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Health systems recovery after COVID-19

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Health Systems Trust
1 Maryvale Road
Westville 3630
Durban
South Africa

Email: sahr@hst.org.za
Website: http://www.hst.org.za
Tel: +27 (0)31 266 9090
Fax: +27 (0)31 266 9199

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Foreword

It brings me great pleasure to present the 25th edition of the South African Health Review (SAHR) on behalf of the Board of Trustees of the Health Systems Trust. As we recover from the devastating effects of the COVID-19 pandemic on society, it is critical that we reflect on the lessons learned, apply these insights to strengthen the country's response to public health emergencies, and develop more resilient health systems.

The 2022 SAHR includes commentary from healthcare workers, researchers, government advisors, academics, activists, and members of the community. It encompasses reflections and lessons learned, ranging from the complexity of providing evidence-informed technical guidance at policy level during a rapidly evolving pandemic with devastating nation-wide health, social, and economic consequences on the one hand, to the responses and experiences of discrete parts of the health system on the other. These diverse perspectives provide essential information on various approaches to COVID-19, as well as salutary lessons for new and diverse ways of rebuilding and rethinking our health system.

The 2022 SAHR was curated as a supplement to the 2021 edition, which addressed the response of government and the broader health sector to COVID-19, investigated the challenges facing the health system, and focused on how to begin rebuilding a better system.

I wish to offer the Board's heartfelt appreciation to the SAHR production team, as well as the authors, peer reviewers, and the SAHR Editorial Advisory Committee, which advises the editorial team. The joint involvement of internal and external peer reviewers, as well as the authors' openness to accommodate collegial feedback and editorial discussion, have strengthened the publication.

I hope that this historic 25th edition of the SAHR will continue to make an important contribution to the improvement of our healthcare system and enhance the delivery of healthcare services under both ordinary and extraordinary conditions.

Professor Salome Maswime
Chairperson of the Board of Trustees
Health Systems Trust

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Editors
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Project Co-ordinator
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Copy Editor
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Cover artwork
'Plans' by South African-based artist, Makiwa Mutomba. Oil on canvas using a palette knife, 2013. This cover captures the spirit of collaboration embodied in this edition of the SAHR, which focuses on lessons learnt following the health systems response to the COVID-19 pandemic, and the plans we should make to prepare for future health emergencies.

SAHR 2022: Editorial

Ashnie Padarath, Themba L. Moeti

South African Health Review

Introduction

During the COVID-19 pandemic, a staggering 765 million cases and 6.9 million deaths were reported worldwide. On 5 May 2023, the Director-General of the World Health Organization, Dr Tedros Ghebreyesus, officially declared that the COVID-19 no longer constituted a public health emergency of international concern. Despite this declaration, Ghebreyesus cautioned that the virus was "still killing" and mutating, and urged countries to examine their pandemic performance to avoid repeating mistakes.[1]

This edition of the *South African Health Review* offers promising examples of COVID-19 response, mitigation, and recovery strategies. Emerging lessons from these efforts may be used to enhance our health system resilience and better prepare us for future pandemics.

Overview of chapters

In chapter one, George et al. investigate the willingness of healthcare workers (HCWs) to promote COVID-19 vaccines, as well as their perceived level of knowledge and communication skills when interacting with patients. The research findings indicate a positive correlation between the vaccination behaviour of healthcare personnel and their inclination to promote vaccination among their patients. A significant number of HCWs indicated that they faced challenges in obtaining access to reliable, credible, evidence-based, and trustworthy sources of information related to vaccines. The authors concluded that enhancing the operational efficiency of HCWs and their ability to communicate proficiently with patients necessitates the provision of readily accessible, clear, pertinent, and current evidence-based information.

Chapter two highlights the work of the Ministerial Advisory Committee (MAC) on COVID-19. The MAC was established in March 2020, with the aim of offering top-level strategic and technical input on various COVID-19 topics. Reflecting on the development of more than 150 advisories, Gray and colleagues foreground the importance of focusing on the best available evidence rather than waiting for the best possible evidence; they also emphasise the importance of emergency response transparency, and reinforce the importance of creating avenues for accommodating public participation, particularly in time-sensitive contexts. The authors' recommendation is for South Africa to emulate other countries by formulating secondary legislation that would facilitate the prompt establishment of an advisory committee during emergency situations. Ideally, the panel of experts should be pre-identified and readily available for prompt deployment during emergency situations. However, it is important to maintain flexibility in order to recruit individuals with relevant expertise based on the specific nature of the crisis.

In chapter 3, Kannemeyer and colleagues investigate the role of health committees (also known as clinic committees) in the Western Cape during the COVID-19 pandemic and reflect on the importance of health committees in outbreak control. The authors describe the many activities carried out by committee members as a result of close contact with their communities, activities that National Department of Health (NDoH) employees were unable to carry out. The authors examine the relationship that evolved between health committees and the NDoH during the COVID-19 pandemic, reporting on how increasing agency on the part of health committees enabled them to grow in confidence and claim access to previously inaccessible spaces. However, the authors highlight persistent power disparities between clinic committees and government, which might stymie successful collaboration between the two groups, particularly in 'invited spaces' where authority lies with government.

In chapter 4, Peters and colleagues report on public-private project at Groote Schuur Hospital to resolve a backlog of roughly 10 000 surgical cases caused by surgical service de-escalation during the COVID-19 pandemic. The authors argue that the volume of services provided in the public sector can be increased by using external capital funding for human resources, equipment, and consumables, and that these services become truly effective when accompanied by adequate multidisciplinary planning, alignment, and support at operational, strategic, and executive levels of healthcare facilities.

In chapter 5, Madela-Mntla and Ngcobo describe some of the adaptive efforts made by the University of Pretoria's Department of Family Medicine (UPDFM) to deliver on its mandate of teaching, learning, and research in the face of the COVID-19 pandemic disruptions during the March-September 2020 nationwide hard lockdown. The authors describe actions taken by the Department to address issues such as lack of effective COVID-19 screening instruments, inadequate communication and care coordination, limited access to medicine and care, and a lack of acceptable COVID-19 information in various languages. The authors believe that the UPDFM's initiatives and lessons learned during the crisis proved invaluable

for use beyond the acute phase of the pandemic, altering the health system for better pandemic preparedness.

In chapter six, Kruger et al. analyse the impact of the COVID-19 pandemic on the utilisation of routine maternal, neonatal, child, and women's health (MNCWH) services in Tshwane District. The study reveals that the pandemic had a significant adverse impact on access to healthcare services for women and children. The authors recommend that future-proofing the health system for significant disruptive events like COVID-19 requires planning for service delivery and client access, especially at community level. They also suggest that while curative care may need to be prioritised in emergency situations, preventive interventions should not be neglected.

In chapter seven, Kleinhans et al. report on their study of gender variations in mental health outcomes during the country's first COVID-19 pandemic lockdown. The study focused on the differential influence of stress, fear, and worry on depression vulnerability by gender during the pandemic lockdown. The study discovered that fear of COVID-19 disease affected stress and depression levels in both genders, with women reporting more stress than males. This has significant implications for post-pandemic mental health interventions. It provides a chance to eliminate gender disparities in mental health care by delivering individualised care services, particularly during times of high stress.

South Africa's reliance on coal-fired power has had a severe impact on climate, environmental health, and public health. In light of this, Irlam and colleagues explore the growing call for a transition to clean renewable energy that maximises socio-economic and local ecological benefits (chapter 8). The chapter addresses the healthcare sector's contribution to environmental pollution and climate change, and argues that climate change will put more strain on South Africa's already overburdened health system. The authors stress the role that health professionals can play in advocating for environmentally sustainable health care as part of global and local efforts towards greater climate justice and health equity, and the importance of educating health professionals. The chapter discusses some of the proposals for public health within the South African just transition movement, with a particular focus on the extremely polluted Highveld Priority Area in Mpumalanga.

Chapter nine examines the response of the Western Cape Department of Health to a sequence of catastrophic occurrences in the province (fires, floods, the COVID-19 pandemic, drought, and load shedding). Quintana et al. identify the key lessons learnt and provide a framework for strengthening the health sector's response to climate change. Recommendations include the need for both provincial and national health departments to participate in climate fora in order to register the importance of building health-sector resilience to climate change; and an ongoing focus on health-system strengthening that improves system capacities and service redesign, with a focus on emergency services, primary health care, communications, surveillance, risk management, and disaster-planning capabilities.

In chapter 10, Walker and colleagues report on a training and capacity-building initiative to strengthen collaboration among eight Southern African countries in implementing public health emergency response strategies. The initiative enabled shared analysis of cross-border movement patterns; building neighbouring countries' capacity to identify priority areas for such response planning; and strengthened relationships for communicating health risks and events. The project also sought to implement initiatives to strengthen cross-border and multisectoral communication; prioritise points of entry for cross-border co-ordination; map population movement patterns; and identify national and regional border health priorities.

The World Health Organization (WHO) has described a well-functioning health-information system as "one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status".[2] In chapter 11, Ndlovu and colleagues examine the available health-information data sources in South Africa, with a particular focus on whether they strengthened during and after the acute phase of the COVID-19 pandemic. The chapter presents a repository of provincial and national data describing the broad status of the South African health system. Data were sourced primarily from national routine data sources, but also captured from major surveys and global reports, and include socio-demographic indicators and determinants, health-status indicators, and health-service indicators.

Conclusion

The collection of articles in this edition of the Review provides valuable insights into the potential benefits and drawbacks of the strategies employed to address the numerous challenges presented by the pandemic. Emerging lessons reference the importance of incorporating information from diverse sources to facilitate evidence-based decision making; the need to effectively and expeditiously manage and meet the information requirements of various end-users; the necessity of considering local contexts when formulating responses; the considerable value of collaboration across diverse sectors, and the adoption of a comprehensive approach that encompasses all segments of society. These findings provide significant contributions to inform South Africa's transition towards a more sustainable long-term approach to managing COVID-19 and the development of its future pandemic preparedness response.

Ashnie Padarath and Themba L. Moeti

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Research

Examining healthcare worker willingness to promote COVID-19 vaccines in South Africa: the importance of a clear evidence base

Gavin George[1,2], Phiwe B. Nota[1], Michael Strauss[1], Emma Lansdell[1], Remco P.H. Peters[3], Petra Brysiewicz[4], Nisha Nadesan-Reddy[4], Douglas Wassenaar[5]

[1] Health Economics and HIV and AIDS Research Division (HEARD), University of KwaZulu-Natal,
[2] Division of Social Medicine and Global Health, Lund University,
[3] Research Unit, Foundation for Professional Development,
[4] School of Nursing and Public Health, University of KwaZulu-Natal,
[5] South African Research Ethics Training Initiative, School of Applied Human Sciences, University of KwaZulu-Natal

South African Health Review

Background

Studies have shown that healthcare workers (HCWs) are considered trusted sources of coronavirus disease 2019 (COVID-19) information in their communities, ideally placing them as effective vaccine advocates. However, limited data exist on the role of HCWs in the promotion of vaccines, and whether they feel adequately equipped to fulfil this role. This study therefore aimed to determine the willingness of HCWs in promoting COVID-19 vaccines, how this correlated with their own vaccination behaviour and attitudes to alternative therapies, and whether they felt they had adequate knowledge and skills to communicate effectively with patients.

Methods

A mixed-methods design was adopted, involving an online web-based survey and in-depth interviews (IDIs). HCWs were recruited for the online survey from an integrated health system database in South Africa using voluntary response sampling, with follow-up qualitative interviews conducted with HCWs who indicated interest in participating in an interview. Univariate and multivariate logistical regression models were used to understand how demographic characteristics, HCW roles, vaccination status, attitudes and practices around alternative medications, and information on COVID-19 vaccines were related to the willingness of HCWs to recommend vaccination to their patients.

Results

Most of the survey sample were vaccinated (90.7%) and indicated that they would recommend vaccination (81.7%). However, a significant proportion of the sample (58.6%) felt that they did not have enough information on COVID-19 vaccines, while 59.8% felt that they required additional guidance on how to educate their patients on COVID-19 vaccines. Vaccinated HCWs were more likely to recommend vaccination (OR=10.63 [95% CI: 6.53-17.31]) than their unvaccinated counterparts. The qualitative results provide further insights into why HCWs were willing or unwilling to administer and promote vaccines, with three themes emerging: (i) HCWs' belief in the value of vaccines and their promotion strategies; (ii) challenges facing HCWs in fulfilling their mandate of administering and promoting COVID-19 vaccination; and (iii) the rationale for HCWs discouraging vaccination and promoting alternative medicines for COVID-19 prevention and treatment.

Conclusions

This study posits that if HCWs are key to the success of national vaccination programmes, then they will need to be provided with clear, contextual, up-to-date information in order to enhance patient communication and vaccine uptake.

Introduction

Healthcare workers (HCWs) have and will continue to be central to the success of any vaccination programme because they are trained and tasked to administer vaccination injections and to work in the health system, which is the custodian of any national vaccination programme. In the recent case of the coronavirus disease 2019 (COVID-19) pandemic, their role became critical, not only for the administration of COVID-19 vaccines, but also as they were expected to play a role in increasing vaccine uptake rates by advocating for vaccination to patients and others with whom they interacted.[1-5] Well before the COVID-19 pandemic, research had already established a strong relationship between HCW attitudes, their personal vaccine behaviour, and their willingness to recommend vaccines to patients.[6]

Low vaccination rates among HCWs and high levels of vaccine hesitancy can have a ripple effect, resulting in decreased vaccination uptake among those who engage with HCWs at professional and personal levels.[7] Conversely, research suggests that HCWs who are vaccinated exhibit positive attitudes towards vaccines, making them ideal advocates or vaccine ambassadors.[8-10] HCWs can increase vaccine confidence among patients by providing information and through effective communication. However, this reflects an inherent expectation that HCWs are knowledgeable about the potential risks and benefits of vaccinating against COVID-19, and that they possess the skills and confidence to communicate this to patients, which is not always the case.[11,12] Furthermore, in cases where HCWs are themselves hesitant to be vaccinated, they are likely to transmit their concerns and doubts about vaccination to their patients and the broader community.[6,11] Research has highlighted that HCWs may share some of the same questions and concerns as the general public regarding vaccination.[13,14]

Previous public health events of the 21st century – including outbreaks of the Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome, influenza A, and Ebola virus disease – have shown that risk communication and community engagement are integral to successfully responding to public health emergencies.[15] As a trusted source of information, HCWs typically act as a conduit for information, and they are largely tasked with engaging with communities on matters related to public health.[16] However, HCW communication practices regarding COVID-19 vaccines hinge on their confidence in the safety and the effectiveness of the vaccine, while other factors, including preference for physiological immunity through natural infection, distrust in government and pharmaceutical companies, and an emphasis on autonomy and personal freedom, may affect both their own vaccination choices and the recommendations they make to patients.[17,18] Additionally, hesitancy and reluctance to promote vaccination to patients may also be fuelled by a combination of ignorance, misinformation, conspiracy theories, doubt about scientific evidence, concerns relating to medical histories, and cultural, religious and philosophical beliefs.[6,19]

In the South African context, there are reports that some HCWs, including doctors, have actively discouraged patients from getting COVID-19 vaccinations.[20] While this evidence is largely anecdotal, it remains cause for concern, and could be a factor in the country's stubbornly slow vaccine and booster uptake rates.[21] Based on this premise, the present study aimed to explore HCW willingness to promote COVID-19 vaccines to family, friends and patients and how this correlated with selected demographic characteristics, their own vaccination or alternative therapeutic behaviour, and whether they had sufficient information and adequate skills with which to engage patients on COVID-19 vaccines. The study further qualitatively explored both the content and nature of these interactions, expanding on what were limited insights into HCW interactions with patients around COVID-19 preventive and treatment options. The findings are relevant, not only in the context of the COVID-19 vaccination programme in South Africa, which has largely been scaled back (at time of writing), but for vaccination programmes more broadly, in which the role of HCWs will continue to remain both central and critical to an effective public health response.

Methods

This study was part of a larger mixed methods study conducted between the 18th of July and the 28th of October 2022, that aimed to investigate reasons for HCW vaccine acceptance and hesitancy in South Africa. Details of the larger study are available elsewhere.[22] Data for this study were drawn from a web-based quantitative survey which explored HCW beliefs and attitudes about vaccines, perspectives on patients being vaccinated, views and use of complementary and alternative medicine for COVID-19, and patient-targeted communication. These data were augmented by qualitative data collected through a series of virtual online in-depth interviews (IDIs) with participants who completed the survey and indicated willingness to participate. The Foundation for Professional Development's (FPD) database was used to recruit HCWs. The FPD is a private higher-education institution that provides training to HCWs, and with permission, records their details in the database. All HCWs who were part of the FPD database were invited through email and social media platforms to participate in the survey, and all the study participants were self-declared HCWs. A total of 7 763 HCWs participated in the full survey. Only study participants randomised[22] to answer the two sections (Sections 4 and 5) containing questions on HCW willingness to promote vaccines to patients, and participants who were in direct contact with patients, were included in the final analysis, which included a total of 2 011 participants.

The survey was divided into two parts. The first part included demographic information and data on vaccination behaviour, and was completed by all participants.

The second part was divided into five sections. Participants were randomly assigned to complete one of the five sections to decrease the time it would take them to complete the survey and to ensure high response rates and better data quality. The full study design, along with recruitment and data-collection details, has been described elsewhere.[22] This chapter presents analyses using variables from two of these sections focusing on HCW willingness to promote vaccines to friends, family and patients.

Section 1 explored factors influencing vaccination decision and general attitudes towards vaccination. Section 2 covered perceived COVID-19 vaccine benefits, both specific and general. Section 3 included questions on perceived vaccine safety, efficacy and perceived risk. The present chapter reports on HCW willingness to promote vaccines to friends, family and patients, which was only asked in Sections 4 and 5. Additionally, Section 4 included questions on COVID-19 vaccine information among HCWs and skills to enable engagement with patients. Section 5 included questions on using and recommending alternative medicines for prevention and/or treatment of COVID-19 including: "Have you used alternative medicines for prevention and/or treatment of COVID-19?" and "Have you recommended alternative medicines for prevention and/or treatment of COVID-19?"

The primary outcome measure was a binary variable for whether or not participants would recommend vaccination. Two survey items were used to create the outcome variable.[23] The first item was from Section 4. Participants were asked to indicate the degree to which they agreed with the following statement: "I would not recommend the COVID-19 vaccine to my patients, family, and friends because I am concerned about the safety of the vaccine". Responses were given on a four-point Likert scale: 'strongly disagree', 'disagree', 'agree', and 'strongly agree'. 'Strongly disagree' and 'disagree' were combined as 'recommend', while 'agree' and 'strongly agree' were combined as 'not recommend'. The second item was from Section 5 of the survey. Participants were asked: "Would you recommend COVID-19 vaccination to eligible patients?" This was captured as 'no', 'yes', and 'unsure'. Responses given as 'no' and 'unsure' were combined as 'not recommend', while 'yes' was 'recommend'.

A binary variable was created for composite COVID-19 vaccine knowledge.[23] Participants were asked five questions about their COVID-19 vaccine knowledge: "Do you have enough information about how COVID-19 vaccines work?", "Do you have enough information about how effective COVID-19 vaccines are?", "Do you have enough information about how safe COVID-19 vaccines are?", "Do you have enough information about COVID-19 vaccines' side-effects?", and "Do you have enough information about how to use COVID-19 vaccines?" All questions were captured as 'no', 'yes', or 'unsure'. Responses given as 'no' and 'unsure' were combined as 'not enough information', while 'yes' was captured as 'enough information'. These five questions were combined to form an independent variable, which was coded using a binary approach.

