estimated that globally about 115,000 health workers died during the first 17 months of the pandemic.<sup>7</sup>

**Despite the Sisonke Vaccination Program, South Africa's initial COVID-19 vaccination efforts were not as effective as hoped.** The goal was to vaccinate 1.2 million health workers by May 2021, but fewer than 500,000 were reached. National rollout efforts were impeded because of limited supplies initially, coupled with the unanticipated sale by the government of 1 million Oxford-AstraZeneca doses to the African Union and

<sup>3</sup> SAMRC 2021.

<sup>&</sup>lt;sup>2</sup> South African National Institute for Communicable Diseases (NICD) and National Department of Health 2021.

<sup>&</sup>lt;sup>4</sup> Stats SA 2021.

<sup>&</sup>lt;sup>5</sup> Bloomberg 2021. <sup>6</sup> NIOH 2021.

<sup>&</sup>lt;sup>7</sup> ICN 2021.

<sup>·</sup> ICN 2021.

the temporary suspension of the Johnson & Johnson vaccine because of reported side effects. Since mid-2021, the vaccination campaign has gained significant momentum, and about 44.3 percent of the adult population were fully vaccinated by mid-December 2021, including most of the health workforce.<sup>8</sup>

This case study finds that preparing for the future of medical work in South Africa beyond the pandemic will require skilled medical staff and substantial investments in health education and medical work to harness the positive impact of global trends on health. South Africa is already the leader in health education, research, and health care provision on the continent. Building on these capabilities will require innovative solutions to developing and sustaining the provision of expensive medical education, the recruitment of more health professionals into the workforce, investments in health workforce management, data collection and analysis, and an effort by the health system to work with the private sector and with a mobile international health workforce. South Africa's response to the COVID-19 pandemic can serve as a foundation for this effort.

<sup>8</sup> Gray and Bekker 2021.

# GLOBAL TRENDS WILL INFLUENCE THE FUTURE HEALTH CONSUMER AND HEALTH SECTOR

#### ECONOMIC GROWTH AND POVERTY REDUCTION WILL HELP TO EXPAND THE MIDDLE CLASS

Inclusive growth will lift more people into the middle class. South Africa achieved much social progress after the end of apartheid. Poverty fell and access to education and health care expanded. However, low growth over the past few years and setbacks during the COVID-19 pandemic have contributed to large fiscal deficits and high public debt, requiring tighter fiscal policy at a time of unacceptably high unemployment, poverty, and inequality. Unemployment is particularly high among young people, reaching 57 percent in 2019 before the onset of COVID. South Africa is currently classified as an upper-middle-income country. While its economic growth is estimated to have rebounded to 4.8 percent in 2021 supported by the global recovery, substantial inclusive growth and stable jobs will still be needed to raise household income, expand the future middle class, and enable South Africa to be classified as a higher-income country.<sup>9</sup>

**Many households will remain poor and continue to have similar health needs as today.** About 60 percent of the population were living below the poverty line for uppermiddle-income countries (UMICs) in 2020. Poverty is higher in rural areas (65.4 percent in 2015) than in urban areas (25.4 percent). Eastern Cape, KwaZulu-Natal, and Limpopo are the poorest provinces. In 2015, only 20 percent of the population was middle class. Simulations suggest that growth acceleration, better jobs, and favorable public policies will help to reduce poverty to about 23 to 33 percent by 2030.<sup>10</sup> A growing middle class will emerge in urban areas. As people's incomes increase, their demand for health care will also increase, whereas the poor will be facing new health challenges. NCDs such as diabetes and cardiovascular diseases are increasingly affecting the poor, often due to unhealthy lifestyle and diets, including alcohol and tobacco consumption.

#### URBANIZATION AND MIGRATION WILL LEAD TO TWO GROUPS WITH DIVERGING HEALTH NEEDS THAT WILL REQUIRE NEW SKILLS TO TREAT

**Urbanization will present health professionals with new challenges.** The urban population is expected to increase from 64 percent in 2015 to 77 percent by 2050, as people move to cities in search of better services and stable jobs, including those in the health sector.<sup>11</sup> The growing middle class will expect better quality care, including services provided by the private sector. However, urbanization can also harm health, particularly for the urban poor who live in overcrowded townships highly exposed to environmental risks, congestion, inadequate access to clean water, housing, and food, and a higher risk of violence and traffic accidents. Future health professionals need to be trained to provide care to both these groups.

**Urbanization will contribute to the depopulation of rural areas and the aging of the rural population.** As most out-migration from rural areas is accounted for by young adults, rural populations will increasingly be characterized by low fertility and aging. Many will be both poor and elderly. The rural poor will continue to face similar health needs as today, with limited means to travel to health facilities in urban areas. However, many rural areas

<sup>9</sup> IMF 2021.

<sup>&</sup>lt;sup>10</sup> World Bank 2018.

<sup>&</sup>lt;sup>11</sup> Bhorat et al. 2015.

are likely to lack the capacity and services needed to support an aging population. Therefore, what will be needed is a strong rural health network that incorporates community care and chronic disease management to take care of an aging population in rural areas. Investments aimed at improving transportation between regions will also be needed to enable rural residents to travel to urban areas to access care.

**Migrants from other countries will continue to move to South Africa, and some will be in poor health.** Net migration to South Africa is expected to decline from the current 2.5 migrants per 1,000 inhabitants to 0.8 in 2050.<sup>12</sup> Nevertheless, this will still leave South Africa with a substantial migrant population, many of whom will live in poor, informal settlements on the outskirts of urban areas with limited access to basic services, which will increase their health risk. Some migrants may also suffer from transmissible diseases (such as HIV/AIDS, TB, or COVID-19) and need specialist care. Some of this migration is likely to be in response to extreme weather events driven by climate shocks (such as extreme temperatures, wildfires, floods, and prolonged droughts) and the rise of climate-sensitive diseases.<sup>13</sup> Some migrants will arrive in poor health and need specialist health professionals with the appropriate cultural and language skills to be able to treat them.

#### SOUTH AFRICA'S GROWING POPULATION WILL GET OLDER AND WILL NEED MORE NCD CARE

**The population will grow substantially, and the average age will increase.** Over the next 30 years, South Africa's population is expected to add another 15 million people to reach 75 million by 2050.

The mean age will increase from 28 years in 2020 to 34 years in 2050 as fertility rates continue to drop to 1.96 in 2050 (Figure 1). Life expectancy is projected to increase from the current 64 to about 73 years in 2040, if HIV/AIDS can be controlled.<sup>14</sup>

#### Demographic shifts will lead to an increase in age-related NCDs. About





67 percent of the population will be of working age (between 15 and 64 years) (Figure 2), an age group more likely than the general population to suffer from age-related NCDs, such as diabetes and heart disease. More elderly care will be needed, especially in rural areas. To treat the growing and aging population, South Africa will have to expand its health workforce and invest in providing medical training in new competencies.

<sup>12</sup> UN 2019.

<sup>&</sup>lt;sup>13</sup> Migration Data Portal for 2020.

<sup>&</sup>lt;sup>14</sup> Foreman et al. 2018.



Figure 2: South Africa Population Pyramid, 2019 and 2050

Source: UN 2019.

#### TECHNOLOGICAL ADVANCES WILL LEAD TO MORE INFORMATION-SHARING AND BETTER TREATMENTS, RAISE CONSUMER EXPECTATIONS, AND FACILITATE FUTURE MEDICAL **EDUCATION AND WORK**

Future consumers will be better informed and have higher expectations of health care. In 2019, more than 91 percent of South Africa's population had access to a smartphone, and 65 percent had access to the Internet.<sup>15</sup> This widespread ability to access health information, such as on different treatment options for various diseases, will increase consumers' expectations of the health care they receive. People will want to be informed about healthy lifestyles, disease prevention, and treatment options, and they will expect to be able to use modern technology such as e-health to access care and take greater control of their health. These growing consumer expectations will increase pressure on health professionals to provide consumers with information and to deliver quality care, particularly in urban areas with a growing middle class.

Medical technology and innovations will facilitate health care provision and medical education. South Africa is an emerging market for the medical technology industry and an export hub for Sub-Saharan Africa. South Africa's medical technology market is expected to grow from US\$1.3 billion in 2019 to US\$1.8 billion in 2023.<sup>16</sup> The health workforce will benefit from this expansion as administrative tasks they must currently carry out manually and on paper will be done much faster using technology, including medical data collection, referral systems, disease surveillance, health education, patient monitoring, and communicating with consumers. There is the potential for striking breakthroughs in prevention and medical treatment similar to the COVID vaccines, such as an HIV vaccine or a cure for cancer, which would greatly improve health outcomes and increase consumer expectations. The COVID-19 pandemic has already accelerated the use of modern technology in medical work, particularly in the expansion of telemedicine. Medical technology is already widely used, especially in the private health sector. With the public sector being financially constrained, the private health sector financed by private health insurance will continue to be the main provider of costly medical technology.<sup>17</sup> As resources for the public health sector increase as a result of economic growth, it will be better equipped and will have more staff trained to treat the growing population.

<sup>&</sup>lt;sup>15</sup> ICASA 2020.

<sup>&</sup>lt;sup>16</sup> SAMED 2020.

<sup>&</sup>lt;sup>17</sup> Africa Health 2020.

#### SOUTH AFRICA WILL CONTINUE TO HAVE A COMPLEX DISEASE BURDEN AND GROWING HEALTH EXPENDITURES

**HIV** and communicable diseases will continue to present a major threat to population health, life expectancy, and human capital, mainly among the poor. About 19 percent of South Africa's population (between the ages of 15 and 49) is infected with the HIV virus, which is still the country's leading cause of death (Figure 3). The Black population is most affected, particularly women. HIV/AIDS and diarrheal and lower respiratory diseases, which mainly affect lower-income groups, are projected to continue to be the leading causes of premature mortality. If HIV/AIDS cannot be contained, this will result in a rebounding of related mortality related to HIV/AIDS can be more controlled, life expectancy will increase to 73 years by 2040.<sup>18</sup> Pandemics and disasters will remain a major risk because of migration, urbanization, degradation of the natural environment, and changes in land use. Poor health outcomes, including a 27 percent stunting rate among children under the age of five, will negatively affect South Africa's human capital potential. Children born today will only be 43 percent as productive in the future as they would be if they had full health and a complete education.

Both sexes, 2020 rank	South Africa Age-standardized, Deaths	: per 100,000 2040 rank	
1 Cardiovascular diseases	]	1 Cardiovascular diseases	Communicable, maternal,
2 HIV/AIDS & tuberculosis		2 Neoplasms	diseases
3 Neoplasms		- 3 Diabetes/urog/blood/endo	Non-communicable diseases
4 Diabetes/urog/blood/endo		4 Diarrhea/LRI/other	Injuries
5 Diarrhea/LRI/other	· · · ·	5 Neurological disorders	
6 Chronic respiratory		6 HIV/AIDS & tuberculosis	
7 Self-harm & violence		7 Self-harm & violence	
8 Neurological disorders		8 Chronic respiratory	
9 Transport injuries		9 Unintentional inj	
10 Unintentional inj		10 Digestive diseases	
11 Neonatal disorders		11 Neonatal disorders	
12 Digestive diseases		12 Transport injuries	
13 Cirrhosis	]	13 Cirrhosis	
14 Other non-communicable	]	14 Other non-communicable	
15 Other group I		15 Mental disorders	
16 Mental disorders		16 Other group I	
17 Nutritional deficiencies	·	17 Musculoskeletal disorders	
18 Maternal disorders		18 Maternal disorders	
19 Musculoskeletal disorders		19 Nutritional deficiencies	
20 NTDs & malaria	]	20 NTDs & malaria	
21 War & disaster		21 War & disaster	

# Figure 3: Top Twenty-One Causes of Age-Standardized Deaths per 100,000 Population, 2020 and 2040

Source: IHME 2021.

Notes: Causes for age-standardized deaths are for both sexes, all ages.

HIV/AIDS = Human immunodeficiency virus/Acquired immunodeficiency syndrome; LRI = Lower respiratory infection; NTDs = Neglected tropical diseases; Unintentional Inj = Unintentional Injuries.

<sup>&</sup>lt;sup>18</sup> Foreman et al. 2018.

**South Africa's future disease burden will include complex NCDs that will require specialist care**. In 2040, a similar disease burden as today will drive mortality (Figure 3). However, between 2020 and 2050, infant mortality is expected to drop from 27 to 15 per 1,000 live births and under-five mortality from 35 to 19 per 1,000 live births.<sup>19</sup> Heart disease, cancer, and diabetes will remain among the top five leading causes of death by 2040, driven by the growing middle class in urban areas, but these NCDs will also become more common among the poor because of their greater exposure to risk factors, including unhealthy diet, pollution, and tobacco consumption. Trauma will kill more people in 2040 than today (Figure 3). To address these challenges, the health workforce must be equipped with an appropriate skill mix to care for patients with HIV/AIDS and communicable diseases, promote healthy lifestyles and behaviors, provide mental health care, and prevent and provide specialist treatment for NCDs and trauma.

There are not yet any comprehensive published data on long COVID, but this syndrome could have profound implications for population health, the health system, and the economy. About 82 percent of patients hospitalized with COVID-19 continue to experience long COVID symptoms one month following their discharge.<sup>20</sup> This has led to concerns that long COVID may reduce workforce productivity; increase the need for chronic disease management, sick leave benefits, and short-term disability entitlements; and require reduced work schedules. Health professionals who suffer from physical or mental impairment due to long COVID may qualify for long-term disability and may never reenter the health workforce or may change occupations. As a result, work pressures will heighten for employers and staff alike.

With a changing disease burden, a growing middle class, and technological advances, the limitations of the current system will become more apparent. In South Africa, richer patients and those with private insurance receive care in the private sector (which services 16 percent of the population), whereas lower-income groups go to the public sector (which services 84 percent of the population).<sup>21</sup> Many of the latter patients currently bypass public primary and community care in favor of either private or public hospitals, which is a costly use of health care resources. Therefore, coordinating health workforce planning across the public and private systems will be crucial to address this challenge.

The government will increase health spending to finance the growing demand for care. In 2019, total health spending constituted 8.3 percent of GDP, of which 4.5 percent was financed by the government for public sector care and the remaining 3.8 percent by private health insurance and households for private sector care.<sup>22</sup> Public and private health spending will likely double by 2050 (Figure 4). The current inequalities in access to care have been amply researched. To improve the situation, in 2019, the government drafted a bill—still under discussion—to provide National Health Insurance (NHI) for the entire population. The government plans to centralize the provinces' nonsalary recurrent health budgets into an NHI fund and raise additional taxes to finance a package of services to be provided in either public or private health facilities. However, the proposal faces opposition from the private sector and other powerful constituencies in the middle class who see it as a threat to maintaining quality services. Substantial public sector resources will be needed to ready the sector for NHI.

<sup>19</sup> UN 2019.