Three univariate logistical regression models were used to regress different measures against the same outcome variable. In the first model, the outcome variable was regressed against demographic characteristics. In the second model, the outcome variable was regressed against vaccination status and against using and recommending alternative medicines for prevention and/or treatment of COVID-19. In the third model, the outcome variable was regressed against vaccination status and COVID-19 vaccine knowledge and perspectives. In every model, the aim was to determine how significantly each measure influenced whether a participant recommended vaccination or not.

In addition, one multivariate logistical regression model regressed the outcome variable against the measures that emerged as significant in the third model, namely vaccination status and COVID-19 vaccine knowledge. Control variables in the model were age, gender, race, religion, nationality, chronic conditions, occupation, health sector, facility, and years worked.

Qualitative data were collected to further elucidate perspectives on HCW COVID-19 vaccine behaviours and patient interaction. As part of the survey, participants had the option to indicate their willingness to be contacted for a follow-up interview. Random selection was done among those who indicated such willingness, using the 'randbetween' formula in Microsoft Excel for IDIs by vaccination status. Participants were then contacted, recruited, and interviews were done with 10 vaccinated and 20 unvaccinated interviewees. Interviews were conducted by two authors (PBN and GG), both experienced researchers with a background in conducting qualitative research and using interview guides. Two interview guides were developed (one for vaccinated and another for unvaccinated HCWs) with open-ended questions and probes on the following: (i) vaccination behaviour; (ii) experiences with administering vaccines; (iii) perspectives on the national vaccine programme; (iv) the vaccines and how HCWs gather and appraise information sources; and (v) perspectives on educational resources that can be used to support HCWs. The virtual IDIs were conducted on Zoom and were 30-45 minutes in duration. The Zoom transcribing software was used to transcribe the recorded interviews. The transcripts were reviewed and edited by two research interns and one author (PBN) to eliminate typographical errors, and saved on Microsoft Word (version 16.70). Qualitative data were analysed thematically using an inductive approach as prescribed by Braun and Clarke.[24] The qualitative data were then triangulated with the quantitative data to gain deeper insight into HCW experiences with COVID-19 vaccines and patient engagement.

Results

Table 1 shows the demographic characteristics of the sample. As evident in the table, most of the sample was

younger than 35 years old (31.4%), and 35-49 years old (42.0%). More than half the sample was female (71.1%), identified as black (55.1%) and South African (92.5%). The majority of the sample did not have a chronic condition (65.7%). The main occupation in the sample was nurse (45.7%), with doctors comprising 22.4% of the sample. Participants were mostly working in the public (43.9%) or private (36.6%) health sectors, and in hospitals (46.4%) and clinics (34.1%). Most of the sample had worked for 10 or more years (62.3%). Most of the sample were vaccinated (90.7%) and would recommend vaccination (81.7%).

Table 2 presents the study's COVID-19 vaccine measures of interest. As seen in the table, 39.1% of participants had used alternative medication, with a similar proportion (35.1%) recommending alternative medication to patients. Vitamins and dietary supplements were the main alternative treatments used (57.3%) and recommended (54.1%). Most of the sample indicated that they would encourage pregnant women (62.7%) and children over the age of 12 years (74.4%) to get vaccinated. More than half the sample (58.6%) felt that they did not have enough information on COVID-19 vaccines, and 59.8% reported needing guidance on how to educate their patients about COVID-19 and the available vaccines.

Table 3 presents the univariate analysis of the sample's demographic characteristics. As reflected, white HCWs were less likely to recommend vaccination than black HCWs (OR=0.58 [95% CI: 0.45 - 0.75]). In addition, all other HCWs such as pharmacists, allied health professionals, personal service workers, paramedics, and other health professionals were less likely to recommend vaccination than nurse HCWs (OR=0.46 [95% CI: 0.35 - 0.60]). Other facilities, including general practitioner practices, were less likely to recommend vaccination than hospitals (OR=0.62 [95% CI: 0.45 – 0.83]).

Table 4 presents the univariate analysis of vaccination status, and the use of and/or recommendation of alternative medicines. As reflected in the table, vaccinated HCWs were more likely than their unvaccinated counterparts to recommend vaccination (OR=10.63 [95% CI: 6.53-17.31]). HCWs who had themselves used alternative medicines for prevention and/or treatment of COVID-19, were less likely to recommend vaccination than those who had not done so (OR=0.61 [95% CI: 0.43-0.86]). HCWs who had recommended alternative medicines for prevention and/or treatment of COVID-19 were less likely to recommend vaccination than those who had not made such recommendations (OR=0.69 [95% CI: 0.49-0.99]).

Table 5 presents the univariate and multivariate analysis on vaccination status, COVID-19 knowledge, and COVID-19 perspectives. As reflected in the table, vaccinated HCWs were more likely than their unvaccinated counterparts to recommend vaccination (OR=7.41 [95% CI: 4.57-12.01]). HCWs who felt they had enough information on COVID-19 vaccines were more likely to recommend vaccination than HCWs who felt insufficiently informed (OR=2.21 [95% CI: 1.57-3.11]).

Qualitative results

The qualitative results provide further insights into why most HCWs willingly administered and promoted vaccines, while others did so under duress or found it challenging as they felt inadequately supported to address concerns raised by patients. Further, the results draw attention to the use and promotion of alternative remedies among some HCWs. HCW narratives illustrate how personal beliefs, attitudes and perceptions influenced their engagement with patients on the subject of vaccines. Three themes emerged from the data: (i) HCW belief in the value of vaccines and their promotion strategies; (ii) challenges facing HCWs in administering and promoting COVID-19 vaccination; and (iii) the rationale for HCWs discouraging vaccination and promoting alternative medicine.

HCW belief in the value of vaccines and their promotion strategies

As confirmed in the quantitative data, the majority of HCWs were willing to recommend vaccination to family members and patients and felt comfortable addressing any concerns raised; this was the case among both vaccinated and unvaccinated HCWs. HCWs were at the coalface of this pandemic, observing high morbidity and mortality rates. Some perceived the availability of vaccines as having brought about a sea change – they observed a reduction in the number of cases, reduced severity of illness in vaccinated patients in relation to those who remained unvaccinated, and reduced mortality.

> *What I have experienced, and I have seen a number of people that we have vaccinated, I think the vaccine has given us immunity. I would say it has really improved in terms of people getting infected with COVID. The number of people who are vaccinated, they never experience it again. Even if maybe you could, it was just in terms of a mild flu … I think the vaccine is really effective.* (P28, Nurse, female, vaccinated)

HCWs presented personal accounts of the perceived benefits of the vaccine.

> *My husband was sick, but I said to him after he had recovered "you would have been much worse, you probably would have ended up being on a ventilator* [if you had not been vaccinated]"*, because he ended up having bronchitis, and I said to him "your bronchitis is related to long-term COVID". And he now understands actually the benefits of having the vaccine.* (P17, Nurse, female, unvaccinated)

HCWs trusted allopathic medicine and believed in the benefits of the available vaccines.

> *It's an evidence-based field of medicine. Just like medicine itself, so yes. You know the evidence is there. You need the vaccine.* (P11, Other HCW, female, vaccinated)

Table 1. Demographic characteristics of the study sample

Measures		n	%
Age (n=2 005)	Younger than 35 years old	629	31.4
	35-49 years old	842	42.0
	50 years old or older	534	26.6
Gender (n=1 996)	Male	577	28.9
	Female	1 419	71.1
Race (n=1 961)	Black	1 081	55.1
	Coloured	138	7.04
	Indian	119	6.07
	White	623	31.8
Religion (n=1 945)	Christian	1 613	82.9
	Muslim	86	4.4
	Buddhist or Hindu	68	3.5
	African Spirituality	53	2.7
	Other	125	6.4
Nationality (n=1 982)	South African	1 834	92.5
	Non-South African	148	7.5
Chronic conditions[a] (n=2 010)	No	1 320	65.7
	Yes	690	34.3
Occupation (n=2 011)	Nurse	919	45.7
	Doctor	451	22.4
	All other[b]	641	31.9
Health sector (n=2 010)	Public	868	43.2
	Private	735	36.6
	NGO	161	8.0
	Public and Private	182	9.1
	Other	64	3.2
Facility (n=2 010)	Hospital	933	46.4
	Clinic	685	34.1
	Residential aged or disability care	41	2.0
	Other	351	17.5
Years worked (n=2 009)	Less than 5	292	14.5
	5 to 9	466	23.2
	10 or more	1 251	62.3
Vaccinated (n=1 975)	No	183	9.3
	Yes	1 792	90.7
Would recommend vaccination (n=1 914)	No	351	18.3
	Yes	1 563	81.7

[a] Chronic conditions were defined as one or more of the following: diabetes, hypertension, respiratory disease, HIV, or other chronic diseases.
[b] This category included pharmacists, allied health professionals, personal service workers, paramedics, other health professionals, and other.

HCWs have historically seen the value of vaccination and applied the same principles to the available COVID-19 vaccines.

Personally, I think it is important. I think that again I'm a believer, so I have taken the flu vaccine annually … I actually did promote the [COVID-19] *vaccine, and quite actively.* (P18, Other HCW, female, vaccinated)

Table 2. COVID-19 vaccine measures of interest

Measures		n	%
Has used alternative medicines for prevention and/or treatment of COVID-19 (n=980)	No	597	60.9
	Yes	383	39.1
Alternative medicines used (n=382)	African traditional	73	19.1
	Vitamins/dietary supplements	219	57.3
	Other[a]	90	23.6
Has recommended alternative medicines for prevention and/or treatment COVID-19 (n=979)	No	635	64.9
	Yes	344	35.1
Alternative medicines recommended (n=344)	African traditional	70	20.4
	Vitamins/dietary supplements	186	54.1
	Other[b]	88	25.6
Would encourage pregnant women to get vaccinated (n=957)	No	357	37.3
	Yes	600	62.7
Would encourage children over the age of 12 years to get vaccinated (n=956)	No	245	25.6
	Yes	711	74.4
Has enough information about COVID-19 vaccines[c] (n=958)	No	561	58.6
	Yes	397	41.4
Needs guidance on how to educate patients about COVID-19 and the available vaccines (n=956)	No	384	40.2
	Yes	572	59.8

[a] This category included Chinese herbal medicine (2.1%), Western herbal medicine (7.1%), Ivermectin (10.5%), Chloroquine (1.1%), and other (2.9%).
[b] This category included Chinese herbal medicine (1.5%), Western herbal medicine (7.6%), Ivermectin (11.1%), Chloroquine (1.7%), and other (3.8%).
[c] The way this summary variable was generated is described in the Methods section.

HCWs interact with patients and are tasked with addressing patient queries. HCWs reported having to allay patient concerns related to the safely of COVID-19 vaccines. HCWs well versed with the potential risks of the vaccine were able to effectively communicate the extent of the risk, drawing on their clinical training.

> *One of the females* [said] *"I'm going to get a blood clot, I'm taking hormone replacement therapy". So, I would respond … "well I am on hormone replacement therapy and here are the stats, you'll have a greater chance of having a thrombosis* [blood clot] *from the hormone replacement itself as opposed to a vaccine".* (P11, Other HCW, female, vaccinated)

Vaccinated HCWs were also able to share their personal experiences as a strategy to alleviate patient fears.

> *I don't want to sugar coat anything or sell people lies. So I tell them my experience of the vaccine, that okay, when I had the vaccine I only had a headache, and it lasted for three days … That's what happened to me, so especially with family members, I got them to vaccinate.* (P21, Other HCW, female, vaccinated)

Some HCWs didn't feel the vaccine was necessary for everyone, and rather focused their energy on convincing patients and family members considered to be at high risk, to get vaccinated.

> *I do not need to be vaccinated, but I do agree that those who are at risk should be vaccinated, the people with comorbidities … like my husband is hypertensive, so I encouraged him to be vaccinated. And the elderly like my mother, she's also been vaccinated because she had COVID in the beginning of 2021. I think those are the people who I would see as people who are high risk and who need to be vaccinated.* (P17, Nurse, female, unvaccinated)

Challenges facing HCWs in administering and promoting COVID-19 vaccination

Some HCWs felt conflicted about actively promoting vaccination because it was incongruent with their personal beliefs.

> *I'm conflicted, but duty bound. So my personal opinion about the subject matter I normally shove aside. I do not share with patients, I don't want to be labelled that I am misleading the public. I don't do that. Whatever I've shared with you, I don't share with the public. Because being in the position that I am in, I may find it problematic, and I may be called into question and I may be re-*

Table 3. Univariate analysis on the demographic characteristics of the study sample

Measures		Recommend n (%)	Odds ratio [95% CI][a]
Age	Younger than 35 years old	486 (81.3%)	1.00
	35-49 years old	667 (82.8%)	1.10 [0.84 - 1.45]
	50 years old or older	409 (80.8%)	0.97 [0.71 - 1.31]
Gender	Male	441 (79.3%)	1.00
	Female	1 118 (82.9%)	1.26 [0.98 - 1.62]
Race	Black	858 (85.0%)	1.00
	Coloured	109 (82.0%)	0.80 [0.50 - 1.29]
	Indian	98 (83.1%)	0.86 [0.52 - 1.44]
	White	465 (76.9%)	0.58 [0.45 - 0.75]
Religion	Christian	1 262 (82.5%)	1.00
	Muslim	63 (73.3%)	0.58 [0.35 - 0.95]
	Buddhist or Hindu	58 (85.3%)	1.23 [0.62 - 2.44]
	African Spirituality	37 (77.1%)	0.71 [0.35 - 1.41]
	Other	93 (76.9%)	0.70 [0.45 - 1.09]
Nationality	South African	1 442 (82.5%)	1.00
	Non-South African	110 (76.4%)	0.68 [0.45 - 1.03]
Chronic conditions[b]	No	1 035 (82.4%)	1.00
	Yes	528 (80.4%)	0.87 [0.68 - 1.11]
Occupation	Nurse	751 (86.2%)	1.00
	Doctor	359 (82.5%)	0.75 [0.55 - 1.03]
	All other[c]	453 (74.5%)	0.46 [0.35 - 0.60]
Health sector	Public	689 (84.0%)	1.00
	Private	561 (79.5%)	0.74 [0.57 - 0.96]
	NGO	131 (85.1%)	1.09 [0.67 - 1.76]
	Public and Private	133 (76.9%)	0.63 [0.42 - 0.94]
	Other	49 (81.7%)	0.85 [0.43 - 1.68]
Facility	Hospital	792 (82.6%)	1.00
	Clinic	554 (84.5%)	1.14 [0.87 – 1.50]
	Residential aged or disability care	30 (75.0%)	0.63 [0.30 – 1.32]
	Other	250 (74.6%)	0.62 [0.45 – 0.83]
Years worked	Less than 5	223 (79.4%)	1.00
	5-9	363 (82.3%)	1.21 [0.82 - 1.76]
	10 or more	977 (82.0%)	1.18 [0.85 - 1.63]

[a] Univariate analysis, binary logistical regression.
[b] Chronic conditions were defined as one or more of the following: diabetes, hypertension, respiratory disease, HIV, or other chronic diseases.
[c] This category included pharmacists, allied health professionals, personal service workers, paramedics, other health professionals, and other.

garded as misleading the public. (P3, Nurse, male, unvaccinated)

Participants raised concerns about not having sufficient information or the ability to respond adequately to the questions posed by patients. Several HCWs felt that their own knowledge deficit resulted in them struggling to navigate through conversations with patients about the COVID-19 vaccines.

I mean, there's all these new vaccines again, and talking about covering the different variants. I don't even know if I need another booster shot … if I don't know it for myself, there's no way I can teach it to a patient. Yeah, especially with the newer updates. I definitely do not know

Table 4. Univariate analysis on recommending vaccination according the study's COVID-19 vaccine measures of interest

Measures		Recommend n (%)	Odds ratio [95% CI][a]
Vaccinated (Section 5 only)	No	34 (42.0%)	1.00
	Yes	785 (88.5%)	10.63 [6.53 - 17.31]
Has used alternative medicines for prevention and/or treatment of COVID-19	No	518 (86.78%)	1.00
	Yes	307 (80.2%)	0.61 [0.43 - 0.86]
Has recommended alternative medicines for prevention and/or treatment of COVID-19	No	546 (86.0%)	1.00
	Yes	279 (81.1%)	0.69 [0.49 - 0.99]

[a] Univariate analysis, binary logistical regression.

Table 5. Univariate and multivariate analysis on HCW vaccination status and COVID-19 vaccine measures of interest

Measures		Recommend n (%)	Odds ratio [95% CI][a]	Odds ratio [95% CI][b]
Vaccinated (Section 4 only)	No	32 (40.0%)	1.00	1.00
	Yes	697 (83.2%)	7.41 [4.57 - 12.01]	7.88 [4.59 - 13.53]
Has enough information about COVID-19 vaccines[c]	No	413 (73.6%)	1.00	1.00
	Yes	342 (86.2%)	2.21 [1.57 - 3.11]	1.91 [1.27 - 2.86]
Needs guidance on how to educate patients about COVID-19 and the available vaccines	No	303 (78.9%)	1.00	-
	Yes	451 (78.9%)	0.99 [0.72 - 1.36]	-

[a] Univariate analysis, binary logistical regression.
[b] Multivariate analysis, binary logistical regression.
[c] The way this summary variable was generated is described in the Method section.

> *enough to be able to adequately educate patients regarding this.* (P19, Doctor, male, vaccinated)

Several participants expressed frustration regarding their lack of accessible information to address questions raised by patients.

> *The old age home pressurised everybody* [to vaccinate]*, and a lot of people didn't ask beforehand, they came back later, and said "What's happening to me?"... So there was a lot of frustration around this whole thing, where they said: "Why should I vaccinate if I sit in my office and am not in contact with many people, just because it's policy?" So yes, it was difficult to give proper answers, because it didn't make sense to me either... I can't lie. This is who I am. I can't tell people a story that I can't scientifically qualify.* (P26, Doctor, female, unvaccinated)

Several HCWs also described how they often had similar questions and concerns as the public about the COVID-19 vaccines.

> *...so obviously because I'm working for the company, I also need to motivate people to do vaccination. So, most of our patients, when I do the call, they ask if the vaccine is appropriate. I also have those questions.* (P30, Other HCW, female, unvaccinated)

Rationale for HCWs discouraging vaccination and promoting alternative medicine

Some HCWs discouraged patients from getting vaccinated based on perceived clinical and anecdotal evidence suggesting harmful effects of the vaccine.

> *So I haven't taken it and I'm telling every patient coming in here, they should not take it, and then I show them all my cases, how many strokes there were, deaths there were, all the side-effects, and I'm sure they are convinced. I tell them or show them. I've got some articles and even some little YouTube clips just stating the obvious and I show them all my statistics.*
> ***Interviewer:*** *So you don't recommend to patients or anyone to get vaccinated?*

> *Never. In the beginning I was hesitant, hesitating because I wasn't sure whether the vaccine was more beneficial than harmful, but as time progressed, I can clearly see with my own eyes and I read from all over the world, the vaccine is not helpful and it's not beneficial. There's no benefit, it's more harmful than beneficial.* (P8, Doctor, male, unvaccinated)

A minority of HCWs advocated for alternative prevention and treatments. Some HCWs leaned towards treatment rather than prevention and believed that medication already existed that would be beneficial for infected patients, or that could be used as prophylaxis.

> *I started people immediately on vitamin C and zinc and those basics. But I've seen actually many, many side-effects just with vitamin C because it's so toxic on your gastric lining … So that was a bit of a worry. Zinc works with any viral disease, zinc works. It definitely makes a difference. The people who were more at risk I put on ivermectin, and it made an incredible difference. And since ivermectin got the Nobel Prize, I think in 2014 or 2015 for being such a safe medicine after how many million dosages. It's a wonderful anti-parasitic as well by the way. I'm actually very sad that they stopped it.* (P26, Doctor, female, unvaccinated)

Some HCWs felt strongly about the use of ivermectin, a widely used antiparasitic medicine with known antiviral and anti-inflammatory properties to treat COVID-19. They expressed a clear stance that the government should not have prohibited HCWs from prescribing it.

> *The South African government does not want us to use ivermectin, crazy. That drug has a Nobel Prize attached to it, it's been used safely … they don't want us to use it, they want us to use very expensive drugs.* (P7, Doctor, male, unvaccinated)

Discussion

This study undertook a national cross-sectional survey of South African HCW willingness to recommend COVID-19 vaccination to patients in relation to their own vaccination behavior, use of alternative medicine, and availability of information. Using qualitative data, an examination was done of HCW views on vaccines, types of engagements with patients, and the perceived value of alternative remedies.

The results showed that a high proportion (91%) of the HCWs in this study had been vaccinated. This correlated with the majority (82%) who indicated that they were willing to recommend vaccination to patients, family, and friends. The data suggest that there was a lower proportion of HCWs willing to recommend vaccines to pregnant women (61%) and children (73%). These findings affirm results from an Italian study on whether HCWs would recommend vaccination to their patients.[25] Papini et al.[25] found that only a small percentage of participants (1.7%) would not recommend the COVID-19 vaccine to their relatives, and even fewer participants (0.9%) would not recommend it to their patients. As in the Italian study, the present study found consistency between HCWs' personal vaccine behaviour and their willingness to promote vaccination; 9% of the sample were unvaccinated, and only 19% were not prepared to recommend the vaccine. A higher proportion of unvaccinated HCWs, compared with their vaccinated colleagues, were unwilling to promote vaccines. However, within the unvaccinated group, some still saw the benefit of, or felt duty-bound to recommend vaccines, with the qualitative data revealing that some HCWs found vaccines particularly beneficial for patients in high-risk groups. The results of the present study affirm data from one of the few studies done on HCW engagement with patients around COVID-19 vaccines,[26] which concluded that vaccine-hesitant HCWs were reluctant to promote vaccines, citing fear of inducing patient anxieties or complaints.

With only 51% of the South African adult population vaccinated by the end of January 2023[21] and with research suggesting that HCWs remain a trusted source of information in their communities,[27-29] it is evident that HCWs have not been adequately educated and utilised in the promotion of vaccination. The literature highlights HCWs' pervasive sub-optimal knowledge and communication skills around COVID-19 vaccination, which has negatively impacted interactions with patients[30] and possibly affected vaccine uptake. While HCWs participating in this study appeared perspicacious, an unmet appetite for additional up-to-date information remains, especially given that this is a relatively novel virus resulting in an evolving sequence of variants and understandings of its effects and effective available treatment and prevention options. The quantitative results of the present study revealed that the majority of participants (59%) felt that they did not have sufficient knowledge of the available COVID-19 vaccines, and a similar proportion (60%) required additional guidance on how to educate patients about COVID-19 and the available vaccines. Further analysis indicates that these factors negatively affected HCW willingness to promote vaccination to patients. Even for those HCWs willing to promote vaccination, the reportedly inadequate information at their disposal made their task more challenging. This is not unique, with other studies reporting that HCWs found it difficult to discuss vaccines knowledgeably with peers and patients.[26] Qualitative analysis in the present study revealed the benefits of having HCWs well versed in the risk and benefits of vaccines, resulting in better communication and ability to adequately address patients' questions and fears.

This study further revealed that HCWs who personally used alternative medication to treat or prevent COVID-19, were less inclined to promote vaccination. Further, those recommending alternative approaches were less likely to recommend vaccines, suggesting that HCWs are not necessarily promoting alternative medication to supplement vaccines, but in some cases they are promoting it as a substitute. This study data supports this assertion, with some HCWs arguing for the benefits of alternative approaches such as traditional African medication, vitamins, and therapeutics such as ivermectin. There are

limited studies on HCW prescription and promotion of alternative medicine. In China, scientists and doctors initially recommended using Traditional Chinese Medicine (TCM) as a cure for COVID-19.[31] During the SARS epidemic, TCM had reportedly been effective in the treatment of infected people, and the Chinese Government ordered the use of TCM to treat COVID-19 patients. It was reported that about 85% of COVID-19 patients in China received combined treatment with TCM and regular medication. This stance is not parochial, as the World Health Organization (WHO) welcomes innovations such as traditional medicine, repurposed drugs, and development of new therapies. Africa and some parts of Asia have a long history of using traditional medicine, and the WHO recognises the many benefits of traditional medicines.[31] In addition, the emergence of conflicting published results on some proposed therapeutic alternatives, including ivermectin, has added to confusion surrounding viable therapeutic alternatives.[32,33] This led to support for the drug across social media and by some organisations.[34] This was picked up by HCWs and the public, including in South Africa, with some anti-vaxxers extolling the benefits of ivermectin.[35] A study in India explored knowledge and practices around ivermectin as a potential pre-exposure prophylaxis (PrEP.). They found that the majority (70.59%) of the sample of HCWs believed that ivermectin was protective against COVID-19, while more than half (57.37%) of the sample used or recommended the drug.[36] While advocacy for ivermectin and other alternative medicine among this sample was small, it suggests a lack of clear messaging, affirming the need to improve institutional communication addressed to HCWs to enhance their role as vaccination facilitators.[37]

For HCWs to promote vaccines effectively to the public, they need both current scientific knowledge and communication skills. This was and continues to be challenging within an emergency context, and continues to evolve as different variants of the virus emerge and more efficacious vaccines and therapeutics become available. There remain numerous sources of information, all made more easily accessible through increased use of the internet and social media – many of these sources provide informative and valuable information, but some propagate misinformation, sometimes persuasively. HCWs require trusted sources of information that deliver updated evidence-based messages that are easily understood by all cadres of HCWs. The value of the present study extends beyond the role of HCWs in promoting COVID-19 vaccines but applies to national immunisation programmes more broadly. Patients, are likely to question both the benefit and safety of available vaccines, with HCWs expected to communicate reliably from a clear evidence base.

The findings of this study contribute to the few studies to date that have explored HCW interactions with patients around COVID-19 vaccines. Specifically, there remains a dearth of data on HCW interactions with patients on the issue of COVID-19 vaccines in the South African and broader African context. A strength of the study is that it employed mixed methods, using both qualitative and quantitative approaches to fully capture the form and content of HCW engagement with patients in South Africa.

Use of an unrestricted self-administered survey was a limitation as the survey was dependent on HCW access to selected online databases. This limitation may have introduced selection bias and limited generalisability. Further, geographical distribution of the study participants was not factored into the survey and was therefore not known, and individual interpretation of the term 'patients' may have influenced how HCWs rated their willingness to promote vaccines.

Conclusions

This study indicates that personal vaccine behaviour of HCWs largely mirrored their willingness to promote vaccination to patients. This is positive given the high proportion of HCWs who were vaccinated and who were subsequently willing to assume the role of vaccine advocates. A large number of HCWs stated that they did not have sufficient information on the available vaccines, contributing to the majority who felt that they needed reliable guidance on how to educate patients. The data indicate that these factors contribute to HCW willingness to promote vaccines to patients. Although a minority, the study revealed that some unvaccinated HCWs were taking and recommending alternative therapies, possibly a consequence of a lack of clear, comprehensible, evidence-based and reliable sources of vaccine information. Therefore, if HCWs are to become the fulcrum of national vaccination programmes, they will need to be provided with clear, contextual, up-to-date evidence-based information, to enhance both workflow and patient communication.

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Conflicts of interests

Douglas Wassenaar is the Chair of the University of KwaZulu-Natal Biomedical Research Ethics Committee

(BREC) that approved this study. The conflict of interest was declared to BREC and this application was managed independently by a BREC Deputy-Chair. The other authors declare no conflict of interest.

Abbreviations

Abbreviation	Description
BREC	Biomedical Research Ethics Committee
CI	confidence interval
COVID-19	coronavirus disease 2019
DOH	Department of Health
FPD	Foundation for Professional Development
HCW	healthcare worker
IDI	in-depth interview
OR	odds ratio
PrEP	pre-exposure prophylaxis
SARS	severe acute respiratory syndrome
TCM	Traditional Chinese Medicine
WHO	World Health Organization

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Good Practice

‘Following the science’: the role of an independent advisory structure in the COVID-19 pandemic response and beyond

Andrew Gray[1], Jacqui Miot[2], Mathildah Mokgatle[3], Helen Rees[4]

[1] Pharmaceutical Sciences, University of KwaZulu-Natal,
[2] Health Economics and Epidemiology Research Office, University of the Witwatersrand, Johannesburg,
[3] School of Public Health, Sefako Makgatho Health Sciences University,
[4] Wits RHI University of the Witwatersrand, Johannesburg

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Background

As the COVID-19 pandemic spread in 2020, many governments across the globe put structures in place to access rapid independent scientific evidence. The South African Minister of Health established an advisory committee in March 2020 to provide high-level strategic advice. This technical guidance, developed as topic-specific ‘advisories’, was expected to be context-specific and based on the best available evidence, locally and internationally. The authors developing the advisories could draw on systems-wide, multidisciplinary experience.

Approach

This chapter provides a reflective experience of the process of preparing advisories, the development of rapid evidence syntheses and their use in decision-making, the outputs and the lessons learned from that process, and the structural and operational changes over the course of the pandemic.
As South Africa has moved out of the acute phase of the pandemic, the lessons learned must be embraced and best practices adopted to inform future pandemic preparedness. Advisories needed to use the best available evidence rather than wait for the best possible evidence. Some advisories were therefore revised multiple times, as new evidence emerged. Advisories were submitted to the Minister of Health for consideration prior to public release. However, in some cases, delays in such release led to confusion as to the scientific basis of policy decisions. The confidentiality of the committee debates also needed to be balanced against the need for engagement with the public. In order to promote accountability and build public trust, from March 2022 all advisories were published on a dedicated website within seven days of receipt by the Minister. The public were thus informed of the scientific basis of the advice, providing important context for subsequent executive decisions. Consistent feedback to the committee from decision-makers was also important, as their advice was only one of many inputs considered by a complex array of government bodies, across different departments.

Conclusions

The world faces a significant risk of further pandemics and other public health emergencies and is engaged in high-level negotiations on strengthening global capacity to respond. Whether that involves a global pandemic accord, strengthened International Health Regulations, or a strengthened global approach to medical countermeasures, rapid, credible, independent and country-specific scientific advice will remain essential. The lessons learned during COVID-19 should not be lost.

Submitted on behalf of the Ministerial Advisory Committee on COVID-19.

Background

Although all governments and multilateral health organisations, such as the World Health Organization (WHO), had already identified the threat posed by novel zoonotic diseases and had previously faced pandemics such as the 2009 influenza outbreak, the novel coronavirus that spread globally in early 2020 posed fresh challenges. The virus, quickly named SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), was identified as the cause of the novel COVID-19 disease. The virus was spread via the respiratory route, although early on there was considerable uncertainty about the role of droplets versus aerosols. How best to respond at a population level was therefore deeply contested from the outset. Greenhalgh et al. documented how the competing narratives ("about problems, how they arose, and how they will be resolved") shaped advice and policy-making on COVID-19 in the United Kingdom.[1] Such decisions are intrinsically ethical in nature, and not merely scientific.[2]

In South Africa, the national government reacted swiftly to the first imported cases and the evidence of local spread, invoking the Disaster Management Act (57 of 2002)[3] on 16 March 2020.[4] The Minister of Co-operative Governance and Traditional Affairs (COGTA) cited the "magnitude and severity of the COVID-19 outbreak", the fact that it had been declared a global pandemic by the WHO, and that it had been "classified as a national disaster by the Head of the National Disaster Management Centre", as justification for that step. The declaration was followed by a plethora of regulations, issued in terms of the Disaster Management Act, over the next two weeks. The regulations imposing significant restrictions on the populace were issued on 18 March 2020.[5] These regulations authorised the Minister of Health to "issue directions to address, prevent and combat the spread of COVID-19 in any area of the Republic of South Africa". The national 'lockdown' was instituted on 26 March 2020.

Directives (also referred to as directions) were also issued by various Ministers, all relying on the enabling provisions of the same Act. To cite just one example, a directive issued on 26 March 2020 by the Minister of Transport covered "improved access and hygiene, disinfection control on all public transport facilities".[6] The directive required the provision of "adequate sanitizers or other hygiene dispensers for washing of hands and disinfection equipment for users of public transport services". All vehicles were to be "sanitized before picking up and after dropping off passengers", all drivers were to wear masks, and all minibuses had to reduce their seating capacity by 50%. These directives, issued within 10 days of the declaration of the state of disaster, were based on the understanding of risk factors for COVID-19, and assumptions about droplet transmission and therefore the role of fomites. In a time of considerable uncertainty, the South African government needed to take rational and justifiable policy decisions backed by the available scientific evidence, which in the earlier stages of the pandemic was sometimes scanty. How and where to ensure access to the best scientific advice was never simple.

As governments across the globe responded to the rapidly developing COVID-19 pandemic in 2020, many were at pains to portray their decisions as being backed by scientific evidence, and therefore as being both rational and justifiable. In some countries, that advice was personified by a leading scientific voice, such as Dr Anthony Fauci in the USA. Heads of State would make policy announcements flanked by scientific and medical advisors. Despite such implied backing, an assessment of the policy-making process in four European countries (Germany, Italy, the Netherlands and the UK) by Hodges et al. noted "a growing gap between scientific advice and political decisions".[7] The authors of that paper argued that "advisors followed not only their particular logics as scientists, but were also receptive to the broader politically-centred logics of their clients, such that the boundaries between scientific advice and political decision-making became blurred". In particular, they noted that "[e]xperts appointed by the Italian Government rarely released opinions conflicting with government decisions". Greenhalgh et al. have argued that "UK policy makers seemed to favour narratives from a narrow group of scientific advisers".[1] As a result, it has been suggested that transparency and autonomy are key to ensuring that "governments do not simply seek advice that aligns with what they want to hear".

Approach

This chapter reflects on the process of preparing advisories, the development of rapid evidence syntheses and their use in decision-making, the outputs and the lessons learned from that process, and the structural and operational changes over the course of the pandemic. The focus is exclusively on the Ministerial Advisory Committee (MAC) on COVID-19, which was established in March 2020 and that evolved both as a structure and in its outputs over the period to date. The chapter was authored by a writing group made up of members of the MAC and charged with this responsibility by the MAC on COVID-19. The writing group relied on reflection and discussion of available documentation and processes. The text of the chapter was circulated to all current MAC members for comment. Hence this chapter represents the perspective of the current MAC on COVID-19. In anticipation of a close-out report, the MAC on COVID-19 developed a reflection document, which informed this perspective. Periodic update reports were also available for reference.

Discussion

The processes followed, the changes made over time, and the lessons learned on reflection are outlined below.

Multiple structures

The Disaster Management Act established a number of structures intended to enable co-ordinated, government-wide responses to a declared disaster. The Intergovernmental Committee on Disaster Management, as established by the Act, included the Minister of COGTA, Members of the Executive Councils (MECs) from the provinces, and members of municipal councils, selected by the South African Local Government Association (SALGA). The National Disaster Management Centre, located within the responsible national department, is supposed to be backed by a National Disaster Management Advisory Forum, drawing on a wide range of constituencies, including "medical, paramedical and hospital organisations". However, it quickly became apparent that a different co-ordinating structure had been created, termed the National Coronavirus Command Council (NCCC), supported by the National Joint Operational and Intelligence Structure (NatJoints).[8] The NCCC was chaired by the President and included selected members of the Cabinet (including the Minister of Health). The President's Coordinating Council (PCC) was also engaged at times; this Council comprised of the President, premiers of the provinces, executive mayors of metropolitan municipalities and the leadership of SALGA. The advisory structures established by the Minister of Health need to be viewed against this background of multiple overlapping structures. Crucially, management of the pandemic response was not primarily in the hands of the Ministry of Health, but in the hands of the Minister of COGTA.

The Ministerial Advisory Committee on COVID-19 – shifting compositions

Section 91 of the National Health Act (61 of 2003) enables the Minister of Health to appoint advisory and technical committees, after consultation with the National Health Council.[9] By notice in the Government Gazette, the Minister may designate the "composition, functions and working procedure" for such committees.

Accordingly, the Minister of Health established a Ministerial Advisory Committee (MAC) on COVID-19 in March 2020. This initial MAC was composed of 51 members, but operated through four sub-committees, focusing on clinical care, public health, laboratory investigation, and research. The MAC included members with expertise in a wide range of areas, including infectious diseases, intensive care, paediatrics, laboratory services and diagnostics, vaccines and therapeutics, medicines regulation, disease modelling, implementation science, social science and research. The initial MAC was chaired by Professor Salim Abdool Karim. In October 2020, the MAC was reduced to 21 members, and Professor Marian Jacobs was appointed as a co-chair. In March 2021, following the resignation of Professor Abdool Karim and five other members, Professor Koleka Mlisana was appointed as a co-chair. Although five additional members were appointed, two further resignations brought the total number of members to 19. No payment was offered to any MAC members.

The focus of this chapter is on the MAC on COVID-19 from inception, but more particularly, the lessons learned and changes made after March 2021. After the establishment of the MAC on COVID-19, three additional MACs were also established: the MAC on COVID-19 vaccines (VMAC), the MAC on Social and Behavioural Change (both established in August 2020), and a MAC on COVID-19 Therapeutics (established in July 2021, replacing a sub-committee of the National Essential Medicines List Committee (NEMLC)). The MAC on COVID-19, while enjoying a wide remit, was not arranged hierarchically in relation to the other MACs. Some co-ordination was, however, enabled through cross-membership, and through engagement at the level of the National Department of Health (NDoH) Incident Management Team (IMT), which met on a weekly basis. In a limited number of instances, cross-MAC advisories were developed, issued jointly by two structures. Examples included the advisory on addressing vaccine hesitancy and the advisory on vaccination of children aged 5 to 11 years.[10,11] The processes followed by the NEML MAC on COVID-19 Therapeutics have been reported elsewhere.[12,13]

Challenges faced by the MAC on COVID-19

As with any structure that is newly formed to respond to an emergency, perfect planning is not always possible, and for this reason lessons must be learned for future pandemic responses. The MAC on COVID-19 was no exception, and there were several challenges along the way. Soon after the establishment of the MAC on COVID-19, some MAC members were interviewed by a national news outlet where they shared their varying views on the effectiveness or otherwise of the lockdown to date. Although some were of the opinion that MAC members should not be voicing views critical of government policy, this had to be balanced against the right of MAC members, many of whom were academics, to express their personal views. Several MAC members resigned as a result of this controversy, which caused some discomfort among the newly constituted MAC membership. In August 2021 the Minister of Health, Dr Mkhize, was asked to stand down by the President. He was succeeded by Dr Phaahla. As a medical practitioner and previous Deputy Minister of Health, Dr Phaahla was able to ensure continuity and to request advice from the MAC on COVID-19 as before. It is important that any emergency structures should be constituted in a way that is resilient should unexpected external political changes occur.

The terms of reference of the MAC on COVID-19

The terms of reference of the MAC on COVID-19 changed over time to accommodate different ways of working and to reflect the changes in composition and the creation of additional MACs. Box 1 shows the remit of the MAC from June 2021, as stated in its terms of reference.[14] Critically,

Box 1. Remit of the MAC on COVID-19, South Africa, June 2021[14]

Purpose

The Ministerial Advisory Committee (MAC) on COVID-19, is a non-statutory, advisory Committee appointed by the Minister of Health to provide high level strategic advice to the National Department of Health (NDoH) (including Minister of Health, Director-General: Health and the NDoH Incident Management Team) on the management of the COVID-19 outbreak in South Africa. The MAC on COVID-19 provides advice, but is not responsible for the delivery or coordination of services related to the COVID-19 response.