<sup>&</sup>lt;sup>20</sup> NICD 2021.

<sup>&</sup>lt;sup>21</sup> World Bank 2018.

<sup>&</sup>lt;sup>22</sup> OECD 2021b.





Notes: OOP = Out of pocket.

The changes brought about by global trends will influence the type of medical work that will be needed in the future. A strong nationwide primary care system will be needed to address the continuously high burden of communicable and HIV-related diseases and to strengthen effective preventive and follow-up care for NCDs. The most complex NCD cases will require more personnel-intensive specialist care provided in hospitals in urban areas. Demand for elderly care will increase in both urban and rural areas. Mental health care will become less stigmatized, and more urban youth will seek treatment. Modern technologies will provide opportunities to increase access to care and information. These future trends and their impact on the population will require the government of South Africa to carefully plan its investments in the overall health sector and in the health workforce in particular. The government's 2030 Human Resources for Health Strategy, published in 2020, contains a strong commitment to the education of health professional and to the health workforce.<sup>23</sup>

<sup>&</sup>lt;sup>23</sup> Department of Health, South Africa 2020.

# HOW PREPARED IS SOUTH AFRICA'S MEDICAL WORKFORCE FOR THE FUTURE?

The future health workforce will need new skills to be ready to treat the health effects of these trends. South Africa will continue to need physicians and nurses trained in treating communicable diseases; providing maternal and childcare; and preventing, detecting, and treating NCDs. Medical specialists will be needed to take care of complex NCD cases and work in trauma care. New diseases such as COVID-19 will increase the demand for some types of staff, especially those trained in intensive care. New technologies will allow some tasks to be automated and will require personnel with new technical skills. To work in this changing environment, the health education system will have to teach new skills to health professionals and to update them regularly through continuous professional education.

South Africa's 2030 Human Resource for Health Strategy lays out five goals and several objectives to be reached by 2030. The goals are to (i) undertake effective health workforce planning to ensure human resources in health are aligned with current and future needs; (ii) institutionalize data-driven and research-informed health workforce policy, planning, management and investment; (iii) produce a competent and caring multidisciplinary health workforce through an equity-oriented, socially accountable education and training system; (iv) ensure optimal governance, build capable and accountable strategic leadership and management in the health system; and (v) build an enabled, productive, motivated, and empowered health workforce. The national government has increased its funding commitments to education and the health workforce and supports provinces in the implementation of strategies to achieve these goals.<sup>24</sup>

The rest of this section examines how prepared South Africa is for the future of medical work, particularly in light of what has been learned from the COVID-19 pandemic.<sup>25</sup> The emphasis of the discussion is on health education, health workforce management, government stewardship, and collaboration with the private sector and with other countries. The findings are based on information collected from key informants (Annex 1) and supplemented by available literature.

#### GENERAL EDUCATION DOES NOT PROVIDE STUDENTS WITH THE SKILLS NEEDED FOR HEALTH EDUCATION

**Better education and learning outcomes are needed to ensure that more high school graduates qualify to undertake medical studies.** South African children can expect to complete 10.2 years of education by the age of 18, but this is equivalent to only 5.6 years when adjusted for quality of learning. In 2017, only 55 percent of children successfully completed secondary school. In two international comparative assessments in 2015 and 2016, South African children ranked last among 49 countries in mathematics and reading.<sup>26</sup> About 24 percent of young people were enrolled in tertiary education in 2018, but more than a quarter of tertiary students drop out during the first year. A 2018 study by the Academy of Science of South Africa (ASSAf) found that success in medical

<sup>&</sup>lt;sup>24</sup> National Treasury, South Africa 2022.

<sup>&</sup>lt;sup>25</sup> Abdool Karim 2020.

<sup>&</sup>lt;sup>26</sup> The two assessments were by the 2015 Trends in International Mathematics and Science Study (TIMSS) of children in grade 5 and by the 2016 Progress in International Reading Literacy Study (PIRLS) of children in grade 4 (IMF 2019).

studies and clinical competency depended not only on the quality of the student's primary and high school education and prior academic achievement but also on career guidance and mentorship, and financial aid.<sup>27</sup> Therefore, it is clear that the quality of South Africa's general education is not high enough to enable most young graduates to successfully pursue a medical or health education. This quality will need to improve substantially, particularly in terms of learning outcomes for reading, science, and math, to ensure that the education system produces enough qualified students for nursing and medical education.

**Government spending on education is already high.** Education is the South African government's fastest-growing expenditure category. Government expenditure on education constituted 6.8 percent of GDP in 2020.<sup>28</sup> This amounts to 19.5 percent of general government expenditures in 2020,<sup>29</sup> which is considerably higher than the average 11 percent of GDP spent by Organisation for Economic Co-operation and Development (OECD) countries.<sup>30</sup> Tertiary education absorbs 15.3 percent of government education spending, or 1.1 percent of GDP in 2018, as is the case to Poland (1.1 percent of GDP) and similar to Germany (1.3 percent of GDP).<sup>31</sup> The government plans to further increase tertiary education spending to reduce income inequality and unemployment by converting student loans into grants.<sup>32</sup> However, the high cost of these reforms may make it untenable to achieve the government's target of doubling tertiary enrollments by 2030 under the present system, whereby it is responsible for funding the tuition of every South African in tertiary education, including medical students.<sup>33</sup>

#### SOUTH AFRICA'S MEDICAL UNIVERSITIES ARE THE BEST ON THE AFRICAN CONTINENT BUT HAVE ONLY LIMITED CAPACITY, CAUSING STUDENTS TO STUDY ABROAD

Despite the high quality of South Africa's medical schools, the country is training considerably fewer medical students than its comparator countries. The nine public medical universities in South Africa are autonomous. In addition, the Faculty of Health

Sciences recently opened in Limpopo Province, and in 2021, the Nelson Mandela University opened in the Eastern Cape.34 Other medical faculties (Stellenbosch, the University of KwaZulu-Natal, and University of the Witwatersrand) have sought to extend into rural areas. In 2020, South Africa's medical institutions produced about araduates. fewer 1.800 than comparator countries like Chile, Colombia, and Turkey (Figure 5). South African universities would have to triple the number of





Source: OECD 2021b.

<sup>30</sup> OECD 2021a.

<sup>&</sup>lt;sup>27</sup> ASSAf 2018.

<sup>&</sup>lt;sup>28</sup> WDI 2021.

<sup>&</sup>lt;sup>29</sup> WDI 2021.

<sup>&</sup>lt;sup>31</sup> WDI 2019.

<sup>&</sup>lt;sup>32</sup> In addition to spending to improve basic education for early grade reading and math, as well as school infrastructure.

<sup>&</sup>lt;sup>33</sup> World Bank 2019.

<sup>&</sup>lt;sup>34</sup> Nelson Mandela University 2021.

medical graduates to about 5,500 annually to achieve the same output as Chile. However, the government's current plans are to increase the number to just 2,000 medical graduates annually by 2030, but even this will require more study places, qualified students, and resources.<sup>35</sup> The Walter Sisulu University in the Eastern Cape has launched a three-year Bachelor of Clinical Medical Practice degree to train clinical associates who can take up some of the work usually performed by medical doctors. However, a lack of consensus has stalled its expansion.

**Many South African medical students study abroad, mainly in Cuba and China.** In 2017, 150 medical students from South Africa were studying in Mauritius and 900 in China.<sup>36</sup> In addition, between 1996 and 2015, a total of 1,767 South African medical students, mostly from rural areas, received training in Cuba under the South African–Cuban Medical Collaboration (SACMC).<sup>37</sup> Since then, these numbers have been increasing. Between 2018 and 2022, approximately 700 Cuban-trained South African medical graduates will have returned annually to South Africa, while another 1,000 are expected to have graduated by 2027.<sup>38,39</sup>

**Foreign-trained medical students often find it difficult to enter the South African health workforce because of the sector's cumbersome registration process.** Despite increased demand for physicians during the COVID-19 pandemic, the Health Professional Council of South Africa (HPCSA) did not register any additional foreign-trained physicians (except for graduates trained in Cuba).<sup>40</sup> In 2020, a survey identified 458 foreign-trained medical graduates (including 284 South Africans and 174 from other countries with residency status) who were either unemployed or working in nonmedical roles in South Africa because their registration with the HPCSA was still pending.<sup>41</sup> Only 60 percent of South Africa's foreign-trained medical graduates pass the mandatory HPCSA board exam, which suggests that the quality of medical education in some countries does not meet South Africa's standards.<sup>42</sup> Therefore, a solution to both issues might be for the HPCSA to streamline its online registration, specifically for foreign-trained graduates from universities accredited by OECD countries.

**Medical students from other countries studying in South Africa are sponsored by their governments and are required to return to their countries after they complete their training**. As of 2016, most foreign medical students in South Africa were from Zimbabwe (37.0 percent), Namibia (8.4 percent), and Lesotho (5.0 percent).<sup>43</sup> Theoretically, students from countries in the Southern African Development Community (SADC) who are pursuing medical studies elsewhere in the region are required to return to their country of origin upon completion of their studies to undertake their internship. However, in practice, this policy is not enforced.

The quality of much medical education in South Africa is also a concern—and has negatively affected the performance of medical students. In 2019, only 15 out of 46 students specializing in surgery passed the qualifying exam.<sup>44</sup> The low quality is due to

- <sup>37</sup> Mayosi and Benatar 2014.
- <sup>38</sup> Squires et al. 2020.
- <sup>39</sup> Sui et al. 2019.
- <sup>40</sup> Karim 2020.

- <sup>42</sup> Mbuli 2020.
- <sup>43</sup> World Bank 2019.
- <sup>44</sup> IOL 2019.

<sup>&</sup>lt;sup>35</sup> Tiwari et al. 2021.

<sup>&</sup>lt;sup>36</sup> Pillay 2019.

<sup>&</sup>lt;sup>41</sup> Le Grange, Dickinson, and Davis 2020.

many factors, including outdated curricula, inadequate supervision of students, and a lack of faculty. About 30 percent of 2,361 academic medical and surgical specialist posts were reported vacant in 2011, due to staff shortages.<sup>45</sup> Regular independent analysis of academic programs would make it possible to identify those medical schools with the most problems and, thus, to provide them with targeted support to improve their quality while also rewarding those that perform well. The government is committed to high-quality education and emphasizes curriculum reforms, modern health education, and faculty development in its 2030 Human Resources for Health Strategy.<sup>46</sup>

The medical curriculum does not adequately prepare students for their roles during and after disasters. Embedding pandemic and disaster preparedness into medical and health education is crucial to prepare both faculty and students for the future. For example, teaching students how to use personal protective equipment (PPE) correctly can reduce any unwarranted fears by staff about interacting with patients during pandemics. Furthermore, the emergence of long COVID as a new pathophysiological syndrome underscores the need for students to learn about (i) the effects of a pandemic on patients with existing chronic diseases; and (ii) the emergence of new chronic conditions as a result of a pandemic and/or the amplification of existing health conditions. These issues could best be taught in the context of a formalized disaster medicine curriculum emphasizing the link between disasters and chronic disease management.

#### NURSING SCHOOLS DO NOT TRAIN ENOUGH NURSES TO TAKE CARE OF A GROWING AND AGING POPULATION

**South Africa trains fewer nurses than other upper-middle-income countries.** Reforms to the curriculum in 1994 caused the closure of several low-performing nursing schools. The remaining schools (143 public and 81 private nursing colleges) train three categories of nurses: (i) professional (registered) nurses with a baccalaureate degree, (ii) enrolled nurses with a three-year college diploma, and (ii) auxiliary nurses with a one-year certificate. In 2020, 6,910 nurses and midwives graduated from these schools, 90 percent of whom were women.<sup>47</sup> The number of registered nursing students has remained steady over the past few years, but there has been a decline in the number of students going into diploma and auxiliary nursing (Figure 6). South Africa trains fewer nurses than other UMICs such as Mexico and Turkey (Figure 7). A substantial increase in nurse graduates will be required to staff the larger health workforce that will be needed in the future. Planning for this increase will need to be based on a cost-effectiveness analysis across all three categories of nurses, as well as on data about future trends, such as anticipated changes in demographics, mobility, medical technology, financing, and new health care models.<sup>48</sup>

<sup>&</sup>lt;sup>45</sup> Department of Health, South Africa 2011.

<sup>&</sup>lt;sup>46</sup> Department of Health, South Africa 2020.

<sup>47</sup> SANC 2021.

<sup>&</sup>lt;sup>48</sup> Blaauw, Ditlopo, and Rispel 2014.

#### Figure 6: Number of Nursing Students per Year, South Africa, 2010–2019





Sources: OECD 2021b and SANC 2021.

Note: Students = Student Nurses and Midwives; Pupil = Pupil Nurse; PNA = Pupil Nursing Auxiliaries.

#### COVID-19 HAS ACCELERATED THE USE OF MODERN LEARNING TECHNOLOGY IN HEALTH EDUCATION

The disruptions caused by COVID-19 caused to in-person classes accelerated the use of digital learning in medical education. The government's declaration of a National State of Disaster in South Africa on March 15, 2020, led to the closure of all higher education institutions in the Post-School Education and Training system (PSET). In addition, travel bans in 2020 required students to study remotely. Among them were many foreign students enrolled in South African universities and South African students studying abroad. For medical universities and health schools, these COVID measures necessitated an immediate switch to remote learning including web-based, virtual classrooms, and digital content. For medical and nursing schools and students, this was a major change.

The lack of prior investments in online learning hindered the switch to remote learning for many schools. Some medical schools quickly switched to innovative electronic learning techniques, including distance learning, to continue to provide high-quality training to students participating remotely in preclinical classes. However, in March 2020, most medical universities and nursing colleges were not ready for this switch as developing engaging e-lectures and digital content requires time and planning. In principle, switching to distance learning created opportunities for students in remote areas to participate, but technical challenges and connectivity issues have also made this learning format challenging. These problems need to be overcome, given the dire need for health professionals in rural areas.

**COVID-19 brought all practical training to a halt, but it will be important to adopt innovative remote-learning methods in case of future pandemics and crises.** Practical training is crucial for students to hone their clinical and patient skills and to prepare for the realities of clinical medical work. However, the circumstances of the pandemic have made this almost impossible, and this scenario may be repeated for future disasters. Therefore, it will be necessary to develop a new educational model that uses simulation technology to enable blended learning.

**High-fidelity simulation education (SE) has been used in clinical teaching around the world but is not yet widely available to students.** SE is a learning method that enable students to experience and learn from different medical scenarios using computerized manikins that can be programmed to recreate clinical conditions in a controlled setting. SE helps students to develop and enhance their clinical decision-making abilities and equips them with technical expertise and problem-solving capabilities before they have real-life clinical experiences.<sup>49</sup> SE is different from virtual reality learning, which involves students putting on a virtual reality headset to become immersed in an interactive virtual environment. When used with appropriate educational software, this enables students to learn from experience in the virtual world.<sup>50</sup> These learning methods can improve the quality of medical education at scale, regardless of the students' actual locations. South African medical universities are establishing simulation centers, but its widespread use is hampered due to a lack of finances, trained educators, equipment, and protected time for educators and learners.<sup>51</sup>

**Virtual simulation education (VSE) is emerging as a new method that could be used in the future for practical clinical training.** VSE covers the spectrum of audiovisual technology–driven simulations, that do not take place in person, including SE and virtual reality learning.<sup>52</sup> Italy opened 23 VSE centers using telematic methods that enable long-distance transmission of computerized information to provide distance education during the COVID-19 pandemic. VSE increases students' retention of knowledge, strengthens their clinical reasoning, and increases their satisfaction with learning.<sup>53</sup> Although simulation equipment is available in South Africa, only a few educators have access to virtual reality or to the 3D touch equipment needed for virtual environments and teleoperated systems.

As technology advances, the functions and roles of health professionals will need to continually evolve accordingly. This will require investment in the continuous training of the health workforce in medical sciences and technology and the use of digital tools. Health graduates may sometimes be directly involved in the design and implementation of medical technologies. For example, the University of the Witwatersrand's engineering hub developed and provided 3D printed face shields to health workers at no cost after private sector hospitals had announced PPE shortages.<sup>54</sup> South African universities developed a host of innovative equipment during the pandemic, such as solar-powered handwashing machines and web-based X-ray lung scans, which are particularly useful in resource-constrained rural locations. Innovation hubs that involve both students and health professionals in the design of medical technology will lead to better technology and better care.

# THE GOVERNMENT'S TERTIARY EDUCATION SPENDING IS ALREADY HIGH, AND THE AMOUNT SPENT ON MEDICAL STUDIES IS UNSUSTAINABLE

**Medical education is one of the most expensive fields of study.** Training a medical doctor in South Africa costs about R 900,000 (\$63,500).<sup>55</sup> The government not only funds

<sup>49</sup> Ingrassia et al. 2021.

<sup>&</sup>lt;sup>50</sup> Pottle 2019.

<sup>&</sup>lt;sup>51</sup> Swart, Duys, and Hauser 2019.

<sup>&</sup>lt;sup>52</sup> Lioce 2020; Pottle 2019.

<sup>&</sup>lt;sup>53</sup> Padilha 2019.

<sup>&</sup>lt;sup>54</sup> Wits Digital Incubator at the Tshimologong Precinct, the School of Mechanical, Industrial and Aeronautical Engineering (MIA), Transnet Center of Systems Engineering (TCSE) and the Transnet Matlafatšo Centre (TMC).

<sup>&</sup>lt;sup>55</sup> African News Agency 2019.

the tuition of South African medical students who study in South Africa but also of those who train overseas. For example, the South African government finances the costs of training South African medical students in Cuba under the SACMC program, which amounts to R 331,000 (\$23,500) annually, which is considerably more than tuition would cost at a medical school within South Africa.<sup>56</sup>

Foreign students in South Africa already pay relatively high tuition. Annual tuition for foreign medical students who study in South Africa varies by university and can range from R 70,000 (\$5,000) to R 120,000 (\$8,000) per year, excluding costs of accommodation. These tuition levels for foreign students are comparable to those charged by European universities. For example, the Universities of Belgrade and Novi Sad in Serbia offer general medical courses in English to a growing number of foreign students and charge annual tuition fees of €5,500 (\$6,000) to €7,000 (\$7,700) per student. Tuition at Zagreb University in Croatia for medical courses taught in English costs €12,000 (\$13,200) per year. Private medical universities in Germany charge tuition of €12,000 (\$13,200) to €23,000 (\$25,200) per year.<sup>57</sup>

Given that the amount the government spends on tertiary education is already very high, it will be vital to identify innovative mechanisms that could be used to fund medical tuition fees going forward. These financing models will need to accommodate substantial increases in the number of South African medical students while also guaranteeing reliable and sustainable financing.<sup>58</sup> Based on a cost analysis of the options available, the government might consider increasing tuition fees for medical students but also providing them with access to student loans (including income contingent loans [ICLs] that do not have to be repaid until the student has graduated and is earning more than a minimal income) as well as charging full-cost tuition for foreign students studying in South Africa.

#### HIGH VACANCY RATES COINCIDE WITH HIGH UNEMPLOYMENT AND ALREADY-HIGH WAGE EXPENDITURES

South Africa has fewer physicians for its population than its comparator countries, and this will become problematic when a large number of their cadre retire. South Africa has fewer physicians for its population than Zambia and fewer than the average for lower-middle-income countries (Figure 8). The situation is better for nurses (Figure 9), with the number of registered nurses growing from 231,086 to 280,231 between 2010 and 2020. As a result, in 2020, there were four nurses for every doctor in the South African health sector, which is above the OECD average of 2.8. However, 47 percent of registered nurses and 29 percent of diploma nurses are older than 50 and will retire within the next decade.<sup>59</sup> The physician workforce is aging too. In 2019, the average age of doctors was 59 for males and 50 for females.<sup>60</sup> Therefore, in the future, the government will have to hire substantially more physicians and other health professionals to replace its aging health workforce, treat a more complex disease burden, and ensure that care is available for all of its growing population.

<sup>&</sup>lt;sup>56</sup> African News Agency 2019.

<sup>&</sup>lt;sup>57</sup> World Bank 2021.

<sup>&</sup>lt;sup>58</sup> World Bank 2019.

<sup>&</sup>lt;sup>59</sup> SANC 2021.

<sup>&</sup>lt;sup>60</sup> Tiwari et al. 2021.



Sources: WDI 2021 and SANC 2021. Note: L/MIC = Lower-/Middle-Income Country.

Substantial increases in staffing will be needed to meet the current and future health care needs of the population. The Department of Health's 2030 Human Resources for Health Strategy report revealed that there is a severe shortage of health workers to meet current need.<sup>61</sup> The strategy proposed hiring an additional 96,586 health workers by 2025, including about 30,000 community health workers (CHWs), which would increase the wage bill by about R 40 billion. The strategy also proposed the introduction of a national health benefits package, which would require an additional 87,614 health staff (mainly medical specialists and officers, nurses, nursing assistants, pharmacists, psychologists, and dental staff), costing an additional R 34.3 billion.<sup>62</sup> To reach staffing targets, the current 9,731 medical specialists would need to be more than tripled to 30,000. To fill all the extra positions, the government would need to recruit among the unemployed health labor force, train substantially more health professionals, and hire foreign-trained health staff from countries with high unemployment and large diasporas (such as Ghana, Nigeria, and Serbia), who could apply for a Critical Skills Work Visa. However, hiring foreign medical staff will be almost impossible as the 2022 Critical Skills List published by the government includes only nurse educators despite the significant shortage of health professionals.63

**Fiscal constraints currently limit the number of additional health staff being hired.** In 2019/20, 63 percent of the government's health expenditure was on wages; in an attempt to rein in this huge national wage bill, it has largely ceased to hire additional staff to fill vacant positions. As a result, 35 percent of physician positions in the public sector are vacant. The 2030 Human Resources for Health Strategy warns that vacancies for essential health workers will worsen by 2025 if the government only increases its health workforce expenditure in line with inflation. Given the government's fiscal constraints, it will be necessary to identify and adopt new financing and recruitment models to realize this strategy. Innovative ways of financing medical education and the health workforce will need to be identified, including income contingent loans for medical studies and a review of physician salaries. Workplace reforms will be required to increase the attractiveness of working in the public sector, such as (i) redesigning workforce practices to include

<sup>&</sup>lt;sup>61</sup> Department of Health, South Africa 2020.

<sup>&</sup>lt;sup>62</sup> Results differ when applying the WISN methodology.

<sup>&</sup>lt;sup>63</sup> Republic of South Africa 2022.

multidisciplinary teams and task-sharing, (ii) increasing staff motivation by ensuring that their jobs are enriching, (iii) providing career progression paths, (iv) optimizing work-life balance, and (v) meeting the needs of women in the health workforce.

**There is a large pool of unemployed doctors and nurses**. The South African Medical Association (SAMA) has reported that over 500 qualified South African medical doctors are unemployed, as are 325 nurses and 200 other health workers.<sup>64,65</sup> In 2020, a survey identified 458 unemployed international medical graduates who were waiting to be registered with the HPCSA.<sup>66</sup> The actual number of unemployed health workers is likely to be even higher, given that there is no database to confirm these anecdotal numbers. This professional idleness is detrimental to the career development of health professionals. Hence, some may seek work in the private sector, where about 60 percent of physicians already provide care to about 20 percent of the population, while others may leave to work abroad; but there are no data on this.

**Physicians and nurses receive expensive medical training financed by the government, but many then leave the country to work and pay taxes abroad.** To develop their skills, health professionals need to accumulate experience working with complex patients in advanced care settings that are mostly located in hospitals in urban centers. As there are not enough such jobs in South Africa, many of these professionals seek such opportunities abroad. Since 2002, South Africa has experienced growing net loss of physicians to OECD countries, reaching about 14,000 in 2010. By 2014, this number had dropped to about 11,000 South African–born physicians.<sup>67</sup> These high emigration rates represent a loss of return on the government's investments in medical education, which cannot be recovered. To reverse this trend, policy makers will need to create more health positions; increase the attractiveness of the public health system as an employer; ramp up hiring, including among the diaspora; find ways to ensure that medical graduates will work where the need is the greatest; and introduce innovative ways of financing medical education based on successful experiences in other countries.

#### COMMUNITY SERVICE AND COMMUNITY HEALTH WORKERS HAVE HELPED TO EASE SHORTAGES

The requirement to perform compulsory community service in underserved areas provides medical graduates with relevant clinical experience, but many do not stay in those posts. Before medical graduates are licensed to practice, they are required to undertake a two-year medical internship at a pre-approved government hospital, followed by a compulsory year of community service. Nurses must also work for one year in compulsory community service. The goal is to increase the number of health professionals working in remote areas and to foster the graduates' professional development.<sup>68</sup> Approximately 90 percent of these practitioners have reported that they made positive contributions to the health of the communities during these internships. Staff supervision helps to make the program successful.<sup>69</sup> Most practitioners assigned to rural areas do not stay in those communities after their community service is over, including those who are

<sup>&</sup>lt;sup>64</sup> ActionSA 2021.

<sup>&</sup>lt;sup>65</sup> Reuters 2021.

<sup>&</sup>lt;sup>66</sup> Le Grange, Dickinson, and Davis 2020.

<sup>&</sup>lt;sup>67</sup> Tankwanchi, Hagopian, and Vermund 2019.

<sup>68</sup> Reid 2018.

<sup>&</sup>lt;sup>69</sup> ASSAf 2018.

from rural areas. Many physicians willing to work in remote areas are not offered jobs there once they finish their community service due to lack of resources.<sup>70</sup>

South Africa's community health workers (CHWs) make significant contributions to the provision of community health care, but their financing is precarious as it comes from private sources. Community health worker programs have existed in South Africa since the late 1920s in various forms, and since 2011 they have been guided by a strong national framework, which was revised in 2018. In 2019, there were 54,180 CHWs in South Africa, most of them women.<sup>71</sup> They help to improve child health, treat communicable diseases, and increase access to care for disadvantaged groups. CHWs are trained by nongovernment organizations (NGOs), but there is no accreditation, recognition, or regulation of CHW training. CHWs are paid by NGOs so they are not on the government's wage bill; this is likely to continue, given the government's wishes to prioritize the hiring of more physicians and nurses for public health facilities.

**CHWs have played an important role during the COVID pandemic as educators and disease-surveillance informers.** They distributed educational materials, carried out contact tracing, and delivered medications to patients with chronic diseases in their homes. By June 2020, CHWs had screened more than 20 percent of the population for COVID-19 by targeting high-risk communities and using mobile screening apps.<sup>72</sup> Even though they have done such valuable work during the pandemic, they have not been integrated into the health system.

#### THE SURGE IN COVID-19 PATIENTS REQUIRES EFFICIENT HEALTH WORKFORCE MANAGEMENT AND CAPACITIES

**The pandemic was a huge disruption to health care delivery and required surge capacity**. During the first wave, the strict enforcement of lockdown regulations led to health facilities being underused.<sup>73</sup> Some people did not seek care for their ailments because they were afraid of contracting the virus. Others were unable to travel to health facilities as taxi fares became unaffordable. The second wave stretched the health system to its limits, particularly the surge in hospitalized patients, some of whom required personnel-intensive specialist care.<sup>74</sup> By mid-July 2020, the spike in COVID-19 patients and a 20 percent absenteeism rate, due to a growing number of health workers being infected, caused a nationwide shortage of 12,000 health workers. This resulted in an urgent need for surge capacity, including 5,200 extra staff in the Western Cape alone.<sup>75</sup>

**Health staff responded quickly to the need for surge capacity**. Medical personnel forfeited holidays and agreed to work longer hours. Some of them, especially infectious disease experts with expertise in TB and HIV, were redirected to support national COVID-19 testing and tracking programs. The similarities between infectious diseases meant that staff could familiarize themselves quickly with new conditions, such as the correct use of PPE.<sup>76</sup> This flexibility helped to rapidly accelerate the scaling up of the health workforce but not by enough to treat the growing number of patients.

<sup>70</sup> Reid 2018.

<sup>&</sup>lt;sup>71</sup> Department of Health, South Africa 2020.

<sup>&</sup>lt;sup>72</sup> Abdool Karim 2020.

<sup>73</sup> Harding 2020.

<sup>&</sup>lt;sup>74</sup> Kew 2021.

<sup>&</sup>lt;sup>75</sup> The Presidency, Republic of South Africa 2020.

<sup>&</sup>lt;sup>76</sup> Nordling 2020.

**Medical students were recruited to work in hospitals during the surge, which enriched their clinical experience.** Medical students and faculty from the University of Cape Town (UCT) coordinated a network of 213 medical student volunteers known as the UCT Surgical Society COVID-19 Student Taskforce.<sup>77</sup> The network trained students in safety issues, asymptomatic transmission, PPE shortages, nationally imposed movement restrictions, and administrative tasks, and then assigned them to work on COVID care in the region's hospitals. Senior students were able to engage in patient interactions under the supervision of professional staff. Doing this work gave them valuable experience in disaster management.

In many countries, the COVID crisis caused retired and inactive health professionals to come back into clinical practice, though in South Africa some administrative issues hindered the efficiency of this process. The United Kingdom automatically reintegrated recently retired physicians and nurses back into the health workforce during COVID-19, which reduced the workload of the General Medical Council, the statutory body that registers and licenses doctors in the United Kingdom. Similarly, the South African Nursing Council (SANC) permitted nurses whose registration had lapsed to be reinstated and waived their registration fees for the duration of the National State of Disaster. However, implementation varied in different provinces due to their varying administrative capabilities. Furthermore, the closure of the SANC's office at the beginning of the pandemic led to delays. These problems could be prevented in the future by automating the online registration of health professionals, who could be given a temporary license to work in the health sector.