Scope

The MAC on COVID-19 reviews material and evidence available locally and internationally, as well as that which is provided by technical working groups, supporting the National Department of Health (NDoH) on its COVID-19 response. Members of the MAC on COVID-19 shall be called upon to provide technical guidance in the form of Advisories when requested by the Minister/Director-General and/or NDoH. In addition, members of the MAC on COVID-19 can suggest advisory topics/ questions, which will be reviewed by Co-Chairs to determine whether the topic/question is appropriate and warranted for the committee to take up. The decision on whether a topic/question should be addressed may be raised by MAC on COVID-19 members, and taken forward by the co-chairs.

The MAC on COVID-19 provides the NDoH recommendations on interventions that should be considered to respond to the COVID-19 pandemic. This may include, but is not limited to, epidemiology and surveillance; testing, diagnostics and laboratory matters; socio-behavioural science; clinical service and practice; and research.

while the MAC was expected to provide advice on the request of the Minister, Director-General of Health or the NDoH, it was also enabled to initiate advisories without such a request.

The terms of reference of the MAC on COVID-19 emphasised that "Members of the MAC are participants in their individual capacity and do not represent any constituency, organization or sector". The rights of MAC members were also protected, as follows: "MAC on Covid-19 members are not prohibited from media communication in their personal capacity. However, under no circumstances may a committee member, other than the Co-Chairpersons of the MAC on Covid-19, officially represent the views and decisions of MAC on Covid-19 in the media or anywhere else in the public domain. Committee members approached by the media or anyone else for information on the MAC, its views and its advisories should direct these requests to the Secretariat." Further, it was stated that "While Committee members are free to voice their personal views on any matter in public or in the media, they are requested to preferably refrain from commenting on matters under active deliberation by the committee. Once the deliberations on a matter have been completed and an Advisory submitted, then committee members should feel free to voice their personal views regardless of whether these personal views concur or differ with the advice provided by the MAC on Covid-19 in its Advisories." The terms of reference also stated that "MAC on Covid-19 advisories and associated documents will be published at the discretion of the Minister of Health on the following website: https://sacoronavirus.co.za/category/mac-advisories/", although no timeline for publication was specified.

The process used to develop an advisory

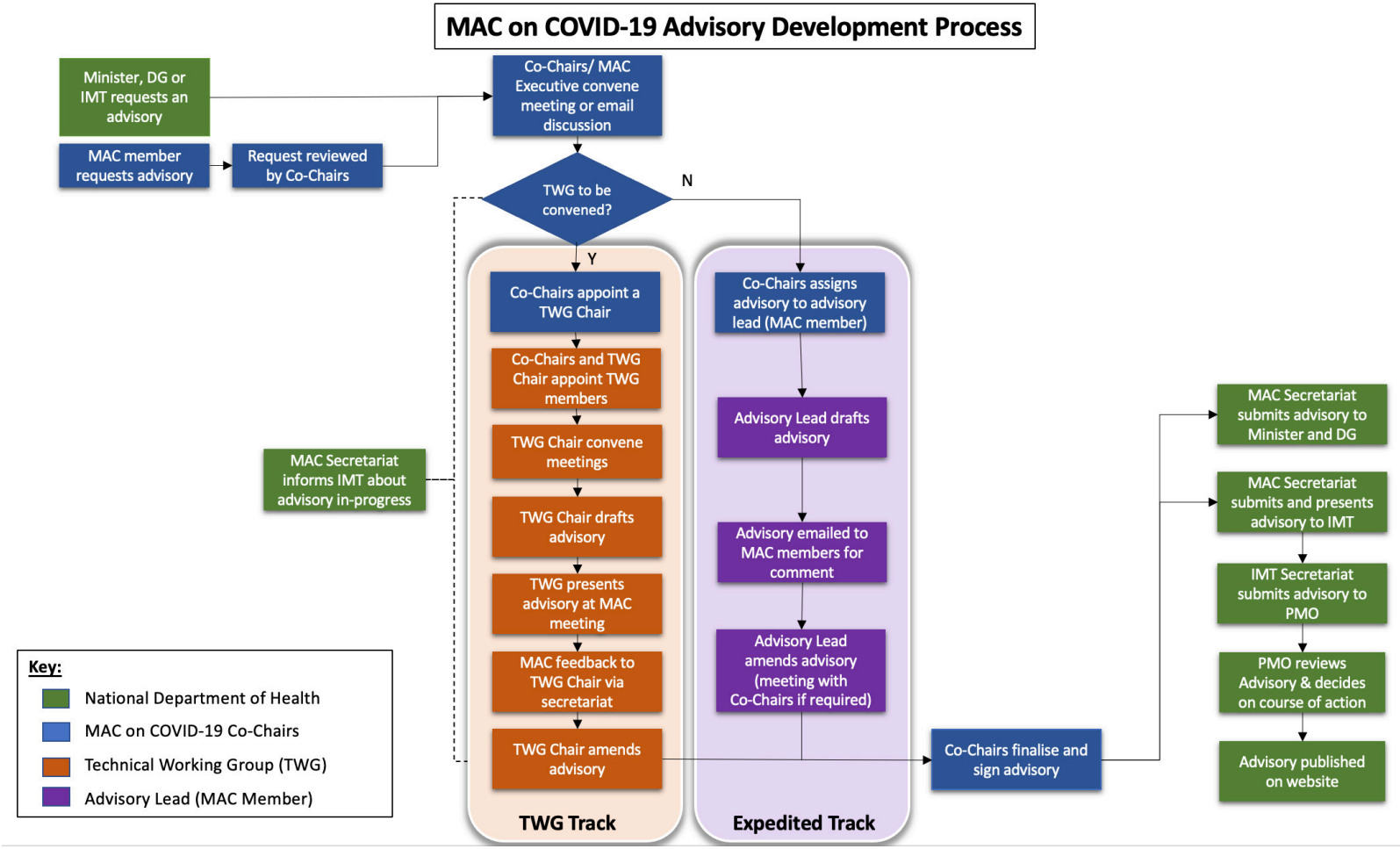
By accessing the best available scientific evidence, and then bringing the collective experience of its members to bear, the MAC on COVID-19 aimed to offer clear and actionable advice to the Minister of Health. Figure 1 shows the process of developing an advisory as it eventually operated in the final iteration of the MAC on COVID-19.

Whether in response to a request or on their own initiative, the MAC was expected to provide technical guidance that was context-specific and based on the best available evidence, locally and internationally, drawing on the systems-wide, multidisciplinary experience of its members. In addition, the MAC was able to constitute technical working groups (TWGs) by including members from outside of the MAC. An expedited track was also enabled, drawing on selected MAC members, with an opportunity for rapid review by the full MAC prior to submission of an advisory that required a short deadline.

Membership of the MAC also enabled linkages with critical scientific and regulatory structures, including the National Institute of Communicable Diseases (NICD), the Burden of Disease Research Unit at the South African Medical Research Council (SAMRC), the South African COVID-19 Modelling Consortium (SACMC), the Network for Genomic Surveillance in South Africa (NGS-SA), the South African Health Products Regulatory Authority (SAHPRA), and the WHO. However, where members of the MAC on COVID-19 also served on other MACs, on regulatory advisory and governance bodies, or on WHO structures, these involvements also had to be managed as potential conflicts of interest, with due regard to confidentiality requirements imposed by such bodies.

Input documents and data that were reviewed regularly included reports from the IMT, the NICD (including hospital admission and death data from daily hospital

Figure 1. The process of developing a MAC on COVID-19 advisory (June 2021)[14]



surveillance (DATCOV)), SACMC projections, NGS-SA reports, and SAMRC excess death estimates. A broader range of sources could be cited in support of advisories, as gathered and assessed by the TWGs and MAC members.

The least well-described portion of the process in this flow chart is that dealing with the actions taken by the Project Management Office (PMO) in the NDoH, in response to the advice received. In addition, the role of the Minister, as the ultimate recipient of the advice, is not stated. As indicated above, the range of actors that could possibly be involved in taking such decisions was extensive, and involved both other government departments and executive structures, such as the NCCC, Natjoints and the PCC. The timing of such decision-making could also be highly variable, depending on the complexity of the issue and the number of potential actors involved. The process by which a MAC advisory was used to guide government decision making in departments other than in health remains unclear. Advisories that touched on aspects primarily managed by other government departments, such as the Department of Basic Education and the newly-created Border Management Authority, were more difficult to link. One of the last advisories issued by the MAC, regarding the appropriate response to the Omicron outbreak in China, is perhaps most obviously linked to the action subsequently taken.[15] The MAC's recommendation not to impose restrictions on travellers from China was accepted.

Figure 1 also does not do justice to the critical role of the secretariat. Secretariat functions for all of the MACs were provided by pharmaceutical policy specialists from the Affordable Medicines Directorate at the NDoH, with support from external donor-funded technical advisors already in place within that unit. Their inputs were crucial to the successful development of advisory documents, the functioning of TWGs and the MAC, and the co-ordination with the IMT and PMO. With the exception of one weekend face-to-face workshop in February 2022, all TWG and MAC deliberations were held virtually, and decisions were taken in virtual meetings or via email.

The last step depicted in Figure 1 refers to publication of the advisory on the website. On recommendation from the MAC on COVID-19, the Director-General agreed in March 2022 to publish all advisories within seven days from receipt by the Minister of Health. The MAC believed that the timely availability and accessibility of the submitted advisories to the general public potentially enhanced public trust. In this way, the public could be informed of the scientific opinion expressed, providing important context for the political decisions that were subsequently taken, whether or not those aligned with the advisory's recommendations. As Jarman et al. put it: "Advising is not decision making. Good advice systems preserve the autonomy and credibility of the advisers and scientists by separating their advice from actual decisions."[16] Although the MAC is not directly listed as a respondent, the issue of transparency is central to the court challenge brought by Sakeliga, which questioned the process for declaring a state of disaster.[17] The experience of the MAC on COVID-19 in this regard should inform future best practice on information sharing with the public. Nonetheless, it should be anticipated that in an emergency some decisions will not go according to plan and will be open to challenge. Transparency in responding to problems and criticisms is critical to retaining public trust.

Advisory outputs

From its inception in March 2020 to July 2022, the MAC on COVID-19 produced 154 advisory documents. Initially, some were in the form of memoranda or responses to a particular narrow request. The first memorandum dealt with the wearing of cloth masks by the public. Early memoranda and advisories also covered direct clinical care questions, such as the options for respiratory support and the evidence for and against specific medicines, such as dexamethasone and ivermectin. Advisories also addressed such contentious issues as the use of disinfection tunnels, reliance on serological testing, self-testing using rapid antigen tests, school attendance, and controls at points of entry into the Republic. Not unexpectedly, it is difficult to track each piece of advice to a final decision, let alone to its effective implementation and the outcomes that resulted. In addition, some initiatives were decided upon at a political level without MAC consultation, such as the prohibition on selling tobacco products.

Only 113 of the 154 advisories provided by the MAC on COVID-19 were eventually published on the dedicated website. A separate website was created for the MAC on COVID-19 Vaccines (https://sacoronavirus.co.za/category/mac-advisories-vaccinations/) but not all earlier advisories were shared on this platform. The NEML MAC on COVID-19 Therapeutics also placed their rapid reviews in the public domain (http://www.health.gov.za/covid-19-rapid-reviews/). Members of this MAC also evaluated controversial subjects, such as the role of ivermectin in preventing and treating COVID-19.[18] However, no publicly accessible repository of advisories from the MAC on Social Behaviour Change was developed.

The MAC's role in critiquing the appropriateness of South Africa's legislation

In addition to public health and clinical issues, the MAC also produced an autonomous advisory that identified key legislative tasks requiring attention.[19] In this advisory, the MAC noted that South Africa's International Health Regulation Act (28 of 1974) predated the current global legislation called the International Health Regulations (2005).[20] This global legislation allows the WHO to make temporary recommendations that are binding on member states in the event of a global public health emergency. The South African 1974 Act is not well aligned with this global legislation, and has limited Regulations issued most recently in 2003.[21] A draft Bill to address this

deficiency was published in 2013, but never tabled.[22] The MAC also noted the lack of progress in implementing the National Public Health Institute of South Africa (NAPHISA) Act (1 of 2020).[23] Lastly, the MAC expressed its misgivings regarding the proposed regulations on notifiable medical conditions, issued for comment in terms of the National Health Act.[24] The comment period on these regulations has been extended, but revised versions have yet to be published, either for further comment or in final form.

Global experiences

The Lancet COVID-19 Commission published an extensive report and recommendations in October 2022.[25] At a national level, they characterised the strengthened health systems elements that were needed as follows: "strong relationships with local communities and community organisations; surveillance and reporting systems; robust medical supply chains; health-promoting building design and operation strategies; investments in research in behavioural and social sciences to develop and implement more effective interventions; promotion of prosocial behaviours; strong health education for health promotion, disease prevention, and emergency preparedness; effective health communication strategies; active efforts to address public health disinformation on social media; and continuously updated evidence syntheses". The last of these speaks directly to the need to institutionalise the capacity to continuously update the evidence to inform public policy. Other demands speak to the need for improved transparency and proactive communication to improve public trust and counter disinformation.

In some countries, there have been urgent calls for the establishment of official inquiries into the manner in which the pandemic was managed in their national settings. For example, the questions raised about the way in which UK scientific advice was elicited and used include: "why did it take so long to increase the transparency of SAGE and other government scientific advice bodies; where, if anywhere, did government get advice about trade-offs and broader policy implications of public health measures; why do UK science advisers have so little autonomy from the government?"[15] Hodges et al. characterise the context in which advice was provided as one of "conflicting values under substantial uncertainty about options for actions".[7] The question that has to be asked is how that uncertainty can be reduced, but also how the provision of high-quality, independent advice can best be institutionalised. The latter is not as contradictory as it may appear at first glance. Hodges et al. further argue that, in the four countries they surveyed, political responses to scientific advice varied, as the pandemic progressed: "In early stages, immense uncertainties about the effectiveness of potential interventions for fighting the outbreak and spread of the virus induced leading politicians to rely heavily on medical expertise for justifying severe constraints on the lives of citizens. However, later in the pandemic, gaps emerged between scientific advice emphasising caution, while politicians increasingly became inclined to promote a relaxation of restrictions to serve economic and social values. At this stage, the logics of scientists, who attach value to evidence and prudence, diverge from the logics of politicians, who seek to comfort their voters with good news."[7]

Lessons learned

As South Africa has moved out of the acute phase of the pandemic, the lessons learned must be embraced and best practices adopted to inform future pandemic preparedness. The following key lessons were identified:

1. Advisories needed to use the best available evidence rather than wait for the best possible evidence.

Some advisories were revised multiple times, as new evidence emerged. In particular, there was very little local evidence available at the start of the pandemic and new data were being produced daily, often with conflicting results. Advisories were also produced at different times for different reasons. For example, an urgent question regarding the response to an upsurge in cases and whether the alert level needed to be adjusted had to be addressed quickly with the evidence at hand. In some instances, advisories were required within 24 hours or less. However, a more fundamental health systems question, such as on the integration of COVID-19 into routine health systems or the options to address vaccine hesitancy, could benefit from a more extended and extensive review of the available evidence.

2. Transparency was key and should be integral to any future emergency responses.

Advisories were submitted to the Minister for consideration prior to public release. However, in some cases, delays in such release led to confusion as to the scientific basis of executive decisions. The confidentiality of committee debates also needed to be balanced against the need for engagement with the public. This was reflected against a background of extensive public discourse as to the merits and consequences of public health interventions, a discourse that continues to this day. As described above, from March 2022 all advisories were published on a publicly available dedicated website within seven days of receipt by the Minister. The NEML MAC on COVID-19 Therapeutics also set an important precedent with their proactive publication of rapid reviews, which then informed the guidelines developed by the NICD. These technical inputs were not submitted to the Minister of Health or the NDoH prior to being incorporated in guidelines. The chairperson of the NEML MAC on COVID-19 Therapeutics did, however, report to the IMT on their work.

Although the advisories provided by the MAC on COVID-19 were eventually placed in the public domain in a timely manner, there was no explicit public participation step in the development process. Although the TWGs could draw on additional members beyond the MAC itself, these were usually academics or technocrats, not representatives of civil society or the general population. How best to accommodate the public voice in

a time-sensitive emergency response remains an open question.

3. Transparency and feedback regarding the use of advisories by government is an important step in the process.

Some of the advisories provided by the MAC on COVID-19 could be directly linked to decisions and actions, such as the revision of topic-specific regulations issued in terms of the Disaster Management Act. Others could not as easily be linked, or were apparently not accepted and actioned. Consistent feedback to the MAC was also important, as their advice was only one of many inputs considered by a complex array of government bodies, across different departments. The quality and timeliness of feedback received from the Minister and NDoH varied considerably over time, and was often deficient or lacking entirely. However, the MAC was also assured by its political principals that its advice was valued. The extent to which purely political considerations contradicted scientific advice is difficult to ascertain, but some issues remained highly contested, perhaps reflecting the range of actors involved. How best to manage cross-border travel was one such issue.

Conclusions and recommendations

The world faces the risk of further pandemics and other public health emergencies and is engaged in high-level negotiations on strengthening global capacity to respond. Three global activities to address pandemic threats are being addressed simultaneously. The first is the proposal for a new Pandemic Accord which is being developed by a WHO-appointed Intergovernmental Negotiating Body tasked with drafting and negotiating a WHO convention, agreement, or other international instrument on pandemic prevention, preparedness and response (https://apps.who.int/gb/inb/). Two other relevant global initiatives that will frame future global pandemic responses include the review and strengthening of the International Health Regulations (2005), and a new agreement on how medical countermeasures should be developed and accessed in future.

This reflection on the role of an advisory structure in the COVID-19 pandemic response has underscored the value of independent and credible scientific advice. The availability of such advice will remain essential. The means to provide independent and credible scientific advice needs to be institutionalised, so that it is ready for the next public health emergency. One option would be to enable a mechanism for rapid mobilisation of an advisory committee through appropriate secondary legislation. As done at global level, a panel of experts could be identified, ready to be called upon rapidly in an emergency, while retaining flexibility to recruit relevant expertise dependent on the context of the crisis.

Abbreviations

Abbreviation	Description
COGTA	Co-operative Governance and Traditional Affairs
DATCOV	Daily hospital surveillance
IMT	Incident Management Team
MAC	Ministerial Advisory Committee
MEC	Member of the Executive Council
NAPHISA	National Public Health Institute of South Africa
NatJoints	National Joint Operational and Intelligence Structure
NCCC	National Coronavirus Command Council
NDoH	National Department of Health
NEMLC	National Essential Medicines List Committee
NGS-SA	Network for Genomic Surveillance in South Africa
NICD	National Institute of Communicable Diseases
PCC	President's Coordinating Council
PMO	Project Management Office
SACMC	South African COVID-19 Modelling Consortium
SAGE	Scientific Advisory Group for Emergencies
SAHPRA	South African Health Products Regulatory Authority
SALGA	South African Local Government Association
SAMRC	South African Medical Research Council
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
TWG	Technical working group
UK	United Kingdom
USA	United States of America
VMAC	Ministerial Advisory Committee on COVID-19 vaccines
WHO	World Health Organization

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Research

Health committee participation in South Africa during the COVID-19 pandemic: a shifting picture

Natasha Kannemeyer[1], Christopher J. Colvin[1,2], Hanne Haricharan[1]

[1] School of Public Health, University of Cape Town,
[2] Department of Public Health Sciences, University of Virginia

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Background

Community participation is an important component in disease outbreak management during times of systemic disruption. However, community participation was lacking in South Africa during the COVID-19 pandemic. It is known that participation at community level faces numerous barriers locally and globally, with efforts towards meaningful participation often being inadequate. The spaces (referring to invented, invited and closed spaces for participation) where participation takes place impact the level and quality of participation.