**Treating long COVID and its complex health issues requires multidisciplinary teams with different skills.** Long COVID sequelae affect multiple organ systems, and these effects can be worse in patients with coexisting illnesses. The complexity of this condition requires an integrated approach in which patients are treated by a team comprising a clinician, an occupational therapist, a rehabilitation medicine specialist, a physiotherapist, and a mental health practitioner.<sup>78</sup>

Many health systems pay extra benefits to health professionals during extraordinary disaster situations, but the South African government's fiscal situation meant that it was unable to afford these hazard allowances during the COVID-19 pandemic. The inadequacy of the financial rewards provided to health staff during the pandemic has been highly contentious and has been criticized by health professionals. If such a "hazard allowance scheme" were to be adopted for future crises, transparent criteria would need to be set to govern the payments aimed at compensating staff for the loss of their vacation time and sick leave, increased overtime hours, higher exposure to pandemics in rural settings, and willingness to temporarily relocate to areas with workforce shortages. Employers could also be mandated to finance the funeral costs of health workers during pandemics.

Unlike in other countries, South Africa's government did not accelerate the recruitment of foreign-trained health professionals, even though there is high unemployment among this group in South Africa. With the onset of the pandemic, the governments of Australia, Canada, Germany, Italy, the United Kingdom, and the United States immediately adjusted their hiring rules to recruit foreign-trained health workers,

<sup>77</sup> Verhage 2020.

<sup>&</sup>lt;sup>78</sup> Mendelson et al. 2021.

whose work visas were processed despite national lockdowns. The United Kingdom provided temporary licenses to 11,800 experienced physicians in good standing with the medical professional council in their countries of origin. In some countries, residency requirements were also shortened for foreign-trained physicians. In Germany, lessqualified foreign professionals were employed as assistants to work with experienced medical doctors. This was not the case in South Africa. Despite increased demand for physicians during COVID-19, the HPCSA did not facilitate the registration of additional foreign-trained physicians. The only exception was made for medical graduates from Cuba under the HPCSA streamlined process.<sup>79</sup> This meant that 458 international medical graduates remained unemployed and unable to help with the effort to combat COVID-19 in South Africa's hospitals.<sup>80</sup> In the future, streamlining the licensing and registration processes for foreign-trained graduates based on the experiences of OECD countries would help to reduce the country's shortages of health staff.

The pandemic highlighted the need for better procurement processes to ensure access to high-quality medical products at competitive prices. During the pandemic, there were cases in some provincial PPE procurement tenders where some of the chosen PPE suppliers were unqualified and had no experience of the supply chain.<sup>81</sup> This led to inflated prices, the import of poor-quality products, and unnecessary wastage and misappropriation of funds, thus depriving health workers and patients of protective equipment and materials. These issues included nonadherence to product specifications, the procuring of unsuitable products, and the receipt of PPE packed under false labels. Procurement for health requires inspection, quality assurance, control, communication, and transparency. To improve the procurement process for the future and mitigate concerns about shortages, the government should issue policy guidance on how to acquire high-quality PPE and ensure transparency in tenders. It might also explore the possibility of decontaminating and reusing PPE to extend the shelf life of PPE in local facilities.<sup>82</sup>

#### DISASTERS HAVE A PSYCHOLOGICAL IMPACT ON HEALTH STAFF AND MAY INCREASE STAFF ATTRITION

The pandemic contributed to high levels of burnout, exhaustion, anxiety, and depression among health staff. Already before the pandemic, the Gauteng Province Department of Health identified high levels of depression, burnout, and anxiety among health staff, ranging from 46 percent among nurses to 78 percent among junior doctors and 81 percent among rural doctors.<sup>83</sup> Deteriorating working conditions, the use of agency nurses, and "moonlighting" of public sector staff in the private sector have also become more widespread and have caused morale to suffer.<sup>84</sup> Pandemics are unique in that the patient is not only the victim of a virus but also a vector.<sup>85</sup> For health professionals, this can lead to uncertainties and stress, especially where there is high-risk exposure and many losses among patients and staff. The need to ration specialist care and equipment caused additional emotional pressures for staff.<sup>86</sup> Staff felt ineffective and emotionally exhausted. Employees with no insurance coverage feared falling ill. High wage

<sup>&</sup>lt;sup>79</sup> Karim 2020.

<sup>&</sup>lt;sup>80</sup> Le Grange, Dickinson, and Davis 2020.

<sup>&</sup>lt;sup>81</sup> Special Investigations Unit 2021.

<sup>&</sup>lt;sup>82</sup> Le Roux and Dramowski 2020.

<sup>&</sup>lt;sup>83</sup> Robertson 2020.

<sup>&</sup>lt;sup>84</sup> Rispel and Blaauw 2015.

<sup>&</sup>lt;sup>85</sup> Dhai et al. 2020.

<sup>&</sup>lt;sup>86</sup> Naidoo and Naidoo 2021.

differentials between different categories and across provinces also affected staff morale. These stressors are likely to create increased medical errors, reduced staff empathy for patients, and increased turnover rates.<sup>87</sup> It is therefore crucial to provide staff with psychological support as well as equipment and efficient management structures. Peer training, counseling, and medication may also be helpful. Professional and volunteer organizations for mental health services could be used as well, including the Healthcare Workers Care Network, which provides mental health support via digital platforms.<sup>88</sup>

**Health managers need support to address challenges that affect staff morale.** Most health managers focus on routine administrative functions rather than on strategic planning and management and have reported feeling "unsupported, isolated, and unprepared" for their roles.<sup>89</sup> The 2030 Human Resources for Health Strategy recommends the development of a national Health Leadership and Management Competency Framework, with a revised performance management and development system to facilitate the training, professional development, and recruitment of health managers. Achieving the goals of the framework will require significant strengthening of management skills and capacity.

#### COVID-19 IS ACCELERATING THE REALIZATION OF SOUTH AFRICA'S VISION FOR MODERN HEALTH TECHNOLOGY

The COVID pandemic widened the use of modern technology in the provision of health care in South Africa. In 2020, President Cyril Ramaphosa set up a Presidential Commission on the Fourth Industrial Revolution (4IR), which has been defined as the fusion of physical, biological, and digital technologies.<sup>90</sup> The commission was tasked with investigating South Africa's readiness for the 4IR and proposing recommendations for leveraging these new technologies, including in the health sector. The commission's report identified artificial intelligence, analytics, blockchain, and the cloud as key tools to increase access to care, supply chain efficiency, and patient data management.<sup>91</sup> Telemedicine, accessible intelligence, and a digitalized supply chain were three areas targeted in the report. Telemedicine allows health staff to work with patients virtually to monitor their symptoms, while maintaining essential patient contact. It reduces the number of patients who have to visit facilities in person and reduces the use of PPE. Making telemedicine a widespread reality will require that students and staff learn how to use the necessary technologies. During the pandemic, the HPCSA relaxed its requirement that telemedicine only be used by professionals and patients who already had a preexisting relationship with each other. However, the advantages of telemedicine extend beyond pandemics, and as it is a priority area under the 4IR report, there will need to be a complete revision of existing telemedicine strategies and legislation to reflect its new prominence in health provision in the future.<sup>92</sup>

There are other innovative alternative technology applications that could prove useful to South African health providers. The "Vula Mobile" app, designed in South Africa, could extend services provided by primary care workers by enabling them access to on-call specialists more quickly than if landlines or fax machines were used. It would be

<sup>&</sup>lt;sup>87</sup> Shreffler 2020.

<sup>&</sup>lt;sup>88</sup> https://www.healthcareworkerscarenetwork.org.za/about-us.

<sup>&</sup>lt;sup>89</sup> National Department of Health, South Africa 2020.

<sup>90</sup> World Economic Forum 2016.

<sup>&</sup>lt;sup>91</sup> Presidential Commission on the Fourth Industrial Revolution 2020.

<sup>&</sup>lt;sup>92</sup> On March 26, 2020, the HPCSA released a guidance note that substituted "telemedicine" for "telehealth." On April 3, 2020, it amended its telemedicine guidelines during the COVID pandemic.

especially useful for clinicians in remote areas. Safeguarding considerations, such as loss of privacy and confidentiality and barriers to access, will all need to be regulated going forward, as part of the implementation of telemedicine.

#### COVID-19 HAS NEGATIVELY AFFECTED HEALTH SERVICE DELIVERY, BUT INNOVATIONS ARE EMERGING

**COVID regulations have made it more difficult for many to access health care.** The government's immediate actions—closing borders, restricting the movement of the population, and encouraging mask use—initially limited the spread of the virus. The government went on to develop a national prevention and onward transmission strategy and rapidly set up an Emergency Operations Center, a National Command Council, and an inter-ministerial committee. These measures have continued in response to highly infectious viral genetic mutations, acute hospitalizations, and high mortality. While necessary to tackle the pandemic, these COVID regulations on top of limited availability of transportation have created barriers to accessing health care, particularly for the poor. The right balance was not achieved between treating COVID patients and maintaining the continuity of care for all other conditions.

Because the pandemic reduced the amount of care available for non-COVID-19 health conditions, there may have been an increase in the number of undiagnosed cases of NCDs and infectious diseases like TB and HIV. A national survey, Wave 2 National Income Dynamics Study—Coronavirus Rapid Mobile Survey (NIDS-CRAM), found that primary care consultations dropped nationwide, including those for HIV testing and under-five child immunization and growth monitoring.<sup>93</sup> The use of preventative services dropped too.<sup>94</sup> Similarly, there was a 48 percent decline in TB testing during the initial Level 5 lockdown, which could be attributed to people not seeking care.<sup>95</sup> Targeted interventions may be needed to catch up on the backlog of missed care, especially among vulnerable and marginalized groups.

A pilot project that incorporated COVID safety protocols into the provision of lowcost and highly effective facility-level care created trust among health staff and patients. In six pilot primary health care (PHC) clinics in the Johannesburg Health District, clinical flows and patient procedures were revised to encompass COVID-19 safety protocols while maintaining the delivery of services. The pilot was developed with the input of specialists with experience working with the Ebola virus and in collaboration with the Infectious Disease Society. The facilities used effective isolation tactics for symptomatic patients, as well as sanitization and social distancing through a system of clinical zoning areas to perform triaging and to facilitate patient flows. Signs guided patients to various zones according to their health needs and level of risk. For example, HIV and TB patients were guided to orange high-risk zones, while patients seeking routine services were guided to blue low-risk zones.<sup>96</sup>

To be effective, a disaster response strategy needs to involve all levels of care, not just hospitals. Even before the pandemic, some primary health care facilities already had to accommodate many patients in a small space, which—once COVID began to spread—increased the risk of transmission. As infection rates increased, the government aimed to

<sup>&</sup>lt;sup>93</sup> Siedner et al. 2020.

<sup>&</sup>lt;sup>94</sup> Burger 2020.

<sup>&</sup>lt;sup>95</sup> Ismail and Moultrie 2020.

<sup>&</sup>lt;sup>96</sup> PHCPI 2020.

maintain the continuity of hospital treatment as tertiary-level hospitals with intensive care equipment and specialists were generally better equipped to respond to the patient surge than PHC facilities. However, a few hospitals and health clinics in South Africa met less than 40 percent of the standards set by the Office of Health Standards Compliance as of 2018/19. This negatively affected their ability to mount an effective pandemic response. Therefore, disaster response planning needs to take account of capacity to provide quality care throughout the health system.

# THE LACK OF DATA ON THE HEALTH WORKFORCE MAKES IT VERY DIFFICULT TO PLAN FOR THE FUTURE

The lack of data on health professionals hinders the analysis and planning of future workforce needs. The 2030 Human Resources for Health Strategy emphasizes the need for (i) effective planning to ensure that human resources are aligned with current and future need; and (ii) policy, planning, management, and investment to be driven by the data. However, the quality and availability of existing data on the health workforce are a concern. The most recent HPCSA, SANC, and South African Pharmacy Council (SAPC) data on current stocks of registered personnel are from 2016 and are not disaggregated by location or by public versus private sector. Data on public sector employees are captured through the Personnel and Salary System (PERSAL), but no detailed data are available on the health workforce in the private sector. Nor do the available data distinguish professionals who have left the country, are retired, or work outside their profession. Without substantial investments in data collection and analysis, health workforce planning for the future will be severely constrained.

Two quarterly surveys collect data on employment but not on the health workforce.<sup>97</sup> The Quarterly Employment Survey (<u>QES</u>)<sup>98</sup> is an enterprise-based survey, whereas the Quarterly Labor Force Survey (QLFS) is a household-based survey.<sup>99</sup> The QES focuses on nonagricultural formal sector employment, while the QLFS covers total employment in all industries and sectors, including the demographic characteristics of the labor force. No data specific to the health industry are included in either survey. However, both surveys report numbers of personnel working in community and social services, a category that groups health services with other services like education and veterinary services. Producing a representative analysis of the health workforce from the household survey would require a costly increase in the sample size to yield reliable results. An alternative option would be for the government to mandate the collection of health workforce data from health facilities, labor unions, and professional councils, which is likely to be extensive enough to be used in analysis. Whatever the sources of these data, they will need to encompass regional differences in vacancies, staffing, and unemployment as well as future demographic trends in both the population and the health workforce, a changing disease burden, new service delivery models and medical technology, and increased mobility.

There are several important prerequisites that will need to be in place before effective planning for the future health workforce becomes possible. First, the current management in the health system lacks the capacity to implement the 2030 Human Resources for Health Strategy at the national level.<sup>100</sup> Second, planning is also

<sup>100</sup> Van Ryneveld 2019.

<sup>&</sup>lt;sup>97</sup> http://www.statssa.gov.za/?page\_id=737&id=1.

<sup>98</sup> http://www.statssa.gov.za/?page\_id=1854&PPN=P0277.

<sup>&</sup>lt;sup>99</sup> http://www.statssa.gov.za/?page\_id=1854&PPN=P0211.

likely to be a futile exercise until financial constraints no longer prevent additional hiring. Third, a comprehensive national information system for the health workforce will be needed. Fourth, there will need to be a consensus among health educators in favor of rolling out the new qualification framework for nurses, expanding the number of clinical associates, reforming the medical curriculum, and introducing multidisciplinary practical training at different levels of care. There has been an attempt by the 2030 Human Resources for Health Strategy to implement the Workload Indicators of Staffing Need (WISN) planning model in the health sector, but it does not define any national standards for staffing ratios. However, the Western Cape Department of Health has a framework for health workforce planning that could be expanded if these prerequisites can be addressed.<sup>101</sup>

**The SADC regional agreement will need to be adjusted to enable effective future health workforce planning**. In the past, the South African health system has recruited health workers from abroad, particularly from Cuba and Tunisia, to fill vacancies in rural areas and to hire scarce specialists. However, the SADC agreement currently limits the percentage of foreign doctors that can be employed by the South African health system to 6 percent. The National Department of Health has agreements with some NGOs to facilitate the recruitment of, for example, Congolese refugee doctors, but this is the extent of the international recruitment that can be done unless the SADC agreement and the Critical Skills List are changed.<sup>102</sup>

#### INVESTING IN RESEARCH AND COLLABORATION WITH THE PRIVATE SECTOR SPURS HEALTH INNOVATIONS AND INCREASES ACCESS TO CARE FOR **COVID** PATIENTS

During the pandemic, there was idle capacity in the private sector that could have been diverted to productive use in the public sector if a national workforce plan had been in place. South Africa's private health sector is the preferred provider for the higherincome and insured population and is a large employer. During the COVID-19 pandemic, because it operates on a fee-for-service model, the private sector has experienced a reduction in revenue caused by a drop in elective surgeries. As a result, some private practitioners have been compelled to close their practices, retire early, or seek other employment. These highly qualified private practitioners could have been offered vacant positions in the public sector. However, insufficient government finances prevented public hospitals from contracting with private physicians. Therefore, planning for future pandemics and disasters should include innovative models of collaboration to make it possible for private health professionals to be redeployed in the public sector.

The pandemic required the government to make quick decisions about private sector collaboration in the provision of essential tertiary care in a race against time. The public sector has approximately 23 percent of the country's intensive care unit (ICU) capacity but serves 85 percent of the population, while the private sector has 77 percent of the country's ICU capacity to serve only 15 percent of the population.<sup>103</sup> During the second wave of COVID, ICUs and acute care departments in public sector hospitals were overwhelmed by patients. The government felt that building field hospitals would be more cost-effective than purchasing private sector ICU capacity for public patients.<sup>104</sup> However, building field hospitals would take several weeks (including procuring suppliers,

<sup>&</sup>lt;sup>101</sup> Department of Health, Western Cape Government 2011.

<sup>&</sup>lt;sup>102</sup> Republic of South Africa 2022.

<sup>&</sup>lt;sup>103</sup> Joynt et al. 2019. Based on the most recent national audit carried out in 2009.

<sup>&</sup>lt;sup>104</sup> SÁMRC 2020.

constructing and equipping the facility, finding staff, and redeploying employees from other public hospitals). Therefore, the government decided to purchase excess capacity in private hospitals instead to ensure access to ICU care. Any analysis conducted to inform a plan for future pandemics should assess the different options available for collaborating with the private sector to maximize ICU capacity. The analysis should also examine losses arising from the government's decision not to refurbish existing ICUs, delays, and inefficiencies in completing the few field hospitals that were built, and the losses associated with the misappropriation of funds during their construction.

Having a preexisting memorandum of understanding in place could facilitate the sharing of resources between the public and private health sectors during crises. There is no formal national arrangement in place that would enable the government to use private sector capacity during disasters. Early in the COVID-19 pandemic in June 2020, the government agreed to contract with private hospitals to provide ICU and other care for referred COVID-19 public health care patients who could not be treated in public hospitals. A national fee structure was also agreed upon with private hospitals for different health services and facilities. Although this public-private contract was negotiated nationally, each provincial Department of Health had to enter into service-level agreements with the private hospitals in their province, which was time-consuming and led to different approaches. Therefore, having a pre-agreed memorandum of understanding ready to take immediate effect nationwide in the event of a health emergency would bypass the need for last-minute negotiations that might delay the provision of care.

South Africa has been chosen by the World Health Organization (WHO) as the location of the first mRNA vaccine technology transfer hub in Africa. This is a major success for the country.<sup>105</sup> Only five countries in Africa have vaccine manufacturing facilities, <sup>106</sup> and the continent currently imports 99 percent of the required vaccines. Given that mRNA technology is revolutionizing vaccine development and production, the establishment of the hub will enable South Africa to contribute to global health security by building mRNA capacity in Africa, thus ensuring faster access to vaccine protection across the continent.

The pandemic brought global recognition for South Africa's genomic surveillance capacity for detecting variants. South Africa is the only African country with enough genetic counselors and medical geneticists to practice genomic medicine.<sup>107</sup> This accumulated genomic epidemiology capacity enabled researchers from the Network for Genomic Surveillance-South Africa (NGS-SA) consortium at the University of Kwa-Zulu Natal to track and identify 16 unique lineages of the COVID-19 virus.<sup>108</sup> Partnerships between South African universities and those in other countries helped to build this capacity.<sup>109</sup> This research helped to control outbreaks as a result of the NGS-SA's investigation of a particular viral lineage, and it showed that genomic surveillance can be implemented on a large scale in South Africa to identify new lineages and inform measures to control the spread of SARS-CoV-2.<sup>110</sup> By November 2020, South Africa had submitted 56 percent of the genomes sent to the Global Initiative on Sharing All Influenza Data

<sup>&</sup>lt;sup>105</sup> The Presidency, Republic of South Africa 2021.

<sup>&</sup>lt;sup>106</sup> Most facilities carry out a "fill and finish" process: the vaccine is imported, and the manufacturer fills the vials with the vaccine and finishes the packaging for distribution.

<sup>&</sup>lt;sup>107</sup> Nembaware et al. 2019.

<sup>&</sup>lt;sup>108</sup> NGS-SA 2020.

<sup>&</sup>lt;sup>109</sup> SAMRC 2019.

<sup>&</sup>lt;sup>110</sup> Tegally et al. 2021.

(GISAID) of African countries.<sup>111</sup> Genome research led to the discovery that the X vaccine was efficacious against the 501Y.V2 variant, which first emerged in South Africa and has also informed the development of preventive and therapeutic approaches to HIV and TB.<sup>112,113</sup> Its importance for the future of medical care means that medical students must learn about genome research during their medical training, to ensure that the future health workforce can maximize the potential of this crucial technology.

#### **CONCLUSION: A STRATEGIC MINDSET IS NEEDED TO PREPARE FOR FUTURE MEDICAL WORK**

This case study has examined how global trends will affect the future of medical work in South Africa and how ready the health workforce is for these trends. The study has found that global trends will affect population health and consumer demand for care in several ways. Substantial economic growth and poverty reduction will help to fuel the growth of a middle class in urban areas who will have more complex health needs than in the past. The population of South Africa will increase by about 15 million people over the next decade, mainly as a result of immigration. Fertility rates will decline, and life expectancy will increase to about 70 years by 2040. Urbanization and migration will contribute to depopulation in rural areas, leaving communities dominated by elderly people. The elderly tend to be poorer and have higher levels of chronic diseases, but many rural areas lack sufficient health capacity to address the growing challenges associated with aging. The country's disease burden will remain complex with high HIV/AIDS and TB rates, communicable diseases, and an increase in chronic and mental health diseases.

The study also assessed how COVID has affected the health workforce. It has found that, as in other countries, the virus caught South Africa unprepared. The impact of COVID-19 has been, and continues to be, devastating for the country and its population. The burden on the health workforce has resulted in exhaustion and increasing attrition, which has worsened existing shortages and negatively affected patient care. There are concerns that the pandemic reduced patients' access to other health services, which may have led to an increase in undiagnosed cases of NCDs and infectious diseases. However, the COVID pandemic also elicited an extraordinary response from health educators, health personnel, medical students, managers, and policy makers. They mobilized innovations in education and service provision that are historically unprecedented in South Africa. Remote medical work and public-private collaboration became a necessity to ensure access to health care for all. Thus, the pandemic demonstrated that change can come quickly, and lessons from the experience can be highly informative in expanding successful health care practices.

#### Preparing for the future will require skilled medical staff and quality health care.

Technological advances will enable wider access to health information and medical treatment. A strong nationwide primary care system will be needed to ensure access to general care throughout the country. There will also be a need for hubs for specialist services to be set up in urban areas with an effective referral system from lower levels of care. Health information systems and e-referral systems should be used to facilitate equity and continuity of health care between rural and urban areas and timely case management by health workers. South Africa is already the leader in health education, research, and health care provision on the continent. Strengthening these existing capabilities to prepare for the future of medial work will require innovative ways to develop and sustain expensive

<sup>&</sup>lt;sup>111</sup> Lu et al. 2021.

<sup>&</sup>lt;sup>112</sup> Rogers 2020.

<sup>&</sup>lt;sup>113</sup> Wonkam 2021.

medical education and to increase recruitment of health professionals into the workforce. The country's response to the COVID-19 pandemic can serve as a foundation for this.

**South Africa will become a high-income country within the next decade**. With economic growth, it will generate more domestic revenue that can be invested in medical education and health technology, building resilient infrastructure and improving data management to provide policy makers with evidence on which to base their policy decisions. Based on the findings of this case study, we offer the following medium-term and longer-term recommendations in the following key reform areas: (i) medical and nursing education and financing; (ii) health workforce planning and management; (iii) data collection and analysis; and (iv) collaboration with the private sector and other countries. These recommendations go beyond simply solving current problems. They reflect a strategic mindset that takes into account future trends and their impact on population health and medical work.

# POLICY RECOMMENDATIONS FOR THE GOVERNMENT OF SOUTH AFRICA

#### 1. INVEST IN HIGH-QUALITY HEALTH EDUCATION AND MEDICAL RESEARCH

**Invest in the quality of general education.** It will be necessary to improve the quality of the math and science (including biology, chemistry, and physics) curriculum in secondary education to increase the number of qualified candidates for nursing and medical schools. Investing in the digital skills of secondary students will also be vital, particularly for girls who will eventually join the future (predominantly female) health workforce. High academic standards should be set for students to qualify for government financial assistance during their medical studies.<sup>114</sup>

**Substantially increase the number of study places for medical students to produce more graduates**. Strategies are needed to triple the number of South African medical graduates and to increase the number of international students who pay full tuition fees. To address staff shortages, medical schools should be encouraged to recruit faculty internationally, including among diaspora academics working abroad. More health graduates are needed to work as medical specialists in hospitals in urban areas and as general practitioners and public health experts, particularly in remote rural areas.

**Invest in the expansion of high-quality education for nursing and other health professionals in line with best practice**. We recommend increasing the teaching staff in these institutions as well as attracting visiting faculty from international health schools. The aim should be to increase the number and improve the quality of nursing and other health graduates. It will also be essential to ensure that future trends are reflected in the curriculum in a timely way, including classes in working with digital health and new medical technologies, and to provide career counseling to health students and graduates to facilitate their entry into the health workforce.

<sup>&</sup>lt;sup>114</sup> World Bank 2019.

**Update curricula to ensure that future health professionals are pandemic and disaster ready.** The curriculum should include training in emerging diseases, digital health, and medical technology based on international best practice in anticipation of future disasters and pandemics. This will yield future specialists in infectious diseases and intensive care medicine. Health students should learn about (i) the types of medical assistance needed for different disasters; (ii) causation and effect between pandemics and chronic conditions and the impact on clinical management; (iii) command, coordination, and communication mechanisms; (iv) triage management of mass casualties and professional ethics; and (v) the use of PPE.<sup>115</sup> The psychological health of staff working in disasters is crucial, so courses on adaptive coping strategies should be offered, including on ways to develop emotional resilience. Community health workers should also be trained to play a supporting role during pandemics and biological disasters.

**Establish the routine use of e-learning approaches in medical and health education and health facilities.** Innovative knowledge-transfer techniques such as distance learning, computer-based instruction, and virtual simulation education are efficient ways to engage students and promote maximum learning. All faculty and students should be equipped for e-learning from home, regardless of their socioeconomic status or geographical location. Students may need support to access hardware equipment (such as computers, headphones, or webcams) and related software programs suitable for virtual medical training (such as Zoom or Moodle). Orientation and training programs may be needed for users who lack confidence in working with technology. The government should seek ways to minimize disruptions in Internet service, for example, by building on the experience of the University of the Witwatersrand (WITS), which partnered with telecommunication companies to provide network access to its students at home.<sup>116</sup> An assessment of the learning outcomes of medical students using this technology could provide valuable insights into its effectiveness.

**Establish South Africa as a center of genomic excellence and promote medical research.** Genomic and syndromic surveillance will be an integral component of future health education and systems.<sup>117</sup> The creation of a South African techno-medical hub would attract researchers from around the world as well as foreign research investment in genomics and technology. It would also provide a major boost for medical research at South African universities. The focus could be on science, technology, and innovations in health fields that are eligible for international funding. The creation of interdisciplinary study teams, covering, for example, medicine and engineering, might yield further medical innovations. Equipping students and clinicians with information on medical technology, digital tools, and data systems would equip them to use e-health tools and to be involved in innovation. It would also position South Africa to deliver evidence-based information to the Africa region that would inform prevention and treatment strategies and products. Finally, the government could encourage South African researchers working in other countries to return home to help advance health research.

<sup>&</sup>lt;sup>115</sup> Gillani et al. 2020.

<sup>&</sup>lt;sup>116</sup> Allowing students to access sites for free.

<sup>&</sup>lt;sup>117</sup> CDC 2014: "Syndromic surveillance is an investigational approach where health staff, assisted by automated data acquisition and generation of statistical alerts, monitor disease indicators in real-time or near real-time to detect outbreaks of diseases earlier than would otherwise be possible with traditional public health methods."

#### 2. **REFORM EDUCATION FINANCING TO TRAIN MORE MEDICAL AND HEALTH GRADUATES**

**Revise nursing and medical education financing**. The government should find ways to measure the performance of medical universities and nursing schools in terms of academic performance and numbers of graduates and to allocate funding among them accordingly. We also recommend conducting a cost analysis of the current policy of admitting medical and nursing students from abroad and charging them the full costs of tuition. Also, policy makers should increase tuition fees for South African medical students but offer them income contingent loans to cover the cost.<sup>118</sup> It would be advisable to conduct another cost-effectiveness analysis of government financing for students pursuing medical studies abroad and their learning outcomes. The government should also contract with cost-effective accredited medical universities in other countries (such as Croatia) that could accept more medical students from South Africa.<sup>119</sup> Crucially, it should also mandate the automatic registration of medical graduates with the South African medical authorities once they graduate from accredited international universities.

Consider introducing income contingent loans for students.<sup>120</sup> These income contingent loans (ICLs) should be based on the experience of other countries where they have already been used successfully to finance tuition fees, for example, Hungary, Ireland, the Netherlands, and the United Kingdom. Students usually only have to start repaying their ICLs once they are earning an income above a certain threshold, though this varies.<sup>121</sup> Hungary has no income threshold and a 6 percent repayment rate on full earnings. In the United Kingdom, graduates earning over £25,000 per year contribute 9 percent of their gross earnings toward the repayment of their loan. New Zealand has a lower threshold than the United Kingdom and a higher repayment rate of 12 percent of earnings. The United States requires graduates to repay 10 percent of their income above a threshold set at 150 percent of the poverty guideline, or \$24,360 for a two-person household in 2017.<sup>122</sup>

**Design an efficient and enforceable repayment system.** The usual way in which these ICLs are repaid is by being withheld from the graduates' wages by their employer, as is done with social insurance taxes. The medical graduates should be under a legal obligation to make monthly direct repayment transfers or to pay an annual minimum amount of their loan to the government. Debtors who fail to comply should be barred from using government services, such as passport renewals, or from receiving the documents needed for their professional certification. If graduates migrate to another country after completing their education, then their ICL repayments would have to be collected from their monthly wages by the government of the host country, which would then transfer the revenue back to the South African government. Governments in destination countries might also match this repayment amount (as is done with social insurance contributions) and include that matching amount in the revenue amount transferred to the South African Ministry of Finance, which would then use this revenue to finance the costly tertiary education of future medical students. None of the three countries in this study currently has an ICL in place. Because it would take time to introduce an ICL system, South Africa could start by creating reciprocal agreements with nearby countries like Eswatini and

<sup>&</sup>lt;sup>118</sup> CDC 2014.