Methods

The aim of this chapter is to explore how participation in health committee spaces was affected during the pandemic, and how the relationship between the state (the Western Cape Department of Health (WCDoH)) and health committees evolved during this period. Health committees are linked to primary care facilities and include community representatives, facility managers, and municipal political representatives (ward councillors), functioning as a bridge between community and health facilities.
This qualitative study was conducted in three phases. In phases one and three, focus group discussions were held with health committees in two economically marginalised areas in Cape Town, South Africa. Phase two involved a three-month observation of committee activities. Both inductive and deductive content analysis were used to analyse the findings. In the deductive analysis, two conceptual frameworks – Arnstein's Ladder of Citizen Participation and Gaventa's notion of invited and invented spaces – were used to interpret the findings.

Results

During the COVID-19 pandemic, health committees responded to community needs and carried out tasks that the WCDoH failed to do. The Department recognised the limits of its pandemic response and the need for collaboration with community actors. This recognition led to an opening up of previously closed spaces to include health committees in more meaningful forms of participation. While there was an opening up, barriers in these spaces hindered participation. Health committees accordingly expanded their roles and empowered members to include themselves in WCDoH spaces and invent their own spaces for participation.

Conclusions

The COVID-19 pandemic illustrated the critical role health committees can play in disease outbreak management. The interplay between invited and invented spaces is highlighted as an important consideration for meaningful participation. Health committees should be actively involved in decision making and implementation processes for participation in invited spaces to be meaningful.

Introduction

Community participation is a key factor in effective public health practice. Collaboration, partnership, and empowerment between community members, health professionals, government and other key stakeholders are at the core of meaningful participation.[1] Previous epidemics (e.g. the Ebola outbreak of 2014-2015 and the HIV and AIDS epidemic in South Africa) highlight the value of community participation as a critical component in effective management of these crises.[2-4]

Degrees and forms of participation can be understood using two conceptual frameworks: Arnstein's Citizen Ladder of Participation,[5] where degrees of decision-making and participation increase with each rung of the ladder, and Gaventa's[6,7] framework of closed, invited, and invented spaces. Participation often occurs at the lower rungs of Arnstein's ladder where there is limited participation in decision-making, either non-participation (manipulation and therapy) and/or tokenism (informing, consulting, placation).[5] Power dynamics impede participation and restrict it to the lower rungs of Arnstein's ladder.[5,8]

The spaces (referring to invented, invited and closed spaces for participation) where participation takes place are important considerations as people bring their histories and past experiences into these spaces. Participatory spaces are thus never neutral.[6,7] State decision-making processes tend to take place in closed spaces, 'behind closed doors' with no place for community engagement.[6,7] Invited spaces, on the other hand, are meant to open up participation, yet these are often also limited and restricted.[6] Here, communities are invited into state-created and state-managed spaces to participate in some way. Invented/claimed spaces are organic spaces created by communities where more meaningful participation might take place.[6] Invented spaces often occur as a result of the restrictions of invited spaces, and as an opposition response towards those who hold the most power (similar to the concept of sites of resistance by bell hooks).[6,9,10] Sites of resistance arise from discrimination and marginalisation and the desire to uplift and empower communities. Power dynamics have a significant impact on how participation unfolds in different types of spaces.[11,12]

In South Africa, the National Health Act (2003, section 42)[13] stipulates the establishment of health committees (HCs) as part of primary health care facilities. However, the form and functioning of HCs is governed by provincial legislation.[13] In the Western Cape, the Western Cape Health Facility Boards and Committees Act, 2016[14] outlines the structure, duties and powers of HCs, with members including community representatives, a health facility manager, and a ward councillor (municipal representative).[14,15] It is unknown how many HCs have been established according to the National Health Act and it is important to note that some HCs are established independently.

This chapter focuses on the experiences of community representatives in HCs in the Western Cape. The envisioned role of HCs is as a bridge between communities and the health system so as to facilitate communication between service users and health facilities. However, HCs often feel unrecognised, pushed aside, under-resourced and excluded from broader health discussions.[16] The pandemic caused systemic disruptions to the health system and it is important to consider how participation may have changed as the pandemic unfolded.

The aim of this chapter is to explore how participation in HC spaces was affected during the COVID-19 pandemic and how the relationship between the Western Cape Department of Health (WCDoH), a key organ of the state, and HCs evolved during this period. The chapter explores what happened to the invited spaces of HCs and what these insights might teach us about community participation during a crisis and beyond.

Methods

This qualitative study explored shifting participation between HCs and the WCDoH in two economically marginalised areas in Cape Town, South Africa, during the COVID-19 pandemic.[17,18] Both communities were overcrowded, with a quadruple burden of disease.[17,18] Based on the research team's prior experience of working with these HCs, it was known that the committees were active in their communities, with supportive relationships with clinic managers.

The study was conducted in three phases. During phases one and three, focus group discussions (FGDs) were held with HCs, conducted by the first author (NK). Twenty-two HC members from Cuttle (21 women and one man) and 10 HC members from Stoneway (three men and seven women), respectively, participated in phase one. Area names used here are pseudonyms.

Due to the fluidity of community engagement work, phase three included 18 and eight participants from Cuttle and Stoneway, respectively. Ages of HC members ranged from 45 to 70 years. Phase one included discussions around the nature of participation prior to the pandemic, while phase three explored how participation had shifted during the pandemic. Phase two involved a three-month observation period of HC activities. Observations were recorded in a notebook, integrated, and triangulated across the datasets during analysis.

Ethics approval was obtained from the University of Cape Town's Faculty of Health Sciences Human Research Ethics Council (HREC 195/2021). The data were transcribed verbatim and analysed thematically.[19,20]

Both inductive and deductive content analysis were used to analyse the data. In the deductive analysis, two conceptual frameworks – Arnstein's Citizen Ladder of Participation and Gaventa's notion of invited and invented spaces – were used to interpret the findings. Different stages from Braun and Clarke's thematic analysis were followed.[19] Findings reported here are from the FGDs and observations.

Key findings

Pre-pandemic collaboration between HCs and the WCDoH was limited. HC roles expanded during the pandemic and members responded to community needs and carried out tasks to assist with infection control. The pandemic saw an opening up of previously closed WCDoH spaces. The two themes below describe how invited and invented spaces influenced participation.

'Nobody will hold us back': active HCs and expanding roles

This theme was used to explore the expanding activities and roles of HCs during the COVID-19 pandemic in South Africa. To assist with infection management and control, HCs took it upon themselves and enforced infection-prevention measures – social distancing, hand sanitising, mask wearing – while people queued outside health clinics, waiting to be seen by health providers. These initiatives stemmed from HC recognition of the need to support health systems and protect communities. HC members mentioned that they were doing 'so many things' (to manage the spread of infections and meet community needs), 'too many to remember'.

> *So, there is a lot that health committees are doing but they [the Department] don't see it. We are doing that voluntarily. We don't get money, but it's in us to help our society, you know.* (Cuttle health committee [CHC] member)

The expanded roles and activities of HCs enabled them to insert themselves into WCDoH invited spaces. Realising the value of their [HC] work, meant that members were able to approach the WCDoH and request inclusion in the pandemic response.

> *No authority came to us as health committee members to say "how can we do X, Y and Z … this is our plan for the people on the ground, can you implement it in the community?" The pressure came from us in order for the sub-district, health management to pressurise [the Department] and say, "when are you going to get the health committees involved in the whole story?"* (CHC member)

HCs empowered themselves by taking ownership and creating and expanding their roles, and by putting pressure on the WCDoH to be included in the pandemic response.

Another instance of HC roles and activities broadening relates to the COVID-19 vaccine rollout. HCs stepped in to assist with vaccine acceptability and uptake among community members. HC members spoke to their communities about their personal vaccine experiences through door-to-door visits to try and reduce fears. HCs assisted with registering people for the vaccine. They spoke about helping people navigate the online government portal, particularly the elderly, sometimes using their own mobile data or airtime. These were new roles that HC members created for themselves during the pandemic.

> *Even when they [the Department] started with numbers of people that needed to be vaccinated, we were the ones who went all out. We started registering the community. Because they [the Department] didn't even know how to go to the grassroots level to educate people about doing the online registration the time that this COVID-thing started* (Stoneway health committee [SHC] member)

As HC members lived in and were part of their communities, they felt a deep connection to their people, and because of this connection, they wanted to help reduce the impact of COVID-19. This connection seems to have been a driving factor in their expanding roles during the pandemic.

> *Ja [yes], what is the slogan that we made in the struggle? 'There is nothing for us, without us.' They [the Department] know that there is a HC, they make plans without us … they come with these plans finished. We want to be part of these plans.* (CHC member)

Rather than sitting back and waiting for the WCDoH to act, HCs empowered themselves through action and their new self-established roles. HCs created new spaces, activities and roles, not entirely without the WCDoH but taking a more active and independent role in supporting a WCDoH approach as well as community needs.

Despite HCs often feeling at the mercy of the WCDoH and lacking in power and authority, the pandemic made them feel a sense of urgency to start acting and doing things differently. Realising their value and feeling empowered by their expanded roles may also have allowed them to put pressure on the WCDoH to increase participation.

> *The vaccine … let me start with the registration: if the community workers, if the community health committee was not there, then they [the Department] cannot do the registration alone, in the facilities. We as SHCs, divided ourselves, then to go to the community, where we register our elderly people. We did make a relationship with them [the Department] by helping them with the numbers.* (SHC member)

The new roles HCs created for themselves intensified their enthusiasm for working together, and these moments of taking on – and succeeding at – new activities confirmed their ability to help.

> *Currently we are playing a role and we are doing something, but in the process, we are promoting the HCs. So now we are on WhatsApp groups, which the sister is on, the area manager is on, which in the past has never happened.* (CHC member)

Participation evolved, with HCs being included on WCDoH WhatsApp groups and recognised for their work. However, engagement between HCs and the WCDoH ultimately remained insufficient. As the pandemic unfolded, participation between HCs and the WCDoH intensified but then closed down again, largely due to conflicting agendas and persistent power dynamics.

> *Okay, to me it was a very good experience for my first time ever [to assist with vaccine rollout]. It was quite exciting to me to operate with the people inside … the doctors. So, they were also excited, the doctors. Because they saw what we were doing. We were working very hard with them, hand in hand … The second time [the second phase of vaccine rollout] it was a bit strange to us because we were all put aside, you see … I had a bad feeling because I was shut down. But, nevertheless, we*

> *health workers, we work very hard and very well and we got a very good communication with each other.* (CHC member)

During the second phase of the vaccine rollout, HCs felt that they were pushed to the side and other organisations were more involved. Among HC workers there were feelings of being used. HCs did express a strong sense of empowerment in relation to the work they did on their own for their communities, but there was still a sense of being disempowered in relation to the WCDoH and the invited space, which was controlled by the WCDoH as an organ of the state.

'Government must work hand in hand with us': moments of participation

This theme reflects the moments of meaningful participation that occurred between the WCDoH and HCs. From the start of the pandemic, the WCDoH was confronted with limits in its ability to address community needs. With vaccine hesitancy high among South Africans, uptake varied from community to community, with socioeconomic, demographic, geographical and sociocultural variables influencing vaccine hesitancy.[21,22]

An example of increased participation between HCs and WCDoH officials was the Vaxi-Taxi initiative – mobile, community vaccination stations. These stations were initiated by the WCDoH but required the assistance of HCs in order to be successful. HCs were needed to identify safe spaces for the mobile vaccine clinics to be positioned and they were relied on to spread the message to communities regarding the date, time and placement of these mobile vaccine sites. Vaxi-Taxis were an effective space for collaboration and participation. Due to all the changes and the urgent need to curb the spread of COVID-19, HCs stepped up to assist despite feeling excluded from decision making and planning.

> *Right, but they still do what they want to without our input. They come and they say "rollout a pop up here and a pop up there", and then they ask us to look for venues, right, but then we as the health committees are good enough to source those venues.* (CHC member)

Participation with HCs increased specifically with the first rollout of the COVID-19 vaccine. They were included in the communication and tasked with assigning safe areas within the community for the mobile vaccine stations. HCs were asked to 'spread the word' about the days, times and location of the Vaxi-Taxis and to assist with infection management on the relevant days. HC members had a role to play and were available to help register people at venues and ensure social distancing and mask wearing. Despite the positive shift toward increased involvement, HCs still felt that there was a long way to go towards full partnership and collaboration with the WCDoH.

Indeed, participation and inclusion levels were different for subsequent vaccine community initiatives. HC members felt that their recognition and participation had shifted back, and that they were pushed aside and no longer needed. HCs felt that they had implemented processes for the smooth running of these community vaccine sites, and once these systems were in place, they had been replaced by other community organisations. There was also little opportunity for HCs to be involved in planning of these mobile vaccine sites, and little opportunity to give feedback, for example on the need for water and food for those waiting to get vaccinated.

Another example of the 'opening up and closing down' of spaces for participation came when HCs became part of monthly WCDoH meetings. Pre-pandemic, HC meetings with the WCDoH were virtually non-existent. During the pandemic, HCs were included in WCDoH planning and decision-making discussions that they had not been privy to before despite their persistent effort to be included. The WCDoH invited HCs to partake in WCDoH Zoom planning meetings. It is likely that the WCDoH's recognition of its limits and the HCs' insistence on being included allowed an opening up of this space.

> *… but it was also health committees that put pressure on the department because every time something was posted to C1 [participant name] she shared it with the rest of us … And from the pressures that were placed on them [the Department] in that last meeting that you were in, then they recognised us. That was a few months back. So then they made this chat [WhatsApp chat] open, then they added us to this chat [WhatsApp group]. Right, but they still do what they want to without our input.* (CHC member)

HC members were optimistic about this inclusion, but they found the opportunities for participation disappointing. There were also several barriers to participation in the Zoom meetings. Barriers commonly included a lack of data and limited access to technological devices capable of supporting Zoom functionality. The lack of data to attend the Zoom meetings was brought to the attention of the WCDoH, but HCs indicated 'that when you ask for resources, they [the WCDoH] say they don't [have]'. It may also be that the WCDoH did not know how to facilitate proper participation. These meetings were also hosted by the WCDoH, which could have influenced the nature of these spaces – HCs might have felt that they had limited ability to fully articulate and participate in these meetings as the agenda was already set. They felt that they were there to listen to COVID-19 updates rather than be heard, share ideas and collaborate around pandemic responses. HCs spoke about the space being a 'waste of time' and found it discouraging.

> *Those Zoom meetings they [the Department] only need our information. So that's why the Zoom meeting was not fruitful for us. Because there was no education from their side. They [the Department] only needed education from our side to keep on moving in their stats. Whenever there is a gap, especially at Stoneway, when their numbers were down, then they need one of our health committees. They say we must assist at Stoneway, because they said Stoneway numbers are very down.* (SHC member)

These Zoom spaces appeared to be a start to the WCDoH engaging with HCs, but there still seemed to be resistance to sharing power properly. There were several inevitable barriers to the Zoom meetings, but the meetings could have been made more participatory if the agenda had been set by both the WCDoH and HCs, with each sharing the floor to facilitate.

Contested spaces

HCs are part of institutionalised, invited spaces acting as a bridge between the health system and the community. However, these invited spaces are often limited for a variety of reasons. The WCDoH Zoom meetings and Vaxi-Taxi interventions were expansions of invited spaces. These spaces represent an opening up of participation, yet the WCDoH still held the actual decision-making power, with HCs being limited to listening and actioning state decisions, instead of collaboration. Rather than being new and collaborative, these spaces were fleeting, opening and closing for particular reasons, mostly due to the WCDoH's fluctuating need for support, as was illustrated with the vaccine rollout where initially HCs were included in the process and then subsequently excluded. HCs saw these invited spaces as restrictive, so they started to create spaces of their own that were more open in comparison. These invented spaces can be viewed as sites of resistance,[9,10] where marginalisation, discrimination, and exclusion in invited spaces result in positive action and creation of spaces for transformation. In these invented HC spaces, the power was held by HC members. Here, links can be drawn between the interplay of power and frameworks of degrees of participation and invented/invited spaces. Invited spaces typically mean less meaningful participation between the organs of the state and HCs – the power is unevenly distributed and heavily weighted on the side of the state.[11]

Invited spaces are important because decisions that have real impact can be made in these spaces, offering opportunities for community input on changes to the health system and its policies. However, when invited spaces limit community influence and participation, community members may explore alternatives.[6,7] Invented spaces can be seen as action-focused,[6] for example where HC members created alternatives to their challenging conditions. Under certain circumstances, invented spaces can also offer more influence than invited spaces. The sections below offer insight into invited spaces, the interaction between invited and invented spaces, and ways to enhance and sustain community participation.

Discussion and recommendations

The importance of community participation is acknowledged globally, yet evidence both locally and globally suggest that it is usually not done well, with HC participation being no exception.[23,24] South Africa has made a commitment to community participation, with HCs being an institutionalised structure for community engagement and a vital vehicle for participation.[25]

HCs often participate in invited spaces, created by organs of the state to partake in discussions and decisions around health services and the health system. The findings from this study highlight the attempts to rethink the position of HCs in relation to health and the community as the WCDoH realised the value of engaging with communities in their response to the pandemic. In opening up these invited spaces, HCs were privy to policy roll-out discussions within the WCDoH and decision-making processes. However, these changes did not seem to be intentional on the part of the WCDoH. Rather, their attitude towards HCs and openings in participation occurred under certain circumstances and in certain contexts. Often when there was a crisis the WCDoH saw the value of engaging with community structures. Even though HCs were consulted, the invited space remained mainly a space controlled by the WCDoH.

HCs realised their power to bring about change through the evolving scope and expansion of their roles and offerings to both the WCDoH and the community during the pandemic. The environmental and structural spaces where participation took place were an important consideration. The particular structural and socio-economic barriers (lack of data, limited access to technological devices to support Zoom) within the invited spaces, for example Zoom meetings, highlight how even when invited spaces are opened to communities for engagement, the physical space impacts degrees of participation. Hence consideration should be given to how to enable participation in invited spaces, for instance through ensuring that there are no barriers.

The COVID-19 pandemic, similar to the Ebola epidemic in West Africa and the HIV and AIDS epidemic in South Africa, illustrated once again the critical role community members can play in disease outbreak management. Invited spaces can stir up the power in individuals to invent their own spaces and realise their own power. Invented spaces and the empowering feelings they produce mean that community members take their growth back into invited spaces to facilitate better participation. In HC-invented spaces, members could share ideas and discuss challenges and solutions. Members felt that they owned and had power within these spaces. Invented spaces were different from invited spaces as the tensions surrounding power were lessened. However, invited and invented spaces do not represent a rigid dichotomy but should rather be viewed as spaces that stimulate each other. These spaces should not be considered as mutually exclusive alternatives but rather as potentially complementary. We need to consider the intersection of these two spaces, making invited spaces more open, innovative and creative, and bringing lessons learned from invented spaces into invited ones.

Despite the restrictions and barriers to participation within invited spaces, these places are still meaningful in their own way. However, participation could be improved through improving access to resources to ensure

that HCs can function and participate in invited spaces. This will impact power dynamics and facilitate participation. Having access to shared resources is the beginning of further opening up partnership and collaboration, and means that there is an understanding of the importance of sharing power, and of respecting, supporting and acknowledging the importance of HCs.