<sup>&</sup>lt;sup>119</sup> World Bank 2021.

<sup>&</sup>lt;sup>120</sup> World Bank 2019. <sup>121</sup> Barr 2001.

<sup>&</sup>lt;sup>122</sup> Britton, van der Erve, and Higgins 2019.

Lesotho and with countries that already have this system and that employ South African medical doctors, such as Australia, Ireland, New Zealand, and the United Kingdom.

#### 3. CONDUCT HEALTH WORKFORCE PLANNING BASED ON FUTURE TRENDS

Conduct a health human resource analysis and use the results in health workforce **planning**. The workforce planning methods used in Australia can provide helpful insights (Figure 10). The Queensland government's health workforce planning involves a five to ten year planning cycle.<sup>123</sup> The main stages in the planning process consist of (i) defining specific planning objectives congruent with the national and provincial health strategies; (ii) carrying out a situational analysis of existing staffing in relation to the structure and capacity of health services; (iii) projecting future staff requirements by specialty and staff group; (iv) assessing the supply of graduates from health training institutions; and (v) developing an implementation strategy and action plan. Horizon scanning methods can be used to visualize the future health sector and define objectives. The quality and productivity of staff should be analyzed to inform policy makers about what is needed from the health workforce and from medical education in the future. The health workforce planning process requires detailed data on future population trends, the number of health graduates and their employment status, the health workforce, the existing structure of health facilities, and the capacity and use of services by type of facility and medical condition. Modern methods should be used to ensure that the forecasting and planning process takes into account future trends such as increased urbanization, the growing middle-class, increased mobility, changing disease burdens, changes in medical technology, and the aging of the population.





Source: Queensland Government 2020.

Increase the number of positions for medical doctors in public health facilities to at least the average level for upper-middle-income countries, based on the results of the health workforce planning process. This may require doubling the number of positions for physicians and hiring more nurses, midwives, and paramedics, starting in

<sup>&</sup>lt;sup>123</sup> Queensland Government 2020.

rural areas with high vacancy rates. To fill these positions, staff could be recruited from a variety of places, including from among the unemployed pools of health workers; new graduates; the South African diaspora working abroad; and internationally in countries with high unemployment, which would require the government to make adjustments to the Critical Skills List.

**Revisit pay scales in health**. Pay scales for each position should be defined according to the objectives of the position, using measurable factors such as seniority, patient load, patient complexity, task complexity, length and timing of shifts, and location in an underserved area. We recommend making performance-based bonuses available to staff for achieving an agreed set of targets. Redesigning the salaries of health staff will require negotiations and agreement between the government, health facilities, and health professional associations, and trade unions.

Identify a reserve capacity of health workers to draw on during times of crises. This will require the collection of data on health sector performance to inform the future education, composition, and planning of the health workforce. It will be equally important to maintain accurate and up-to-date information on the country's health professionals, both active and inactive, so that they can be contacted and mobilized to bolster workforce capacity during a crisis. These temporary reserve workers can be used to tackle administrative tasks, screening of patients, and contact tracing; dispel misinformation; and reassure different patient groups. More experienced professionals, such as recent retirees, could provide care in the absence of current staff redeployed to treat pandemic-related patients. Tapping into the pool of advanced medical students is another option to consider. We also recommend developing a national strategy for CHWs to define their roles related to pandemic preparedness and management.

#### 4. INVEST IN HEALTH WORKFORCE MANAGEMENT AND THE USE OF MODERN TECHNOLOGIES

**Reform human resource management in public hospitals**. Modern personnel management practices need to be introduced into health facilities. This could involve developing effective employee promotion policies with a process for managers to follow, improving working conditions, offering employees opportunities for professional education and to conduct medical research, and ensuring that health professionals can fully apply their knowledge by providing them with appropriate health infrastructure and medical equipment.

**Consider creating or designating one independent institution as the sole clearinghouse for granting credentials to providers.** Only one independent health statutory authority should be designated to issue credentials and registrations during disasters to accelerate the registration of health professionals, including foreign-trained medical graduates. The necessary planning should be done in advance to ensure that this agency can work virtually if necessary. Credentialing software and forms for each type of health professional should be standardized and results shared with professionals, employers, and the medical association.

**Prevent staff burnout**. Mental health services should be widely available for health staff, including through virtual telemedicine, which is a more discreet way to provide care. After COVID-19, some health professionals may not be able to work in clinical practice anymore because of post-traumatic stress and may be looking for positions in public and community

health work. Others may wish to acquire additional education, which the government could help to support. As health care organizations are digitally transforming their operations, these new educational paths for health employees might include working in informatics, data science, and related technology. Health staff at risk of or diagnosed with long-COVID symptoms may be able to take on administrative positions. The provision of screening for infected workers, temporary alternative work arrangements or redeployment, and comprehensive sick leave and benefits packages would all help to allay staff fears about their future employment.

Streamline the registration processes for foreign-trained medical graduates. Several measures can be taken to integrate foreign-trained health professionals into South Africa's health workforce, including emergency exemptions, easing of accreditation requirements, fast-tracking licensing, waiving fees for licensure exams and renewals, and allowing them to practice under supervision within a narrow scope of practice. South Africa could also follow the lead of other countries that have relaxed their health labor laws. For example, in 2012 Germany passed the Federal Recognition Act to facilitate recruitment of health personnel from non-EU countries. It defined the rules for the equivalency recognition of the degrees of physicians and nurses who have completed their training in non-EU countries. Under these rules, foreign physicians who have applied for this equivalency are granted a provisional license to perform a restricted number of medical activities for up to two years while their application is being processed. Since 2019, the German Agency for Skilled Workers in the Health and Nursing Professions has been responsible for recognizing foreign degrees and issuing visas and work permits for foreign health professionals within six months of application.<sup>124</sup> If South Africa were to similarly adjust its hiring rules for foreign-trained health staff, this would accelerate needed recruitment.

Develop an enabling environment to facilitate the use of new medical technology and the acquisition of the necessary skills by health staff. Medical technology can make it possible to treat more patients, but it will require the recruitment of health professionals with technology and digital skills. The role of management will be critical in stimulating employee engagement and overcoming any resistance to new medical technology so that South Africa can attain its Fourth Industrial Revolution aspirations. A better understanding of the role that technology can play in health care can broaden acceptance of e-health initiatives among providers and patients. For example, in the future, nurses will need to learn how to conduct telemedicine visits from home or from virtual care centers without sacrificing their personal bonds with their patients. Regulations are needed to establish the requirements for these visits, for provider licensing, and for clinical applications for telemedicine. The prerequisites for establishing an enabling environment will be ensuring adequate Internet access and bandwidth to enable the use of these technologies, updating technology in rural health facilities, training doctors and nurses in how to conduct telemedicine appointments, and teaching patients how to take advantage of virtual appointments.

Accelerate the use of telehealth. Virtual interactions can be used for communication and counseling, mental health care, monitoring patients with chronic conditions, and identifying patients who need specialist care. Telehealth can also be used by specialists at academic medical centers to provide training and support to primary care providers in rural and remote areas via "tele-mentoring," so that they can treat patients with complex conditions

<sup>&</sup>lt;sup>124</sup> World Bank 2021.

such as long COVID. This tele-mentoring oversight has the potential to expand the capabilities of junior providers in remote areas. Standard medical records software is beginning to offer fully integrated telemedical capability. Cost-effective broadband platforms like Zoom and Skype can be used for remote evaluations. Computer applications can provide "instant-on" telehealth software infrastructure with standard computing hardware.

**Prepare staff to work with new remote diagnostic and treatment technologies**. These remote technologies include smartphone applications for performing electrocardiograms, (EKGs) like the Telemedicine Stethoscope, which facilitates stethoscope audio and EKG livestreaming between patients and providers, or the Kardiamobile 6L, which captures a 6-lead EKG using a small, handheld device connected to a cell phone. Blood tests can now be accomplished remotely using devices like the Abbott i-STAT portable blood analyzer. Lumify is an integrated tele-ultrasound that connects clinicians around the globe in real time.<sup>125</sup> To get maximum benefit from these kinds of technologies, it will be necessary to establish regulations to govern how they are used and to provide health care staff with relevant training.

**Expedite legal and regulatory mechanisms to govern medical procurement.** Public procurement agencies should work with medical authorities and practitioners to ensure the procurement of cost-effective and high-quality medical products. A draft Public Procurement Bill was gazetted for public comment in February 2020; however, the earliest it is expected to become law is in 2023. When this bill is passed, the procurement process will be made public, which will increase transparency and accountability.

#### 5. COLLECT DATA AND CONDUCT ANALYSIS TO INFORM STRATEGIES AND POLICIES

**Invest in data collection and analysis.** It will be essential to collect regular data on population dynamics, the changing disease burden, and the health workforce. A centrally managed database will also be needed to hold detailed information on health sector performance and the health workforce (including links to health facilities with data disaggregated by professional category, such as ancillary health care workers, laboratory technicians, and pharmacists), as well as data on the unemployed, the duration of their unemployment, and on medical and health graduates. These data will be essential for current and future health workforce planning and recruitment and for determining medical and nursing education budgets. Better data will enable regular monitoring and analysis of the sector to inform future policy decisions on the health workforce. This would expand on the recent progress made in developing the national Human Resources for Health Information System (HRHIS), the HRH Data Warehouse, and the HRH Registry linked with the WHO National Health Workforce Accounts (NHWA). Data will need to be collected at different levels, including the data contained in PERSAL and its Vulinhlela Management Information System, the parallel software and applications used by the provinces, professional council registers, the district-level WebDHIS, and the private sector.

**Launch dynamic data platforms**. Online job portals will be needed to streamline the registration of vacancies and jobseekers in the health sector, which should be linked to the health workforce database. These portals should provide online job search and placement services including job descriptions, training materials, guidance materials, and the certification of education and background credentials for job seekers. In particular, we

<sup>&</sup>lt;sup>125</sup> Rosser 2020.

recommend: (i) leveraging online platforms for recruitment and processing of credentials and regularly updating health workforce databases; (ii) introducing biometric clocking systems in health facilities for health staff, which is already common in the private sector; (iii) enabling online applications for professional registration and credentialing with nursing and medical councils; (iv) increasing use of mobile money for payments to providers and suppliers; and (v) developing early detection tools to identify changing disease incidence and early warning systems for climate-related environmental risks to alert health staff and ensure prompt community response.<sup>126</sup> Using electronic health records can facilitate the collection of data on patients throughout the system. Using International Classification of Diseases-10 (ICD-10) coding systems to track diagnoses of patients will yield helpful data to inform any necessary adjustments to medical education to ensure that it is producing the skills that are needed to treat patients.

**Develop a national strategy to prepare for and respond to pandemics and disasters.** South Africa needs a nationally cohesive strategy for dealing with future pandemics and disasters based on analyses of how the COVID-19 pandemic affected the health system. The COVID-19 experience showed that primary health care providers are critical for treating less severely ill patients at home and keeping people with chronic conditions from getting sick and needing hospital care. The strategy should cover the management of critical health infrastructure, workforce (re)distribution, medical procurement, and high-quality PPE and should ensure the continuity of routine care while treating pandemic-related patients. At the local level, hospitals and clinics should revise their own disaster preparedness plans in line with the strategy.

Require Statistics South Africa (Stats SA) to collect detailed health workforce data every quarter from health facilities, labor unions, and professional councils. This could include administrative data and payroll data; and add a health module to the existing Quarterly Employment Survey (QES) that would collect health labor data disaggregated by gender, location, job title, and the type of health facilities. Business tax forms could also be used to capture data from private sector providers. This quarterly health employment module would gather detailed data about job openings, new hires, resignations and dismissals, and employment status to be used in health workforce planning and recruitment.

**Invest in health infrastructure and medical equipment in accordance with a national health sector masterplan**. The success of the current and future health sector will rest on the provision of a strong nationwide primary care system employing experienced family medicine practitioners, nurses, mental health specialists, and allied health workers. The system will also need to provide more complicated and expensive specialist care for NCDs, including cancer and diabetes, and for mental health disorders. These future investments will need to be carefully coordinated in a national health masterplan, which would identify the optimal distribution of medical investments across the country based on future projections of population groups across regions and on disease profiles. Urban areas will need to invest in the kinds of health care needed to take care of both their growing middle class and the urban poor. Rural areas may need support to ensure they can provide appropriate care for their elderly population.

<sup>&</sup>lt;sup>126</sup> Meiro-Lorenzo 2017.

# 6. EXPAND COLLABORATION WITH THE PRIVATE SECTOR AND AN INTERNATIONAL WORKFORCE

**Fully exploit the potential of public-private collaboration**. Policy makers should take advantage of opportunities to partner with the private sector, particularly in the provision of highly specialized treatments. However, they will need to take a holistic approach to the entire health workforce, both public and private, to facilitate planning and to optimize the provision of care. This can be done by producing Memoranda of Understanding and contracts with private providers that set out agreed terms for the use and remuneration of private sector staff for treating public sector patients during disasters. These options should be included in the National Health Workforce Strategy.

Offer South Africa's expertise and capacity to its neighboring countries, especially during health crises. South Africa's private health sector already offers care to privately insured patients in other countries in the region. As the capacity of South Africa's public health sector expands in the future, policy makers may wish to conclude Memoranda of Understanding with South Africa's neighboring countries such as Lesotho and Eswatini to assist them during pandemics and disasters. South Africa has the potential to play a pivotal role in pandemic response in the region and to treat foreign patients in those of its hospitals with free capacity.

**Harness the benefits of having an international health workforce**. South Africa is fortunate in having an international health workforce, but the benefits of health workforce mobility cannot be harnessed until data are collected on migrant health workers by nationality to inform migration estimates and identify temporal and demographic patterns. The government should consider facilitating the international movement of health professionals by introducing online recruitment and registration and by actively recruiting among diaspora health professionals working abroad. The return of highly qualified health professionals to work in South Africa's health care system and in health research would help to improve the quality of care.

Adopt migration policies to fully benefit from international health workforce mobility. The South African government could reform its administrative processes to accelerate the hiring of foreign health professionals. Physicians and health professionals should be added to the government's Critical Skills List to prioritize their immigration to South Africa. The government should also consider amending its policy to allow the recruitment of health professionals from other African countries with high unemployment. Foreign medical staff could also be recruited through bilateral agreements with countries that already have a mobile health workforce, such as Egypt, Ghana, Mexico, Nigeria, and Serbia. To facilitate the integration of foreign health staff into the South African health system, the government should provide them with induction and language courses and information on administrative formalities inside and outside of the workplace (e.g., how to obtain residence permits).

### REFERENCES

- Abdool Karim, S. S. 2020. "The South African Response to the Pandemic." *New England Journal of Medicine* 382 (24): e95.
- ActionSA. 2021. "Insufficient Capacity but SA Doctors Unemployed at Home." *Polity,* January 11. <u>https://www.polity.org.za/article/insufficient-capacity-but-sa-doctors-unemployed-at-home-2021-01-11.</u>
- Africa Health. 2020. "Market Insights: South Africa Medical Devices Market." Africa Health Exhibition. <u>AFH19 Industry Insights Medical Devices Market REPORT.pdf</u> (africahealthexhibition.com).
- African News Agency. 2019. "Training SA Doctors in Cuba Costs Double What It Would Locally— DA." *Independent Online* (IOL), August 19. <u>https://www.iol.co.za/news/politics/training-sa-</u> <u>doctors-in-cuba-costs-double-what-it-would-locally-da-30973039.</u>
- ASSAf (Academy of Science of South Africa). 2018. "Reconceptualizing Health Professions Education in South Africa." Pretoria. <u>http://dx.doi.org/10.17159/assaf.2018/0021.</u>
- Barr, Nicholas. 2001. *The Welfare State as Piggy Bank: Information, Risk, Uncertainty, and the Role of the State*. Oxford: Oxford University Press.
- Bhorat, H., K. Naidoo, M. Oosthuizen, and K. Pillay. 2015. "Demographic, Employment, and Wage Trends in South Africa." United Nations University-World Institute for Development Economics Research (UNU-WIDER) Working Paper 2015/141. Helsinki: UNU-WIDER.
- Blaauw, D., P. Ditlopo, and L. C. Rispel. 2014. "Nursing Education Reform in South Africa— Lessons from a Policy Analysis Study." *Global Health Action* 7 (Dec. 22;): 26401. doi: 10.3402/gha.v7.26401. PMID: 25537941; PMCID: PMC4275647.
- Bloomberg. 2021. "80% of South Africans May Have Already Had Covid-19: Discovery." BusinessTech, August 19. <u>https://businesstech.co.za/news/lifestyle/514256/80-of-south-africans-may-have-already-had-covid-19-discovery/.</u>
- Britton Jack, Laura van der Erve, and Tim Higgins. 2019. "Income Contingent Student Loan Design: Lessons from around the World." *Economics of Education Review* 71: 65–82.
- Burger, R. D. 2020. "Examining the Unintended Consequences of the COVID-19 Pandemic on Public Sector Health Facility Visits: The First 150 Days." Cramsurvey.org. <u>https://cramsurvey.org/wp-content/uploads/2020/12/16.-Examining-the-unintended-</u> <u>consequences-of-the-COVID-19-pandemic-on-public-sector-health-facility-visits-The-first-150-days-2.pdf.</u>
- CDC (US Centers for Disease Control and Prevention). 2014. "Framework for Evaluating Public Health Surveillance Systems for Early Detection of Outbreaks." <u>https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5305a1.htm.</u>
- Department of Environmental Affairs, Republic of South Africa. n.d. "Climate Change and Human Health." Pretoria.

https://www.environment.gov.za/sites/default/files/docs/factsheet\_climatechange\_health.pdf.

Department of Health, Republic of South Africa. 2011."Human Resources for Health South Africa. HRH Strategy for the Health Sector: 2012/13–2016/17." Pretoria. https://www.gov.za/sites/default/files/gcis\_document/201409/hrhstrategy0.pdf.

—. 2020. "2030 Human Resources for Health Strategy: Investing in the Health Workforce for Universal Health Coverage." Pretoria. https://www.spotlightnsp.co.za/wpcontent/uploads/2020/08/2030-HRH-strategy-19-3-2020.pdf. —. 2021. *Latest Vaccine Statistics*. COVID-19 Online Resource & News Portal. <u>https://sacoronavirus.co.za/latest-vaccine-statistics</u>.

- Department of Health, Western Cape Government. 2011. "The Future of Health Care in the Western Cape 2020. A Draft Framework for Dialogue." Cape Town. https://www.westerncape.gov.za/other/2011/12/healthcare 2020 - 9 december 2020.pdf.
- De Villiers, M., S. Van Schalkwyk, J. Blitz, I. Couper, K. Moodley, Z. Talib, and T. Young. 2017. "Decentralised Training for Medical Students: A Scoping Review." *BMC Medical Education* 17 (1): 1–13.
- Dhai, A., M. Veller, D. Ballot, and M. Mokhachane. 2020. "Pandemics, Professionalism, and the Duty of Care: Concerns from the Coalface." *South African Medical Journal* 110 (6): 450–52.
- Foreman, K. J., N. Marquez, A. Dolgert, K. Fukutaki, N. Fullman, M. McGaughey, M.A. Pletcher et al. 2018. "Forecasting Life Expectancy, Years of Life Lost, and All-Cause and Cause-Specific Mortality for 250 Causes of Death: Reference and Alternative Scenarios for 2016– 2040 for 195 Countries and Territories." *The Lancet* 392 (10159): 2052–90.
- Gillani, A. H., M. I. Mohamed Ibrahim, J. Akbar, and Y. Fang. 2020. "Evaluation of Disaster Medicine Preparedness among Healthcare Profession Students: A Cross-Sectional Study in Pakistan." *International Journal of Environmental Research and Public Health* 17 (6): 2027. https://doi.org/10.3390/ijerph17062027.
- Gray, Glenda, and Linda-Gail Bekker. 2021. "Update on the Janssen (JNJ) Ad26.COV2.S Vaccine." Sisonke. <u>https://sacoronavirus.co.za/wp-content/uploads/2021/08/Sisonke-Provisional-Results-6-August-2021GG2.pdf.</u>
- Green, A. 2019. "'Flawed' Community Service System Leaves Some Newly Qualified Doctors Workless after Declining Posts." *Daily Maverick,* January. <u>https://www.dailymaverick.co.za/article/2019-01-21-flawed-community-service-system-leaves-some-newly-qualified-doctors-workless-after-declining-posts/.</u>
- Harding, A. 2020. "Coronavirus in South Africa: The Lull before the Surge?" BBC News, April 10. https://www.bbc.com/news/world-africa-52228932.
- Hodges, C. M., Stephanie Moore, Barb Lockee, Torrey Trust, and Aaron Bond. 2020. "The Difference between Emergency Remote Teaching and Online Learning." *EDUCAUSE Review*, March 27. <u>https://er.educause.edu/articles/2020/3/the-difference-betweenemergency-remote-teaching-and-online-learning.</u>
- ICASA (Independent Communications Authority of South Africa). 2020. "The State of the ICT Sector Report in South Africa." Centurion, Gauteng. <u>https://www.icasa.org.za/uploads/files/State-of-the-ICT-Sector-Report-March-2020.pdf.</u>
- ICN (International Council of Nurses). 2021. "ICN Reaction: WHO DG Dr Tedros confirms at least 115,000 Health Workers Have Died due to Pandemic." *ICN News,* May 24. <u>https://www.icn.ch/news/icn-reaction-who-dg-dr-tedros-confirms-least-115000-health-workers-have-died-due-pandemic.</u>
- IHME (International Health Metric Network). 2021. "South Africa." <u>https://www.healthdata.org/south-africa</u>
- ILO (International Labour Organization). 2019. "The Future of Work in the Health Sector." Working Paper No. 325, Sectoral Policies Department, Geneva.
- IMF (International Monetary Fund). 2019. "Struggling to Make the Grade: A Review of the Causes and Consequences of the Weak Outcomes of South Africa's Education System." IMF Working Paper WP/19/47, Washington DC.
  - ——. 2021. "Monetary Policy, Inflation, and Distributional Impact: South Africa's Case." IMF Working Paper WB/21/78, Washington DC.

- Ingrassia, P. L., M. Ferrari, M. Paganini, and G. Mormando. 2021. "Role of Health Simulation Centres in the COVID-19 Pandemic Response in Italy: A National Study." *BMJ Simulation and Technology Enhanced Learning*, February. bmjstel-2020.
- IOL (Independent Online). 2019. "South Africa: All Surgery Students from Five Universities Fail Exam." *University World News: The Global Window on Higher Education,* October 5. https://www.universityworldnews.com/post.php?story=20191004143516730.
- Ismail, N., and H. Moultrie. 2020. "Impact of COVID-19 Intervention on TB." Division of the National Health Laboratory Service, National Institute for Communicable Diseases, Johannesburg, South Africa. <u>https://www.nicd.ac.za/wp-content/uploads/2020/05/Impact-of-Covid-19-interventions-on-TB-testing-in-South-Africa-10-May-2020.pdf.</u>
- Joynt, G. M., P. D. Gopalan, A. Argent, S. Chetty, R. Wise, V. K. W. Lai, E. Hodgson et al. 2019. "The Critical Care Society of Southern Africa Consensus Statement on ICU Triage and Rationing (ConICTri)." *Southern African Journal of Critical Care (Online)* 35 (1): 36–52.
- Karim, A. A. 2020. "It Takes Most Foreign-Trained Doctors Months to Register in South Africa So How Did Cuban Health Workers Do It in Just Three Days?" *Bhekisisa,* May 27. <u>https://bhekisisa.org/health-news-south-africa/2020-05-27-it-takes-most-foreign-trained-doctors-months-to-register-in-south-africa-so-how-did-these-healthcare-workers-do-it-in-just-three-days/.</u>
- Kew, J. 2021. "Hospitals in S. Africa Hub Face Being Overrun by Covid Surge." *Bloomberg,* June 26. <u>https://www.bloomberg.com/news/articles/2021-06-26/hospitals-in-south-africa-hub-face-being-overrun-by-covid-surge.</u>
- Le Grange, J. M., S. J. Dickinson, and J. R. J. Davis. 2020. "Capacity Building during COVID-19: Utilising South Africa's Underutilised International Medical Graduates." *The South African Medical Journal* 110 (5): 343–44.
- Le Roux, C., and A. Dramowski. 2020. "Personal Protective Equipment (PPE) in a Pandemic: Approaches to PPE Preservation for South African Healthcare Facilities." *South African Medical Journal* 110 (6): 466–68.
- Lioce, L. L. 2020. *Healthcare Simulation Dictionary—Second Edition*. AHRQ Publication No. 20-0019, Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/patient-safety/resources/simulation/terms.html.
- Lu, L., S. Lycett, J. Ashworth, F. Mutapi, and M. Woolhouse. 2021. "What Are SARS-CoV-2 Genomes from the WHO Africa Region Member States Telling Us?" *BMJ Global Health* 6 (1): e004408.
- Madhav, N., B. Oppenheim, M. Gallivan, P. Mulembakani, E. Rubin, and N. Wolfe. 2017. "Pandemics: Risks, Impacts, and Mitigation." In *Disease Control Priorities: Improving Health* and Reducing Poverty (Chapter 17), 3rd ed., ed. D. T. Jamison, H. Gelband, S. Horton, et al. World Bank, Washington, DC. https://www.ncbi.nlm.nih.gov/books/NBK525302/.
- Mayosi, Bongani M., and Solomon R. Benatar. 2014. "Health and Health Care in South Africa— 20 Years after Mandela." *New England Journal of Medicine* 371 (14): 1344–53.
- Mbuli, S. 2020. "HPCSA: No Plans to Include Foreign-Trained Healthcare Workers in COVID-19 Response," April 24. Johannesburg, South Africa: Bhekisisa Centre for Health Journalism. <u>https://bhekisisa.org/health-news-south-africa/2020-04-24-foreign-doctors-not-allowed-help-during-covid-19-outbreak-in-south-africa/.</u>

Meiro-Lorenzo, M. 2017. "World Bank Group Approach and Action Plan for Climate Change and Health." Washington, DC: World Bank Group. <u>https://openknowledge.worldbank.org/bitstream/handle/10986/27808/113573-WP-PUBLIC-FINAL-WBG-Climate-and-Health-Action-Plan-002.pdf?sequence=1.</u>

- Mendelson, M., J. Nel, L. Blumberg, S. Madhi, M. Dryden, W. Stevens, and F. Venter. 2021. "Long Covid: An Evolving Problem with an Extensive Impact." *The South African Medical Journal* 111 (1): 10–12.
- Migration Data Portal. 2021. "Migration Data in the Southern African Development Community (SADC)." <u>https://www.migrationdataportal.org/regional-data-overview/southern-africa.</u>
- Naidoo, R., and K. Naidoo. 2021. "Prioritising 'Already-Scarce' Intensive Care Unit Resources in the Midst of COVID-19: A Call for Regional Triage Committees in South Africa." *BMC Medical Ethics* 22 (1): 1–9.
- National Treasury, Republic of South Africa. 2022. "Budget 2022 Speech." Pretoria.
- Nelson Mandela University. 2021. "Launch of the Medical Programme." Webinar recording. Port Elizabeth, South Africa. <u>https://medicalschool.mandela.ac.za/</u>.
- Nembaware, V., African Genomic Medicine Training Initiative, and N. Mulder. 2019. "The African Genomic Medicine Training Initiative (AGMT): Showcasing a Community and Framework Driven Genomic Medicine Training for Nurses in Africa." *Frontiers in Genetics* 10: 1209.
- NGS-SA (Network for Genomic Surveillance in South Africa). June 2020. "A Network Established to Rapidly Respond to Public Health Threats in South Africa." Durban. http://www.krisp.org.za/ngs-sa/ngs-sa network for genomic surveillance south africa/.
- NICD (National Institute for Communicable Diseases). 2021. COVID-19 Special Public Health Surveillance Bulletin, Vol. 19 (Supplementary Issue 2): August 4.
- NIOH (National Institute for Occupational Health). 2021. "COVID-19 Hospital Surveillance-Weekly Update on Hospitalized HCWs: Week 45, 2021 for Data Collected from March 5, 2020 to November 13, 2021 on the DatCov Platform." Epidemiology and Surveillance Division, National Institute for Occupational Health, Johannesburg, South Africa.
- Nordling, L. 2020. "Tested by HIV and TB, South Africa Confronts New Pandemic." *Science* 368 (6487): 117.
- OECD (Organisation for Economic Co-operation and Development). 2021a. "Spending on Tertiary Education (Indicator)." <u>https://data.oecd.org/eduresource/spending-on-tertiary-education.htm#indicator-chart.</u> Accessed August 19.
  - . 2021b. "Health at a Glance," OECD Indicators. <u>https://www.oecd-</u> <u>ilibrary.org/sites/ae3016b9-en/1/3/7/1/index.html?itemId=/content/publication/ae3016b9-</u> <u>en& csp =ca413da5d44587bc56446341952c275e&itemIGO=oecd&itemContentType=book.</u>
- Padilha, J. M. 2019. "Clinical Virtual Simulation in Nursing Education: Randomized Controlled Trial." *Journal of Medical Internet Research* 21 (3).
- Patel, V., and D. Dahl-Grove. 2018. "Disaster Preparedness Medical School Elective: Bridging the Gap between Volunteer Eagerness and Readiness." *Pediatric Emergency Care* 34 (7): 492–96.
- PHCPI (Primary Health Care Performance Initiative). 2020. "Adjusting Facility Operations to Promote Safety and Maintain Access to Routine and Essential Services in Johannesburg, South Africa." <u>https://improvingphc.org/sites/default/files/COVID-</u> <u>19%20Promising%20Practice%20South%20Africa.pdf.</u>
- Pillay, Tahir. 2019. "Challenges Facing Graduates of Foreign Medical Schools Returning to South Africa: Developing Criteria for the Recognition of Medical Degrees." Paper given at Health Professions Council of South Africa (HPCSA) First Annual Conference, August 19, Johannesburg.
  <a href="https://www.hpcsa.co.za/Uploads/Events/Conference/day%202/19Aug\_3A\_14h10-14h25">https://www.hpcsa.co.za/Uploads/Events/Conference/day%202/19Aug\_3A\_14h10-14h25</a> Prof Tahir Pillay.pdf.
- Pottle, J. 2019. "Virtual Reality and the Transformation of Medical Education." *Future Healthcare Journal* 6 (3): 181–85. https://doi.org/10.7861/fhj.2019-0036.