Since spaces of participation are filled with our historical pasts, it is also imperative to consider more neutral spaces where HCs and the WCDoH are on a more even footing.[6,7] This study proposes that there needs to be innovative thinking about these spaces. HC members and the WCDoH should decide on spaces together and should come up with mutually agreeable ways to partner. A start is to ensure that the facility manager is present at HC meetings, and to have the venue of these meetings rotate between community and state venues. These changes require a redistribution of power and HCs can encourage the WCDoH to share neutral or equal spaces through continued activism, participation in WCDoH spaces, and insistence on inclusion. The process of becoming stronger and more confident in invented spaces can assist in leveraging HC positions and roles within the health system to persuade the WCDoH to share power and shift towards more meaningful participation. More broadly, HCs can use their experiences from the invented spaces, and they can perhaps remind health authorities of the positive results of previous collaborative work during COVID-19. Coordination, support and resources are needed to assist HCs to navigate these state-provided spaces. The findings of this study indicate that HCs want to be included in planning, intervention rollout and decision-making processes. To achieve this, there should be collaboration between the WCDoH and HCs. It would be useful for representatives of HCs to have regular meetings with the WCDoH. For this to happen, HCs should be organised at sub-district and district level.

Mechanisms to ensure attendance of municipal representatives and facility managers at HC meetings would help to create trust and partnerships between the WCDoH and HCs. This would be a step toward power redistribution. The COVID-19 pandemic has shown us how HCs are part of the health system, and that this inclusion needs to be institutionalised and recognised by health professionals. Shared workshops facilitated by HC members and health professionals can help bridge the divide between HCs and health professionals. Here, the value of each role and what each has to offer can be recognised and acknowledged.

The COVID-19 crisis saw the WCDoH recognise the value of HCs, but the collaboration was limited. Establishing partnerships and developing trust occurs over time. Improving trust and building on the experiences during the COVID-19 pandemic may help with managing epidemics in the future, as the relationship and ways of working together would be in place already.

As HCs understand their communities and the needs of their communities best, including them in health-intervention planning and idea generation to improve health services and community health is important and will help tailor interventions appropriately for different settings. HC members are trusted by their communities. The information they share is more likely to be trusted than when coming from the WCDoH, and this redistribution of power shifts the norm and empowers HCs. The health-related messages received by the public, and who delivers those messages, both matter. HCs can play a critical role here. Community interventions in the future, whether in response to a crisis or to uplift communities, are likely to be better received by community members when facilitated by the community. The WCDoH can move into a guiding and supporting role, and allow HCs to sustain and inform their own interventions.

Several factors in this study limit the ability to transfer these findings to other settings. The two HCs in this study were quite active compared with other HCs in the province, which may have had a different experience. The roles described in provincial policies also differ significantly from province to province, and these findings may not be transferable to other provinces where the structure and function of HCs are different. Regardless of these limits to transferability, however, these findings suggest some important lessons about how degrees of participation can change due to various circumstances and factors, lessons that may be relevant to HCs in other settings. Future research should consider research with both active and less active HCs to further our understanding of how community participation is shaped by relationships, power and levels of action and influence.

Abbreviations

Abbreviation	Description
CHC	Cuttle health committee
FGD	Focus group discussions
HC	Health committees
SHC	Stoneway health committee
WCDoH	Western Cape Department of Health

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Research

The Western Cape Surgical Recovery Project: experience at Groote Schuur Hospital

Shrikant M. Peters[1], Daniel Nel[2], Lydia Cairncross[2], Ross Hofmeyr[3], Pierre Arends[2], Farai Chigumadzi[2], Janine Watson[4], Deidre Anthony[4], Melinda Davids[4], Zainap Ganief[5], Eugenio Panieri[2], Bhavna Patel[1], Bernadette Eick[1], Belinda Jacobs[1], Kristy Evans[6], Grant Strathie[7], Dominique Van Dyk[3], Marcin Bartosz Nejthardt[3], Richard Llewellyn[3], Bruce M. Biccard[3]

[1] Executive Management & School of Public Health, Groote Schuur Hospital & University of Cape Town,
[2] Department of Surgery, Groote Schuur Hospital & University of Cape Town,
[3] Department of Anaesthesia & Peri-Operative Medicine, Groote Schuur Hospital & University of Cape Town,
[4] Peri-Operative Nursing Services, Groote Schuur Hospital,
[5] Information Management Unit, Groote Schuur Hospital,
[6] Hospital Trust, Groote Schuur Hospital,
[7] Clinical Technology, Groote Schuur Hospital

South African Health Review

Background

Data from six Western Cape secondary-level hospitals have shown that during the first wave of the COVID-19 pandemic (which lasted from May to July of 2020), total surgeries decreased by 44%, and elective surgeries by 74%, due to secondment of nursing, anaesthetic and surgical staff to COVID high-care and intensive-care services. At Groote Schuur Hospital, the loss of surgical output over the two years of the pandemic-related surgical service de-escalation (2020-2021) was estimated at 10 000 cases, with 6 000 patients with progressive disease waiting for elective surgical care.

Methods

In early May 2022, a Surgical Recovery Project was initiated; funding from the Western Cape Department of Health, and donations from the Gift of the Givers Foundation, private individuals, businesses, and other non-governmental organisations were used to build, staff, and equip a Day-Case Surgery Suite.

Results

By the Project midway point (end October 2022), a total of 800 extra cases had been completed, and the Project is currently on track to exceed the target of 1 500 cases in a calendar year by at least 10%. The largest number of procedures done were eye cases (n = 191), followed by cases involving surgery to the integumentary system (n = 141), and musculoskeletal system cases (n = 123). There were a total of 30 patient cancellations. While the Project expectedly had poorer on-time-start statistics in the first quarter of operation (range 0.0 - 6.9%), the percentage of on-time-start statistics improved markedly over the second quarter (range 43.3 - 56.5%). World Health Organization checklists were completed for 85.1% of operations performed at the Day-Case Surgery Suite, and no adverse incidents or mortalities were recorded at the Unit.

Conclusions

This project demonstrates that the volume of services provided in the public sector can be escalated with the use of external funding of capital for human resources, equipment and consumables. However, these services become truly effective when there is sufficient multi-disciplinary planning, alignment and support, at operational, strategic and executive levels of healthcare facilities.

Introduction

The COVID-19 pandemic brought crisis to healthcare systems globally. Surging waves of critically ill patients necessitated dramatic restructuring of healthcare facilities and massive internal redistribution of healthcare resources, which in the South African context were already stretched by an established quadruple burden of disease. The Western Cape recorded its first Coronavirus case on the 11th of March 2020, and rapid local progression of the pandemic resulted in the province experiencing the highest number of cases and deaths in the country during the initial period of the first wave in South Africa.

At Groote Schuur Hospital (GSH), a tertiary academic hospital linked to the University of Cape Town (UCT), the expanding disease burden displaced routine services due to the need for COVID-segregated in-patient care facilities, including high-care and intensive-care wards, and Operating Rooms (ORs). A motivation was therefore drafted by the hospital Chief Executive Officer, outlining the need for additional COVID-specific high-care beds, as well as COVID-specific ORs, to better meet this demand for urgent care of patients with COVID-19. A disused hospital space was proposed as the site for a 16-bed high-care ward for management of persons under investigation (PUI) and COVID-positive patients. In addition, two new ORs and a four-bed recovery area were built to process PUI and COVID-positive surgical emergencies. The infrastructure plan also included setting rooms, autoclaves, change rooms, a cold layout room, a sluice room, storage rooms, offices, sleep-in rooms, a staff kitchen, and rest areas.

However, with each successive wave many peri-operative staff were re-directed to critical-care services, while tertiary elective surgical care, already a crucial and scarce resource in the public sector, was de-escalated. These elective patients experienced progression of their primary disease and/or comorbidities while awaiting diagnostic workup and surgical procedures, and they subsequently required more complex and riskier procedures, resulting in higher complication rates and poorer outcomes.

Despite the name, 'elective' or 'booked' surgery is not optional, being necessary for curative care after diagnosis. At national level, the economic impact of delayed interventions was significant. Initially, curable early stage cancers eventually progress to stages of inoperability, with debilitating pain, shortened lifespans, and increasing cost of chronic cancer care. Benign conditions were also postponed. Both have the potential to impact on the quality of life of public-sector patients, their ability to work, earn an income, and care for themselves and their households.[1-3] Reduced booked case numbers also decreases the number of experiential learning opportunities. This remains a threat to the clinical competence and quality of surgical care provided in the uninsured sector and can result in a loss of accreditation for reimbursement for such care in the insured sector.[4-6]

The global backlog of elective surgical cases after the first wave of the pandemic was estimated to be 30 million; this was calculated to take a year of operating time to work back, but only if all hospitals were to increase their pre-COVID surgical volumes by at least 20%.[7] Data from six secondary hospitals in the Western Cape province showed that during the first wave, total surgeries decreased by 44%, and elective surgeries by 74%.[8] At GSH, 1 500 theatre lists were foregone in the pandemic, resulting in the cancellation of approximately 10 000 elective surgeries.

Despite all levels of the health system requiring increases in inputs so as to increase volume of surgical services, and despite the cost of services being relatively high at tertiary centres, it is these centres that have capacity for service escalation in the short term, in terms of staff, capital equipment and unused OR time, and therefore it is at this level that the greatest number of extra procedures can be accommodated. Accordingly, post-pandemic, the COVID-19 escalation space was envisioned as one of the sites for the Western Cape Surgical Recovery Project, specifically, the establishment of a fully-fledged Day-Case Surgery Suite, a service that had been planned for over a decade, pending funding. The proposal to utilise COVID-19 funding for this purpose was accepted by the Provincial Department of Health, and renovations were carried out by provincial architects and facility engineers for three months (from July to September 2021) with the receding of the first pandemic wave (Figure 1). A limited number of extra surgeries were allocated to smaller OR complexes at district and regional levels, while a mix of both complex in-patient and day-case procedures were performed at GSH.

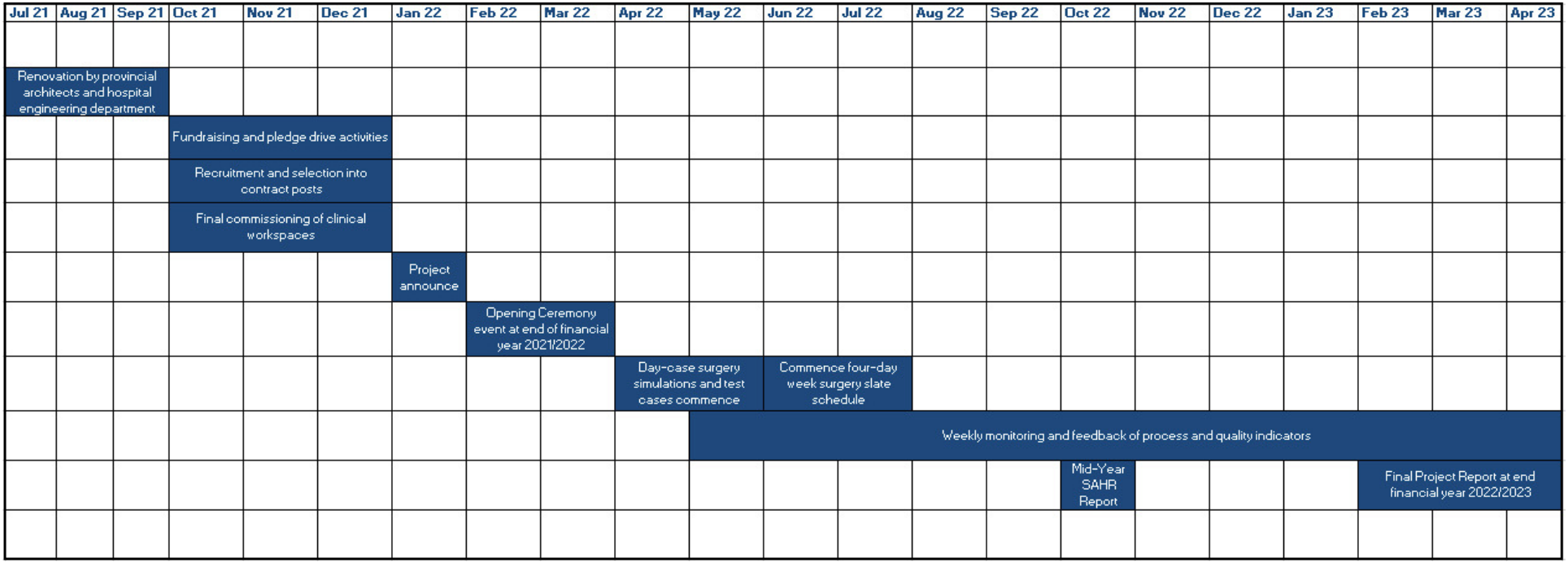
The aim of this chapter is to describe the conceptualisation, planning, implementation and six-month midpoint results of the GSH Western Cape Surgical Recovery Project. The information is provided according to the six building blocks of the health system as espoused by World Health Organization Building Block model,[9] and is based on the consolidated views of provincial management, facility management, and frontline clinicians.

The Groote Schuur Surgical Recovery Project

Financing

In March 2022, the Western Cape Deputy Director General of Health presented the Six Levers for Service Design Transformation post-COVID.[10] This mapped out the recovery of services for: chronic diseases, intermediate care, violence and trauma, routine preventive services, equitable resource allocation, and as a distinct entity, surgical services. For this last service area, the Provincial Government allocated R20 million of its operating budget toward Surgical Recovery throughout the Western Cape, of which GSH and its referring hospitals (New Somerset Hospital, Victoria District Hospital and Mitchell's Plain District Hospital) received R6.5 million to use for the

Figure 1. Gannt chart of Surgical Recovery Project progress, GSH, July 2021 - April 2023



Source: Groote Schuur Hospital Peri-Operative Services Functional Business Unit.

staffing components of their respective peri-operative services.

One of the first independent organisations that GSH reached out to as a strategic funding partner was the Gift of the Givers Foundation (GOGF), the largest disaster-response non-governmental organisation based in Africa. Noting the systemic delays to access of urgent time-bound surgical services, an agreement was reached between GOGF and Hospital Management, for the organisation to assist with extra funding of the Provincial Department of Health's Recovery Plan.[11] GOGF pledged to commit a further R2.5 million per year over a period of two years. Funds were also donated by over 3 000 individuals, as well as social clubs and businesses.

Legal funneling and stewardship of these funds required the establishment of the GSH Trust as a Public Benefit Organisation (PBO) in 2021. The primary role of the Trust is to identify the most pressing unfunded service needs that do not fall within the allocated annual operational budget of the Hospital. The Trust has been active in fundraising and marketing and engaging with the public and helped the Project to gain greater community recognition through interactions and engagements with popular radio stations, participation in public events such as the Sanlam Cape Town Marathon, in which hospital staff and benefactors participated to raise funds. Supporters and the general public were updated regularly on the number of cases completed and they received patient case vignettes; this was done via GSH social media accounts and ongoing interaction with the formal media.

Medicines, technology, equipment and infrastructure

Upfront purchases included a full suite of capital equipment, including anaesthesia workstations, patient monitors, infusion and syringe pumps, ultrasound, difficult airway equipment, blood-gas analysers, defibrillators, electrocautery units, suction devices, autoclaves, computer terminals, and display and supply carts, among other items. As the area was designed for surgical and peri-operative care, isolated electrical outlets with generator backup, piped medical gasses and suction/scavenging, and suitable changing, cleaning and sluice areas, were included. When significant emergency funding became available during the pandemic, and as newer successful treatment modalities were demonstrated globally, the high-care specification infrastructure plans were then pivotable to include high-care-level treatment, including advanced monitoring and high-flow nasal oxygen-capable outlets at every bedside, and a staging area for the preparation, processing and sterilising of equipment for the hospital's CAIR (COVID anaesthesia intubation and retrieval) team.[12] Senior consultants were asked to vet all provincial equipment purchases (including video laryngoscopes, transport monitors and ventilators) both clinically and financially. This ensured cross-cutting functionality and lateral compatibility with existing equipment, cost-effectiveness, and regard for use in surgical service recovery post-pandemic.

Service delivery, leadership and governance

The Hospital's Surgical Recovery Project was started in early May 2022, with extra hand surgery and eye cataract lists on Saturdays, using a mixed complement of GSH staff working overtime rates (for nursing staff) and pro bono (for medical staff), while recruitment and selection processes were initiated for formal posts. The project was implemented using a phased approach, gradually increasing the number of participating specialties. Day-case elective surgery was introduced first, followed by short-stay overnight cases, and finally more complex cases requiring longer stays.[13] The rationale for this strategy of expanding ambulatory capacity first was to utilise fewer hospital resources and reduce risk of in-patient COVID exposure.[2,14,15] Some surgical specialties, such as Cardiothoracic Surgery, Neurosurgery and Ophthalmology, were unable to make use of the Day-Case Surgery Suite, due either to lack of equipment or infrastructure constraints in the Suite. These specialties were provided with OR slates in Main Theatre in lieu of slates allocated to them for Surgical Recovery, and they used an extra staffing complement.

The Theatre Management Committee (TMC) at GSH, similar to other such Committees at the Hospital, maintains clinical and corporate governance of all peri-operative services provided in the Day-Case Surgery Suite, as well as the Main Theatre Complex overall. The Committee is a consultative and decision-making forum tasked with ensuring the maintenance of quality, safety, and efficiency; it is chaired by the Medical Manager: Peri-Operative Services, and includes senior surgeons, anaesthetists and theatre matrons. Transversal issues requiring further escalation, such as infrastructure maintenance and further equipment requisitioning, are relayed to the Hospital Executive Management Committee to action.

Human resources

Human Resources (HR) is a critical enabler of service (and cost) escalation. Staff costs generally account for two-thirds of all healthcare service expenditure, and this is a driver of other costs (for example, increased consumable utilisation); as such HR is tightly regulated.[15,16] Despite this, there must still be contingency planning for when staff members are ill, or when emergency services are under pressure and requiring service escalation. Over the first financial year of operation (April 2022 to March 2023), expenditure for contract staffing (as well as high-cost consumables) was tracked by GSH cost centres for allocation and reconciling to the Surgical Recovery Project funds held with the hospital's finance director. Purchase sign-off for requisitioned items is completed by the appropriately delegated individual, from Operational Manager to Medical Manager. At the end of the first financial year, permanent posts allocated are to be transitioned to the running of a Day-Case Surgery service, which will form part of the general expenditure of the

Peri-Operative Services' Functional Business Unit at the hospital.

Clerical support for the Surgical Recovery Project was required to manage information processing and administration of the unit. Information processing includes accurate and timeous capture of standard patient demographic, admission, procedure, quality, efficiency and discharge information onto the Hospital Information System. Thereafter, the hospital Information Management Unit (IMU) collates the captured information to create FBU reports detailing the volume, efficacy, quality and safety of the service provided. Efficient unit administration also involves folder management, assisting with the ordering of consumables and equipment, forwarding of patient billing information to the hospital accounting offices for fee payments, follow-up clinic bookings at Surgical Outpatient Department Clinics, and managing the schedule of the area OM.

A total of 14 full-time equivalent (FTE) nursing posts were created based on the requirement to run ORs for 12-hour day shifts (from 07h00 to 19h00, Monday to Thursday each week), the four-bed recovery area, and the 16 bed Day-Case Surgery Ward. Due to the lack of available theatre specialty-trained nurses, general nurses were employed for on-the-job upskilling. As most new staff had no prior theatre experience, half of the new nursing personnel were allocated to the Day-Case Surgery Suite and Ward, and half to more complex inpatient Surgical Recovery lists under supervision in the hospital's Main Theatre Complex (MTC). This was done so that the nursing skills mix in the different ORs was balanced for the necessary training and supervision of junior staff to take place. Finally, a nursing OM was rerouted from the MTC, and managerial responsibilities in theatre were restructured in order to support the Surgical Recovery Project.