- The Presidency, Republic of South Africa. 2020. "Statement by President Cyril Ramaphosa on Progress in the National Effort to Contain the COVID-19 Pandemic." COVID-19 Online Resource & News Portal, July 12. <u>https://sacoronavirus.co.za/2020/07/12/statement-by-president-cyril-ramaphosa-on-progress-in-the-national-effort-to-contain-the-covid-19-pandemic</u>.
  - 2021. "Remarks by President Cyril Ramaphosa on the Occasion of South Africa's Successful Bid for m-RNA Technology Transfer Hub," July 21.
    <u>http://www.thepresidency.gov.za/speeches/remarks-president-cyril-ramaphosa-occasion-south-africa%E2%80%99s-successful-bid-m-rna-technology-transfer-hub.</u>
- Presidential Commission on the Fourth Industrial Revolution. 2020. Summary Report and Recommendations of the Presidential Commission on the Fourth Industrial Revolution. Republic of South Africa, Pretoria.
- Queensland Government. 2020. "Strategic Workforce Planning Guide." Queensland, Australia. <u>https://www.health.qld.gov.au/system-governance/strategic-direction/health-workforce-information-gateway/workforce-planning.</u>
- Reid, S. 2018. "Twenty Years of Community Service in South Africa: What Have We Learnt?" In *South African Health Review 2018*, ed. L. C. Rispel and A. Padarath, 41–47. Health Systems Trust: Durban.
- Republic of South Africa. 2022. "Government Gazette" 680 (4580): February 2. Pretoria. http://www.dha.gov.za/images/notices/Gazetted Critical Skills List 2022-compressed.pdf.
- Reuters. 2021. "Budget Woes Mean South African Doctors Jobless While Hospitals Battle COVID-19," January 28. <u>https://www.reuters.com/article/uk-health-coronavirus-safrica-healthcare-idUSKBN29X1C6.</u>
- Rispel, L. C., and D. Blaauw. 2015. "The Health System Consequences of Agency Nursing and Moonlighting in South Africa." *Global Health Action* 8: 26683.
- Robertson, L. M. 2020. "Mental Health of Healthcare Workers during the COVID-19 Outbreak: A Rapid Scoping Review to Inform Provincial Guidelines in South Africa." *SAMJ* 110 (10): 1010–19.
- Rogers, D. A. 2020. "Learning from Multi-Hazard Early Warning Systems to Respond to Pandemics." Washington, DC: World Bank Group. <u>http://documents.worldbank.org/curated/en/429511592591445701/Learning-from-Multi-Hazard-Early-Warning-Systems-to-Respond-to-Pandemics.</u>
- Rosser, J. B. Jr. 2020. "The COVID-19 Crisis and Its Impact on the Future of Healthcare." *JSLS: Journal of the Society of Laparoendoscopic Surgeons* 24 (3): e2020.00039. https://doi.org/10.4293/JSLS.2020.00039.
- SAMED (South African Medical Technology Industry Association). 2020. "South African Medical Technology Industry Fact File." Johannesburg. <u>South African Medical Technology Industry</u> <u>Fact File (samed.org.za)</u>.
- SAMRC (South Africa Medical Research Council). 2019. "First High Through-Put-Genomics Sequencing Centre in Africa to Decode Genes." SAMRC SARS-CoV-2 Wastewater Surveillance Dashboard: An Early Warning System for COVID-19 Infections, July 24. Cape Town.
  - —. 2020. "Covid-19 Surge: Investing Heavily in ICU Capacity Is Not the Only Option." SAMRC SARS-CoV-2 Wastewater Surveillance Dashboard: An Early Warning System for COVID-19 Infections, May 29. Cape Town. <u>https://www.samrc.ac.za/news/covid-19-surgeinvesting-heavily-icu-capacity-not-only-option</u>
  - —. 2021. "Report on Weekly Deaths in South Africa." SAMRC SARS-CoV-2 Wastewater Surveillance Dashboard: An Early Warning System for COVID-19 Infections, August 14. Cape Town. <u>https://www.samrc.ac.za/reports/report-weekly-deaths-south-africa.</u>

- SANC (South African Nursing Council). 2021. "Age Statistics 2020," April. Pretoria. https://www.sanc.co.za/wp-content/uploads/2021/04/Age-stats-2020.pdf.
- Shreffler, J. P. 2020. "The Impact of COVID-19 on Healthcare Worker Wellness: A Scoping Review." *Western Journal of Emergency Medicine* 21 (5): 1059–66.
- Siedner, M. J., J. D. Kraemer, M. J. Meyer, G. Harling, T. Mngomezulu, P. Gabela, and K. Herbst. 2020. "Access to Primary Healthcare during Lockdown Measures for COVID-19 in Rural South Africa: An Interrupted Time Series Analysis." *BMJ Open* 10 (10): e043763.
- Squires, N., S. E. Colville, K. Chalkidou, and S. Ebrahim. 2020. "Medical Training for Universal Health Coverage: A Review of Cuba-South Africa Collaboration." *Human Resources for Health* 18: 12. https://doi.org/10.1186/s12960-020-0450-9.
- So, H. C. 2019. "Simulation in Medical Education." *Journal of the Royal College of Physicians of Edinburgh* 49 (1): 52–57.
- Special Investigations Unit. 2021. Final Report on Procurement Matters during the National State of Disaster: Investigation into the Procurement of, or Contracting for Goods, Works, and Services, including the Construction, Refurbishment, Leasing, Occupation, and Use of Immovable Property, during, or in respect of the National State of Disaster, February 4. Pretoria, South Africa.

Stats SA (Statistics South Africa). 2021. Mid-Year Population Estimates. Pretoria.

- Sui, X., P. Reddy, A. Nyembezi, P. Naidoo, K. Chalkidou, N. Squires, and S. Ebrahim. 2019. "Cuban Medical Training for South African Students: A Mixed Methods Study." *BMC Medical Education* 19: 216. <u>https://doi.org/10.1186/s12909-019-1661-4.</u>
- Swart, R., R. Duys, and N. D. Hauser. 2019. "South African Simulation Survey—A Review of Simulation-Based Education." Southern African Journal of Anaesthesia and Analgesia 25 (4): 12–20.
- Tankwanchi, A. S., A. Hagopian, and S. H. Vermund. 2019. "International Migration of Health Labour: Monitoring the Two-Way Flow of Physicians in South Africa." *BMJ Global Health* 4 (5): e001566.
- Tegally, H., E. Wilkinson, R. J. Lessells, J. Giandhari, S. Pillay, N. Msomi, K. Mlisana, et al. 2021. "Sixteen Novel Lineages of SARS-CoV-2 in South Africa." *Nature Medicine* 27 (3): 440–46.
- Tiwari, R., A. Wildschut-February, L. Nkonki, R. English, I. Karangwa, and U. Chikte. 2021. "Reflecting on the Current Scenario and Forecasting the Future Demand for Medical Doctors in South Africa up to 2030: Towards Equal Representation of Women." *Human Resources for Health* 19: 27. <u>https://doi.org/10.1186/s12960-021-00567-2.</u>
- UN (United Nations). 2019. *World Population Prospects 2019, Volume II: Demographic Profiles*. Department of Economic and Social Affairs, Population Division 2. <u>https://population.un.org/wpp/Graphs/1\_Demographic%20Profiles/South%20Africa.pdf.</u>
- Van Ryneveld, Manya. 2019. "Looking Back to Look Forwards: 25 Years of Human Resources for Health in South Africa." Health Professions Council of South Africa (HPCSA) First Annual Conference, August 19, Johannesburg. <u>https://www.hpcsa.co.za/Uploads/Events/Conference/day%202/19Aug-3C\_13h40-13h55\_Manya\_Van\_Ryneveld.pdf.</u>
- Verhage, S. K. 2020. "Maximising Health Science Student Volunteers for the COVID-19 Response: A Valuable Resource." *South African Medical Journal* 10 (11): 1062–63.
- WDI (World Development Indicators). 2018. Expenditure on Tertiary Education (% of Government Expenditure on Education)—South Africa [Data set]. Washington, DC: World Bank. <u>https://data.worldbank.org/indicator/SE.XPD.TERT.ZS?locations=ZA</u>.

WDI (World Development Indicators). 2021. *Health Indicators—South Africa* [Data set]. Washington, DC: World Bank. <u>https://data.worldbank.org/indicator/SH.MED.PHYS.ZS</u>.

Winston, Andrew. 2019. "The World in 2030: Nine Megatrends to Watch." *MIT Sloan Management Review*. <u>https://sloanreview.mit.edu/article/the-world-in-2030-nine-megatrends-to-watch/.</u>

WHO (World Health Organization). 2021. "Tracking SARS-CoV-2 Variants." Geneva. https://www.who.int/en/activities/tracking-SARS-CoV-2-variants.

Wonkam, A. 2021. "Sequence Three Million Genomes across Africa." Nature, 209-11.

World Bank. 2018. Overcoming Poverty and Inequality in South Africa. An Assessment of Drivers, Constraints and Opportunities, March. Washington DC.

——. 2019. "South Africa Economic Update. Tertiary Education Enrollments Must Rise." Washington, DC.

https://documents1.worldbank.org/curated/en/173091547659025030/pdf/South-Africa-Economic-Update-Enrollments-in-Tertiary-Education-Must-Rise.pdf.

——. 2021. "Health Workforce Mobility from Croatia, Serbia, and North Macedonia to Germany." Washington DC.

World Economic Forum. 2016. "The Fourth Industrial Revolution: What It Means, How to Respond." Cologny, Switzerland.

https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-howto-respond/.

# ANNEX 1: PEOPLE INTERVIEWED FOR THE SOUTH AFRICA CASE STUDY

Name	Position	Institution
Professor J. Francis	Senior Researcher	University of the Witwatersrand
Professor J. Mahlangu	Former Dean, Faculty of Health Science	University of the Witwatersrand
Professor L. Rispel	Center for Health Policy & South African Research Chair, School of Public Health, Faculty of Health Sciences	University of the Witwatersrand
Mr. M. Sibanda	Site Coordinator of Community Health Workers, Ezintsha	University of the Witwatersrand
Professor Francois Venter	Head of Ezintsha, Subdivision of Reproductive Health and HIV Institute	University of the Witwatersrand
Professor J. Ataguba	Director, Health Economics Unit	University of Cape Town
Dr. Mark Blecher	Chief Director, Health and Social Development	National Treasury of South Africa
Mr. Jonatan Daven	Director, Public Finance (Health)	National Treasury of South Africa
Dr. T. Chidarikire	Director, HIV Prevention Programs	National Department of Health
Dr. Z. Mavundle	Senior Public Health Specialist	Department of Health (Western Cape)
Dr. T. Zulu	Senior Manager	Government Medical Aid scheme
Dr. M. Selepe	Medical Doctor	Intercare Private Hospital
Mr. D. Ramashi	Operations Manager	Yeoville Clinic, Johannesburg
Dr. R. Ahluwalia	Chief Executive Officer	Higher Health <u>https://higherhealth.ac.za/</u>
Dr. Angelique Coetzee	Board Chairperson	South African Medical Association (SAMA)
Dr. William Oosthuizen	Legal Adviser	South African Medical Association (SAMA)
Dr. K. Letlape	Chairperson	Health Professions Council of South Africa (HPCSA)
Dr. J. Nxumalo	Senior Manager	South African Nursing Council
Mrs. S. Mchunu	Registrar	South African Nursing Council
Mr. K. Manamela	Deputy Secretary General	Democratic Nursing Organization of South Africa
Mr. Cassim Lekhoathi	Deputy General Secretary (Acting)	Democratic Nursing Organisation of South Africa
Miss P. Madi	Manager of Public Health Services	Roche Diagnostic
Dr. David Wilson	Program Director, Health Nutrition and Population practice	World Bank Group

Major global trends such as economic integration, urbanization, climate change, demographic shifts, digital and technological advances, and rising consumerism will all affect population health and shape the future of medical work. In South Africa, these trends can be harnessed as opportunities, but this will require the government to take a strategic approach and to give its immediate attention to six health workforce issues: (i) the mismatch between the number and the skills of health graduates produced by the health education system and the number and specialties needed for future medical work; (ii) the unsustainable financing system for expensive medical education; (iii) the large numbers of foreign-trained medical graduates whose degrees are not being fully recognized in South Africa; (iv) high vacancy rates in health facilities coinciding with high unemployment and inadequate human resource management; (v) insufficient data on the health workforce; and (vi) the public sector's reluctance to collaborate with the private sector and international health labor. With more large-scale disasters looming, South Africa's experience with the COVID-19 pandemic will provide important lessons for the future of medical work. Based on the findings of this case study, we make recommendations on health education policy and human resource policy. These include (i) investing in high-quality education and aligning investments in health education and medical research with future needs; (ii) looking for innovative ways to finance medical education; (iii) investing in the health workforce on the basis of health workforce planning and future projections of need; (iv) modernizing the human resource management in health facilities and facilitating the use of modern technology; (v) making substantial investments in the collection and analysis of data on the health workforce and using results in workforce planning; and (vi) expanding public-private sector collaboration and developing policies to manage the mobility of the health workforce to and from the private sector and abroad.

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