Two permanent anaesthetic registrar posts were created to process the increase in surgical workload. These staff are responsible for safely anaesthetising patients using either general or regional techniques, and also assist in outreach anaesthetic services, emergency transfer, and intensive care services at GSH. They are the primary clinicians responsible for pre-operative assessment and optimisation, as well as postoperative analgesia, recovery and discharge of patients. Anaesthetic consultants were rerouted from the existing pool to supervise and manage these registrars, to develop clinical protocols, to oversee the quality of care provided, and lead clinical governance of the Day-Case Surgery Suite. Clinical protocols and standard operating procedures (SOPs) developed and updated for the project included guidelines for referral to a pre-assessment clinic, pre-operative investigations required for day-case surgery, guidance on managing patients with common chronic illnesses such as diabetes, hypertension and anaemia, general rules for pre-operative fasting, and analgesia guidelines for post-operative patients.

Two general surgeon Medical Officer (MO) posts were created to assist with the efficient processing of surgical recovery cases. These MOs were tasked with the support and management of peri-operative patients. This included liaison with the various surgical specialties on the hospital booking lists, assessment and work-up of patients pre-operatively, assistance intra-operatively, and safe discharge from the recovery area together with anaesthetic colleagues. In addition to process management of the area, the surgical MOs were also responsible for chairing daily morning multi-disciplinary OR huddles, ensuring that the data captured by clerical staff accurately reflected the caseload processed through the ORs, and taking part in weekly theatre-management meetings.

Information management

To fulfil the targets set by GSH in conjunction with the Province and external stakeholders, the TMC included volume, quality and efficiency measures of the new Day-Case Surgery Suite in the MTC FBU data reports, which are drawn by the Hospital IMU on a weekly and monthly basis. Generation of these reports requires accurate and timeous data transcription by theatre clerks, from nursing elective and emergency theatre registers, into proprietary cloud-based information systems such as Clinicom (for elective data) and WebSurgiBank (for emergency data).

Data are then extracted by the IMU and uploaded to the Hospital's Microsoft SharePoint website. Data uploaded here are then visualised into Microsoft Excel charts and tables, as well as interactive dashboards using Microsoft Power BI. These data are used for both operational and formal research, having been authorised as a peri-operative registry with the UCT Human Research Ethics Committee. This enables a multi-disciplinary, team-based, data-driven approach to OR management, to deliver safe surgical services of a consistently high quality.

Results

The summary data below have been reviewed from official hospital datasets, as contained in the GSH Peri-Operative Registry.

Process

Elective waiting times for malignant and benign conditions were manually collated at the start of the Project, based on a survey of all Surgical Heads of Divisions. Just over 6 000 patients were waiting for surgical procedures at the start of the Surgical Recovery Project on the 1st of May 2022. This survey is planned to be repeated one year hence at the end of the first year of the Project.

From the start of May to the end of October 2022 (the first six months of the Project), a total of 800 surgical procedures were completed, averaging 133 procedures per month, or 31 procedures per week, and beyond the target of 750 procedures set for the period.

Specific ICD9 codes were utilised to record the types of procedures performed. Ranked by category, the largest number of procedures done were eye cases (n = 191), followed by cases involving surgery to the integumentary system (n = 141), and musculoskeletal system cases (n = 123).

There were a total of 30 patient cancellations on Surgical Recovery Project lists. Reasons for cancellation included patient issues (unwell for surgery, not starved, or did not attend on the day), or provider issues (lack of theatre time or equipment, or further workup required).

Efficiency

Start times over the first six months of the project were poor, with less than 10% of all theatre slates initially starting their first cases before 08h00. Despite poor on-time start (OTS) statistics in the first three months of operation (range 0.0 - 6.9%), the percentage of OTS improved markedly over the last few months of the Project (range 43.3 - 56.5%). While day-case surgery can decrease bed utilisation in hospital, this results in patients needing to travel to the hospital on the morning of their procedure, which introduces delays due to transport delays and folder administration.

Further difficulties experienced with day-case surgery include the necessary pre-operative assessment of patients and secondment of theatre equipment from Main Theatres. Lastly, at project start, emphasis was placed on safe, methodical daily start-up of the new OR slates, with less concern for efficiency initially.

The average duration of operations in the Surgical Recovery Project was 45 minutes, while the average duration including anaesthetic induction and recovery time was 80 minutes.

Quality

World Health Organization checklists have been completed for 85.1% of operations performed at the Day-Case Surgery Suite. No adverse incidents have been recorded against the Day-Case Surgery Suite. No 30-day in-patient mortalities have been recorded for the Project to date.

Discussion

Human resources

The greatest challenge to surgical recovery – at GSH, in the Western Cape, and nationally – is lack of trained nursing staff with the specialised skillset required to run ORs, despite there being funded posts vacant. Recruitment of staff in the public sector can also be a lengthy process, and in initiating the Project, Agency and Overtime expenditure had to be used. This is particularly difficult when trying to bring in nursing staff on ad hoc agency or very short-term contract conditions. Contracts were only filled several months after Project initiation. In future, provincial health department funding is likely to remain constrained. Thus, HR requirements are likely to be the main barrier to future service escalations.[13,14]

Future pandemic waves

Further challenges to surgical services remain the possible impact of future COVID waves, and lockdowns, especially if more virulent forms of the virus than Omicron resurface. The Day-Case Surgery Unit was used as a COVID-19 high-care space during the peaks of the COVID waves; in the event of future COVID waves, other high-care areas would need to be found to accommodate such patients in order to mitigate risk to the Project. However, de-escalation of Main Theatre Complex services would inevitably occur, due to the need for secondment of anaesthetic, nursing and surgical staff.

Although there have been attempts to devise and implement objective scoring systems (such as the MeNTS score and its local South African adaptations) to determine an adequate service mix between COVID and surgical services, surgical divisions at GSH found these impractical to use as a tool for deciding which cases to prioritise, given the considerable demand and backlog of surgical cases.[16,17]

Service needs for complex surgical cases

Despite the significant advantages of Day-Case Surgery, approximately half of all OR slates are planned to perform in-patient general anaesthesia procedures. Most surgical specialties at tertiary level perform operations that are not amenable to Day-Case Surgery, and have patients with longstanding, complex and advanced pathology. In-patient slates allowed these surgical teams to tackle the extremely long waiting lists at tertiary level, resulting from de-escalation of surgical services at GSH during COVID-19 waves. The number of beds available for pre-operative and postoperative care remain a constraint on tertiary-level surgical service escalation.

Evaluation challenges

Evaluation results show that the Surgical Recovery Project enabled increased surgical throughput and decreased surgical waiting time for patients; reduced ward bed occupancy through the use of a Day-Case Surgery model of care; reduced risk of in-hospital morbidity due to shorter hospital stays and enabled better multidisciplinary management of patients in a purpose-built space.

The evaluation process however was not without its pitfalls. Collection, collation and analysis of information across specialties is a time-consuming, manual and ad hoc process. Due to nuances in treatment algorithms and patient presentations, different specialties maintain their own waiting lists, with each diagnosis having its own target time from initial assessment to definitive surgical procedure. Patients are thus added and removed from these lists dynamically. Current provincial information systems do not cater to these varying needs, and there is no single database of patient waiting times for elective proce-

dures, although theatre information systems are in development by the Western Cape Department of Health. These systems should be standardised across facilities and regions for comparative analysis.

Further complicating the use of elective waiting times for impact monitoring is the fact that prevalence of surgical illness is dependent on social determinants of health, the availability of effective screening programmes and referral systems, as well as population growth, particularly in urban areas.

Recommendations

In implementing the Project at GSH, it has been evident that the volume of services provided in the public sector can be escalated with the use of external funding of capital for HR, equipment and consumables. These services become truly effective when there is sufficient multi-disciplinary planning, alignment and support, at operational, strategic and executive levels of healthcare facilities. The following factors should be taken into account when undertaking similar initiatives.

- A large outlay of capital investment is required for the delivery of peri-operative services. Therefore, a crucial enabler of peri-operative and critical-care services is access to the necessary funding for infrastructure and capital equipment. In the absence of such funding, network relationships of clinicians and managers within non-governmental organisations, corporate social investment schemes, tertiary institutions, charities and the general public can be leveraged through traditional media and social media to generate financial support. Active Hospital Trusts can perform this role, and the funding ambit of these institutions may increase over time, as tertiary provincial healthcare expenditure becomes more and more constrained.
- Planning for short-term responses to external shocks to the health system, including future pandemic waves, must also consider future service demands, in order to channel unpredictable injections of funding into standing Annual Operational Plans, which can be readily actioned and provide the infrastructure skeleton on which future services can be built.
- The use of provincial funding for such projects should be dedicated to the fixed-cost HR required (especially scarce nursing skills) to build service sustainability. Once-off or on-going purchases of variable-cost items such as equipment and consumables can then be requested from funders and declared as donated goods. There is a constant need to upskill and train staff, especially in scarce skills areas such as peri-operative services, hence this also needs to be built into staffing ratios. A benefit of this is the ability to employ lower-level staff, who can be upskilled in the process.
- Data collection for monitoring and evaluation, as well as formal research, are crucial for understanding project progress, and should be built into routine unit management. Regular review meetings with Hospital Clerks and IMU personnel helps to facilitate standardised definitions and measurements. Hospital Information Systems, however, carry outdated and generic ICD coding dictionaries and require updating to the latest versions available. In the absence of this, regular data-verification meetings must be held between Clerks and Clinicians. Elective surgery wait-time monitoring systems need to be developed for facilities to review on a regular basis, and this can assist with dynamic theatre scheduling.
- A mixed model of high turnover, centralised surgical services, together with partners in accessible peripheral hospitals, who are also able to make use of the same budget, can foster a sense of local Project ownership across the system. An increase in surgical procedures performed at regional and district level over the longer term would be a more cost-efficient use of resources.
- An active and highly visible funding and media campaign can generate both financial and community support for healthcare facilities and is another opportunity to build trust with patient communities. Such a campaign can also galvanise the goodwill and dedication of staff around a common goal of increasing the general public good, despite multiple competing constraints faced by public healthcare services.

Abbreviations

Abbreviation	Description
FBU	Functional Business Unit
GOGF	Gift of the Givers Foundation
GSH	Groote Schuur Hospital
IMU	Information Management Unit
LGC	Local Governance Committee
MO	Medical Officer
MTC	Main Theatre Complex
OM	Operational Manager
OR	Operating Room
RCWMCH	Red Cross War Memorial Children's Hospital
TMC	Theatre Management Committee

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Case Study

A Family Medicine response to the COVID-19 lockdown: University of Pretoria perspective

Edith N. Madela-Mntla[1], Sanele Ngcobo[1]

[1] Department of Family Medicine, University of Pretoria

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Background

The COVID-19 pandemic caused great social, political and economic disruption, and imposed unprecedented changes in work, lifestyle, service delivery and social interactions in South Africa and worldwide. Healthcare providers, working in often already overstretched healthcare systems, found themselves at the forefront of global and national efforts to contain the havoc of morbidity and mortality wreaked by SARS-CoV2.
This chapter describes efforts by the University of Pretoria's Department of Family Medicine (UPDFM) to deliver on its mandate of teaching, learning, and research in the face of the disruptions of the COVID-19 pandemic during the March-September 2020 nationwide hard lockdown.

Methods

A perspective review was undertaken, drawing on reports, meeting minutes, email correspondences and electronic personal communications analysed to describe the activities undertaken by the UPDFM during the study period.

Results

Nationally, some of the adaptive responses triggered by the COVID-19 lockdown drew from the pre-existing UPDFM repertoire of community-oriented, learner- and patient-centred practices of service delivery. Key among these practices were data collection and management using validated tools; virtual communication and meetings; health promotion and disease prevention through training nurses, community health workers and patients on newly developed Covid-19 prevention strategies; clinical intervention, including screening and diagnosis, treatment and care coordination using telemedicine and full service delivery in homeless shelters; patient referral/mobility by staff using sponsored rental cars and using an application to call an ambulance, and treatment continuation through home delivery of medication.

Conclusions

COVID-19 restrictions presented the UPDFM with a unique opportunity to draw from its experience and create rapid, impactful interventions. Most lessons learnt by the UPDFM during the crisis proved invaluable for use beyond the acute phase of the pandemic, thereby transforming the health system for better pandemic preparedness.

Introduction

The COVID-19 pandemic was a global disaster.[1] It significantly disrupted organisational and occupational practices for citizens, businesses and governments worldwide,[2,3] put public governance arrangements to the test, and disrupted interpersonal communication.[4,5] The pandemic undermined years of progress made in the fight against the human immunodeficiency virus (HIV), tuberculosis (TB), and malaria,[6] and seriously set back efforts to stem the rising tide of non-communicable diseases in southern and sub-Saharan Africa.[7] As health systems were overwhelmed and critical primary and secondary health services interrupted, direct and indirect pandemic-related morbidity and mortality increased as people failed to access needed care.[8,9] However, a crisis is also an opportunity.[10] While the pandemic tested the effectiveness of and revealed gaps in existing practices, it also activated an unprecedented mobilisation of research and innovation systems to address immediate needs and improve overall system resilience to future crises.[11]

The first SARS-CoV2 case was identified in South Africa on 5 March 2020. A National State of Disaster was declared on 15 March 2020, and a subsequent hard lockdown was initiated on 26 March 2020. This was followed by different levels of lockdown until 5 April 2022, when the National State of Disaster was finally lifted.[12] While the restrictions adversely affected everyone, they had a particularly negative impact on the health and well-being of the poor, the homeless, and people with chronic conditions or in need of home care,[13-16] who found themselves with no or limited access to health services, food security, shelter and medication.

This chapter details the response of the University of Pretoria's Department of Family Medicine (UPDFM) to the COVID-19 lockdown in its quest for continuation of care to different vulnerable communities during the lockdown.

This chapter uses a qualitative, multi-site case study approach to describe the UPDFM's response to the COVID-19 lockdown in the first six months. Data used in this chapter were gathered from published papers (related to the UPDFM), unpublished reports from the team, UPDFM meeting minutes, data collection sheets, clinical notes, as well as email and other communication. The authors drew mainly on their own experiences and those of their colleagues as part of the broad collaborative team, with a special focus on the first six months of lockdown, (26 March - 30 September 2020). This period represented a time of great crisis and opportunity for the UPDFM, as reflected in the various data sources used, complemented with observational notes from a range of sites.

The UPDFM is a department within the University of Pretoria in Tshwane district, Gauteng, South Africa. Tshwane district has an estimated population of 3 275 152, with a total of eight community health centres and 68 clinics. Being an academic department, the UPDFM has three overlapping roles: holistic bio-psychosocial community-focused district-model-based PHC delivery; medical undergraduate, postgraduate and clinical associate training; and research. Community engagement is at the centre of all these roles. In clinical practice, the UPDFM actively takes part in district health service delivery in Gauteng, Mpumalanga, and North-West provinces.[17]

The University of Pretoria Department of Family Medicine

The Department of Family Medicine (DFM) forms part of the School of Medicine in the Faculty of Health Sciences at the University of Pretoria (UP), with key faculty holding joint appointments in the Gauteng Provincial Department of Health (GDoH). As such, the DFM has three concurrent responsibilities. Academically, the DFM is expected to educate and train undergraduate and graduate medical and clinical associate students in a way that equips them to deliver quality primary health care (PHC) to people living in South Africa; to support the delivery of quality health care in the City of Tshwane (CoT) and across the provinces as and when required; and to engage in basic and applied research.

In terms of clinical practice, the DFM actively participates in district health service delivery in Gauteng, Mpumalanga, and North-West provinces. Tshwane district forms the hub of the UPDFM's activities, with a population of over three million[18] attending a range of health facilities that are part of the referral system.[19] About 80% of Tshwane residents use public health services.[20]

The UPDFM offers service delivery through the community-oriented primary care (COPC) model based on the principles of using evidence-based approaches, equitable, integrated, person-centered care that is organised in a manageable geographical region with good information management and geo informatics.[21,22]

In Tshwane district, the UPDFM implements COPC at clinics, community health centres, and district hospitals, as well as in a range of community settings such as households, homeless shelters, and old age homes. In other provinces, the model extends to rural and mining communities, in partnership with indigent healthcare providers and the private sector. The UPDFM's comprehensive care involves five types of activities, namely promotive, preventive, curative, rehabilitative, and palliative care. In this process, the UPDFM incorporates the three components of the WHO framework,[21] namely: integrated health services with an emphasis on primary care and public health functions; multisectoral policy and action; and empowered people and communities. The COPC model was adapted to manage the COVID-19 pandemic in all settings where the UPDFM was rendering services.

The UPDFM offers training to undergraduate students in years one to four through the Longitudinal Community Attachment for Students (L-CAS) programme. The programme links medical students to integrated primary care from the household to the hospital and back. It introduces students to integrated, interdisciplinary and coordinated primary health care services outside the hospital environment. The programme also involves training for consultation in different situations and environments, in partnership with ward-based outreach teams (WBOTs).[17] At postgraduate training level, students fall into two groups, namely medical registrars (clinical trainee specialists) or other postgraduate trainees. The latter group are either attached to the UPDFM or co-supervised with other departments, and may be either involved with UPDFM research projects or collect data elsewhere.

Clinical associate (ClinA) students, called 'physician assistants' in other settings, undergo a three-year training programme for the Bachelor of Clinical Medical Practice (BCMP) degree. They spend their first year learning clinical theory and practice at the UP campus, and the remaining two years doing clinical practice at allocated clinical sites under family physician mentorship. This involves intensive in-service training at health facilities serviced by or partnering with the UPDFM.[17] A clinical associate is a professional member of the healthcare

team, with the necessary knowledge, skills and attitude to function effectively, mainly in the district/government healthcare system in South Africa. Clinical associates play a vital role in rural health care, where doctors are few and far apart. Their support ensures better health care for patients, and enables doctors to engage in a greater number of outreach programmes.[17] The role of clinical associates became even more prominent during the COVID-19 pandemic crisis, when a huge number were employed by the UPDFM to implement COPC, especially in rural and mining communities.

During COVID-19 lockdown, training was extended to nurses, community health workers (CHWs) and patients, to equip them on Covid-19 prevention guidelines and practices.

CHWs are crucial for the success of COPC in that they visit households and assess health needs before patients present at formal facilities. The UPDFM is involved in the development of this cadre through continuous work-based education and training.[17] CHWs collect and transmit household data to a central repository, using a purpose-built application (AitaHealth™) on their tablets.[23] AitaHealth™ is a purpose-built data-collection, support and management system.[23] Using web and mobile-phone technology, team leaders and CHWs, assisted by doctors and other specialists, work with real-time information to make decisions and provide care.

Research is an ongoing endeavour in the UPDFM. Data collected on an ongoing basis through implementation of COPC and other funded projects is available for research. From 2020, the UPDFM has also collected longitudinal data from two sites for the South African Population Research Infrastructure Network (SAPRIN) project, a health demographic surveillance system project commissioned by the South African Medical Research Council (SAMRC) with funding from the Department of Science and Innovation (DSI). This project is in partnership with the University of the Witwatersrand (Wits) and the University of Johannesburg (UJ).[24]

Impact of COVID-19 lockdown on the health system

COVID-19 impacted different components of the health system served by the UPDFM. Hard lockdowns at the start of the pandemic to curb the spread of COVID-19 had extremely negative effects on health-service users, especially vulnerable and key populations. The documented negative impact on the health system is described here, including impacts on health-service users, the health workforce, and the process of healthcare delivery.

- Impact on health-service users: During the lockdown, health-service users experienced issues such as limited space to practise social distancing; congested facilities; loss of income resulting in food shortages, hunger and new diseases; anxiety and depression; as well as inadequate access to health education.[25] Vulnerable groups, such as people living with intellectual disabilities, people experiencing homelessness, and substance users, battled to comply with general COVID-19 prevention measures,[14,26] including sanitising and masking. In addition, patient access to chronic medication was ruscestricted due to limited transportation during lockdown, leading to more patients lost-to-follow-up.
- Impact on the health workforce: A meta-analysis by Gholami et al.[27] reported that a significantly high number of healthcare workers were infected with COVID-19 compared to the general public globally. Similar trends were observed in three academic hospitals in Tshwane district, with an 11.1% period prevalence of SARS-CoV-2 infections.[28] This resulted in a shortage of healthcare workers at different levels of the healthcare system across Tshwane. A number of temporary healthcare worker posts were created, bloating the staff establishment in provinces. Furthermore, changes were reported in self-perception of mental well-being among health workers in Tshwane,[29] many of whom felt overworked, with long hours under difficult conditions, and fears of being infected.
- Impact on health-service delivery: Part of the government's response to the pandemic was to dedicate certain health facilities as 'COVID-19 hospitals'. Tshwane District Hospital (TDH) was one such example, while Skinner Street Clinic (a PHC clinic on TDH grounds, with a headcount of 58 147 in 2019/2020) was closed.[20] Dedicating facilities to managing COVID-19 resulted in staff repurposing, leaving gaps in the routine care of other health conditions. In some facilities in Tshwane, there was a reported decrease in the number of mental health visits during the lockdown period.[30] Many patients on chronic medication missed their regular clinic appointments, while others could not get appointments because of staff shortages.

Impact of COVID-19 on the UPDFM care model

The UPDFM's model of care was disrupted in several ways at the beginning of the pandemic. The disruptions were experienced across the UPDFM's three roles, namely holistic health service, training, and research. However, focus here is on disruptions related to the provision of holistic health services, since they affected the other two areas (teaching and research). Disruptions included unavailability of the PHC facilities due to their designation for the exclusive care of people with COVID-19; increase in the numbers of patients lost to follow-up due to lockdown restrictions and lack of transportation; shifts in the primary facility for acute health services, from clinics to hospital emergency units; reduction in human resources available at PHC facilities due to either sickness or redeployments; patient overloads at some healthcare sites due to an influx of people experiencing homelessness accessing healthcare and seeking shelter; low avail-

ability of services for diagnosing COVID-19 due to the polymerase chain reaction (PCR) test being the only diagnostic test, sites being fewer and results taking longer; inconsistent or absent guidelines and tools for managing COVID-19; disrupted communication among HCWs due to restricted physical interaction and non-streamlined health communication systems; and pausing of CHW visits to households due to restriction on movements , leading to disrupted care coordination.

Results

Findings are presented from the analysis of documented evidence of interventions by the UPDFM during the first six months of COVID-19 lockdown (Table 1).

Health promotion

The UPDFM launched the "Health is in our Hands" awareness campaign in an effort to combat the massive amount of false information about COVID-19 that was circulating. The campaign aimed to produce a number of understandable, timely, locally relevant, scientifically educated, and easily accessible visual texts to assist everyone in understanding important healthcare issues and the doable steps they may take to manage COVID-19 and stop the spread of SARS-CoV-2. Each of the brief educational videos in this series covers a distinct COVID-19-related theme. External funding made it possible for translation from English into Afrikaans, isiXhosa, isiZulu and Sepedi. The videos were distributed via the various projects the UPDFM was involved in.

Screening tools

There were no central or standardised tools for COVID-19 screening. A standardised tool for gathering biographical data and medical history of individuals experiencing homelessness was also not available. In order to tackle this issue, various data-collection instruments were developed and personnel were trained to utilise electronic questionnaires to record and evaluate individuals. Survey tools included AitaHealth,[23] Qualtrics[31] and Phulukisa.[32] and the Vula app. In the first few months of the pandemic, COVID-19 screening questions were added to the AitaHealth app which was used by CHWs to screen household members for COVID-19, and an automated response advised CHWs on the action to be taken, i.e. whether the screened individual ought to get tested or not. After creating a COVID-19 screening note, a team leader was also able to reply to the note and advise a CHW on what to do next.

The Qualtrics online survey platform was used to create interviewer-administered questionnaires in the early stages of lockdown. In addition, the Phulukisa Healthcare Solutions platform (developed in partnership with a private-sector company), was used at a later stage with a view to adopting it as a comprehensive platform. Both these platforms were used mostly in homeless shelters by data capturers and clinicians to capture biographical information, medical history, substance-use history, and to do COVID-19 screening.

The Vula Mobile app[33] allows for back-and-forth text communication as well as exchange of images between the referring practitioner at the primary care facility and the accepting doctor at the referral centre. The app was designed and developed by a private company and made available for public service use in 2014. During COVID-19 lockdown, it was also used by social workers to follow up on homeless patients discharged from temporary COVID-19 hospitals. The UPDFM collaborated with Tshwane District to establish a COVID-19 call centre that provided a toll-free helpline. The line was managed by a group of medical students who received assistance from family physicians. The Vula application was utilised to facilitate the coordination of information dissemination between the call centre and healthcare establishments.

Communication and coordination of care

The findings indicate that the disruption of care coordination was attributable to the unavailability of certain facilities at their customary referral level, which was due to their conversion into COVID-19 hospitals or their exclusive focus on emergency cases. Virtual multidisciplinary team (MDT) meetings were introduced to improve care coordination, coordination of resources, teaching, support of nursing staff, referral to tertiary care, and clinical support. Initially the meetings were daily, and then less frequent as stability was reached. A variety of online meeting platforms facilitated engagement and cooperation among stakeholders, which was key in dealing with the crisis. Using platforms like Zoom and Ms Teams enabled interactions between the UPDFM and other role players such as the City of Tshwane (CoT), the GDoH, the local non-profit sector, the Department of Social Development (DSD), Gauteng Emergency Services, and some private companies. This created various synergies, and strengthened cooperation as resources were stretched.

Access to medicines and care

While the country was under lockdown, many people on chronic medication avoided medical facilities and did not collect their medicines. Accordingly, in collaboration with clinic management, the UPDFM introduced home delivery of medication for chronic-care patients who normally collected from Skinner Street Clinic. This was done to improve treatment adherence and access to chronic medications, to decongest medical facilities, and to provide alternative access to patients who missed follow-up consultations or medication collection visits. An appointment list recording upcoming and missed appointments was used to identify eligibility for home delivery of medication. Administrative staff phoned those with active repeatable scripts and offered home delivery of medication. Clinical staff audited the rest of the files and conducted telephonic consultations to determine whether chronic medication could be safely continued

Table 1. Summary of challenges and interventions implemented by the UPDFM during COVID-19 lockdown, 26 March - 30 September 2020

Areas of concern	Challenge	Interventions
Lack of effective tools to screen for COVID-19	No central or standardised data collection tools for COVID-19 screening. No standardised tool for the collection of biographic and medical history information for people experiencing homelessness.	Self-developed tools and spreadsheets to screen for COVID-19 and respond appropriately delivered digitally via: • Qualtrics online survey platform (people experiencing homelessness, substance users, patients on chronic medication) • Phulukisa (people experiencing homelessness, substance users, and patients on chronic medication) • AitaHealth (COVID-19 screening, household registration)
Care coordination	Care coordination was disrupted due to some facilities being unavailable at their usual referral level, either because of being converted to a COVID-19 hospital or hospitals only attending to emergency cases.	Virtual multidisciplinary team meetings (MDT) were held to better coordinate distribution of resources, plan training of health workers on COVID-19, improve clinical support and patient referral.
Communication between healthcare workers	Face-to-face meetings could not be held, this resulted in a lack of support for clinical decisions. Staff (especially administration staff) worked from home Lack of access to digital tools to work remotely	Daily virtual meetings were held using different platforms such as Microsoft Teams, Zoom, and WhatsApp.
Health promotion and disease prevention	Fake news was spreading fast about COVID-19.	A series of videos on COVID-19 were developed and translated into different languages.
Management continuity	A number of patients were lost-to-follow-up due to diminished access to health facilities.	Telemedicine (Telephonic consultation with patients accessing if they qualified for home delivery of medication). Home delivery of medication

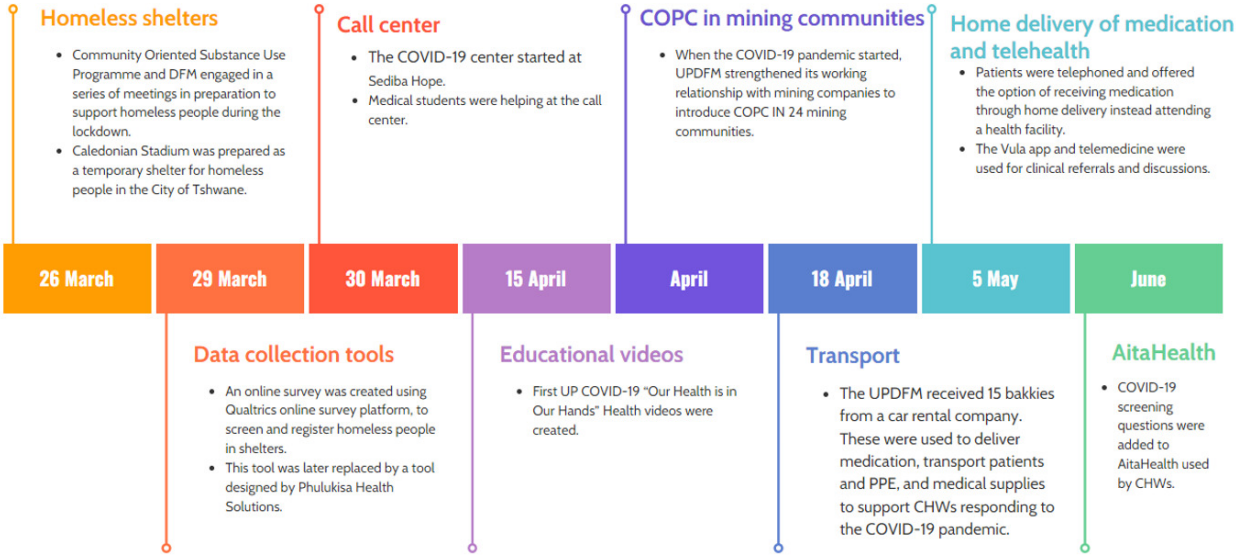
or adjusted. Those eligible were offered a home-delivery option. Furthermore, those qualifying for central chronic medicines dispensing and distribution (CCMDD) but were not yet enrolled, were offered enrolment telephonically for subsequent medicine supply.[20]

A significant proportion of patients faced barriers in accessing hospitals for regular consultations, including transportation limitations, apprehension regarding Covid-19, and other factors. The UPDFM's ability to manage the sudden influx of patients was facilitated by alternative modes of patient transportation and the staff's exceptional commitment to their duties. This encompassed the accumulation of individuals awaiting referral for additional medical attention. In April 2020, the UPDFM successfully negotiated and obtained a total of 15 pick-up trucks from a car rental company without incurring any rental fees. The aforementioned items were utilised for the purpose of administering medication, conveying patients from destitute shelters to medical facilities, and conveying personal protective equipment and medical supplies to facilitate the efforts of Community Health Workers in addressing the COVID-19 outbreak. The UPDFM also implemented the utilisation of the pre-existing Mpilo application utilised by the Gauteng Emergency Services to facilitate the dispatch of ambulances for the conveyance of patients between homeless shelters and healthcare facilities.

COPC in mining communities

When the COVID-19 pandemic started, the UPDFM strengthened its working relationships with mining companies to introduce COPC in 24 mining communities. Utilising existing Ward-based Primary Healthcare Outreach Teams (WBPHCOTs), this support focused on strengthening CHW training, as well as monitoring and evaluation of WBPHCOT work. Up to 100 clinical associates started working in the programme collaborating with Occupational Health Services at the mines and the District Health Services in the mining communities. Among the activities they embarked on were COVID-19 screening and testing, home visits, home care, delivery of food parcels, and vaccination.

Figure 1. Timeline of UPDFM interventions from 26 March to 30 September 2020



Recommendations

- Foster strong collaboration among relevant parties to generate mutually beneficial reactions, and deliberately strive for the harmonisation of healthcare efforts.
- Continuously evaluate methodologies and frameworks to assess their preparedness for managing crises.
- Adopt innovative approaches in all aspects of work, as this facilitates ingenuity and results in essential resolutions.
- Prompt establishment of a proficient communication plan to facilitate the uniformity of procedures and impede the proliferation of the disease.
- Develop novel strategies to effectively mobilise and utilise resources to counteract the proclivity for resource depletion during periods of pandemic.
- Enhance the preparedness of the healthcare system by establishing unambiguous protocols and evaluating novel approaches for handling pandemics.
- Record the insights gained during periods of crisis and incorporate effective ones into standard practise after the crisis has passed. Conversely, it is important to retain unsuccessful approaches as cautionary examples.

Conclusions

The disruption and restrictions that came with the COVID-19 lockdown presented the UPDFM with a unique opportunity to think and act more innovatively so as to create rapid, impactful interventions. Like the rest of the country, the UPDFM was initially unprepared as the pandemic was unexpected and government communication on national plans yielded little guidance. These challenges changed in the latter stages of the pandemic as more information became available. The unprecedented pandemic meant that the UPDFM's COPC model had to respond in adaptive ways. Strategies evolved while they were being implemented, as evidenced in documentation, observations and personal interpretations of the team members. The UPDFM's adaptability proved to be invaluable in responding to the health crisis. These proved to be invaluable lessons for pandemic preparedness for the health system.

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Abbreviations

Abbreviation	Description
BCMP	Bachelor of Clinical Medical Practice
CCMDD	central chronic medicines dispensing and distribution
CHW	community health worker
ClinA	clinical associate
COPC	community-oriented primary care
CoT	City of Tshwane
COVID-19	coronavirus disease of 2019
DSD	Department of Social Development
EVDS	Electronic Vaccination Data System
GDoH	Gauteng Department of Health
HIV	human immunodeficiency virus
L-CAS	Longitudinal Community Attachment for Students
MDT	multidisciplinary team
NCD	non-communicable disease
OECD	Organisation for Economic Co-operation and Development
PCR	polymerase chain reaction
PHC	primary health care
PPE	personal protective equipment
SAPRIN	South African Population Research Infrastructure Network
TB	tuberculosis
TDH	Tshwane District Hospital
UJ	University of Johannesburg
UP	University of Pretoria
UPDFM	University of Pretoria Department of Family Medicine
WBOT	ward-based outreach team
WBPHCOT	ward-based primary healthcare outreach team
WHO	World Health Organization
Wits	University of the Witwatersrand

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Research

Effect of the COVID-19 pandemic on women's, maternal and child health services in Tshwane District, South Africa

Annelet Kruger[1,2,3,4], Manei Letebele-Hartell[4], Mphailele Tshukudu[4], Mpho Moshime-Shabangu[4], Tabea Manyane[4], Maria Van der Westhuizen[4], Mary Mlangeni[4], Setlola Phoshoko[4], Rebecca Makau[4], Vivian Mfolo[4], Maureen Masha[5,6], Vundli Ramokolo[7], Tanita Botha[8], Ute Feucht[2,3,4,9]

[1] Department of Family Medicine, University of Pretoria,
[2] Research Centre for Maternal, Fetal, Newborn and Child Health Care Strategies, University of Pretoria,
[3] Maternal and Infant Health Care Strategies Research Unit, South African Medical Research Council,
[4] Tshwane District Health Care Services, Gauteng Department of Health,
[5] Right to Care,
[6] National Institute for Communicable Diseases (NICD), a division of National Health Laboratory Service,
[7] HIV and Other Infectious Disease Research Unit, South African Medical Research Council,
[8] Department of Statistics, University of Pretoria,
[9] Department of Paediatrics, University of Pretoria

South African Health Review

Background

The COVID-19 pandemic severely impacted healthcare service delivery globally. The aim of this study was to assess effects of the COVID-19 pandemic on the uptake of routine healthcare services related to maternal, newborn, child, and women's health (MNCWH) in Tshwane District, an urban locality in Gauteng Province, South Africa.

Methods

As part of the observational Tshwane Maternal-Child COVID-19 study, routine data sources, including the District Health Information System and other district-based datasets, were studied from April 2019 to March 2022, to describe the impact of the first four COVID-19 waves in Tshwane District. The year pre-pandemic was used as a baseline. Data included MNCWH data elements/indicators, child health data elements/indicators, and COVID-19 surveillance data. Data analysis included descriptive statistics, together with visual analysis of trends over time. Statistical investigation included testing of differences between data from the pre-pandemic year (as baseline) and data from the following two pandemic years (2020/2021 and 2021/2022), as per the National Department of Health's financial years (from April to March of the following year).

Results

Multiple MNCWH health elements/indicators showed major decreases during the COVID-19 pandemic period, with preventive services rendered at primary healthcare and community level more severely affected than facility-based clinical services. The most significant decreases were recorded during the first pandemic year, most notably during the first strict lockdown period, with partial or complete recovery in the second pandemic year, while selected indicators saw large impacts during the actual COVID-19 waves.

Conclusions

The COVID-19 pandemic severely impacted the ability of women and children to access healthcare services in this large urban district in South Africa. Health system strengthening measures and adequate planning for future emergency situations are crucial to mitigate the negative impact on maternal and child health, as South Africa strives to move towards reaching its Sustainable Development Goals.

Introduction

The first case of SARS-CoV-2 infection was reported in Wuhan, China, in December 2019. The ensuing pandemic affected most countries severely, with the burden of COVID-19 disease and accompanying lockdown regulations impacting on the provision of routine and essential health services. South Africa was no exception, given its pre-existing quadruple burden of diseases, including HIV and tuberculosis; non-communicable diseases (mainly hypertension and diabetes); suboptimal maternal and child health; and violence/injury.[1]

Providing continuity of healthcare services in an already stretched healthcare system is challenging, particularly during a pandemic. South Africa reorganised its healthcare services by increasing medical and laboratory capacity and building field hospitals – all in anticipation of a rapid increase in number of adult COVID-19 cases. Additionally, the country implemented a level-5 lockdown in March 2020, which prohibited non-essential economic activity, limited movement of people outside their homes, and restricted availability of transport for commuters. Four distinct COVID-19 waves ensued between March 2020 and March 2022, leading to the enforcement of several levels of lockdown restrictions. Despite public-health interventions to curb the spread of SARS-CoV-2, routine and emergency healthcare services needed to continue to avoid collateral morbidity and mortality, resulting in major strains on the healthcare system.

International research has highlighted widespread and significant impacts of the COVID-19 pandemic on the provision and utilisation of healthcare services, especially those related to maternal, newborn, child and women's health (MNCWH).[2] In attempting to understand the impact on the healthcare system it is insufficient to rely solely on hospital-based studies, as disease burden may shift within the context of severely constrained pandemic environments. The Tshwane Health District has the same geographical boundaries as that of the Tshwane metropolitan municipality. It is a largely urban district in the Gauteng Province of South Africa with a population of 3 552 452 people, and a total surface area of 6 345 km^2, making it the third-largest municipality in the world by surface area.[3] Primary health care (PHC) facilities in Tshwane District provided continuous services during the pandemic as reported in district management meetings and personal communications with clinicians, with occasional short-term closures due to COVID-19-related prevention activities.

The research aim was to gain a better understanding of the effect of the COVID-19 pandemic on the uptake of routine MNCWH services in Tshwane District, rendered mainly at PHC facilities and district hospitals (public-sector facilities), as well as at community level and at schools/crèches.

Methods

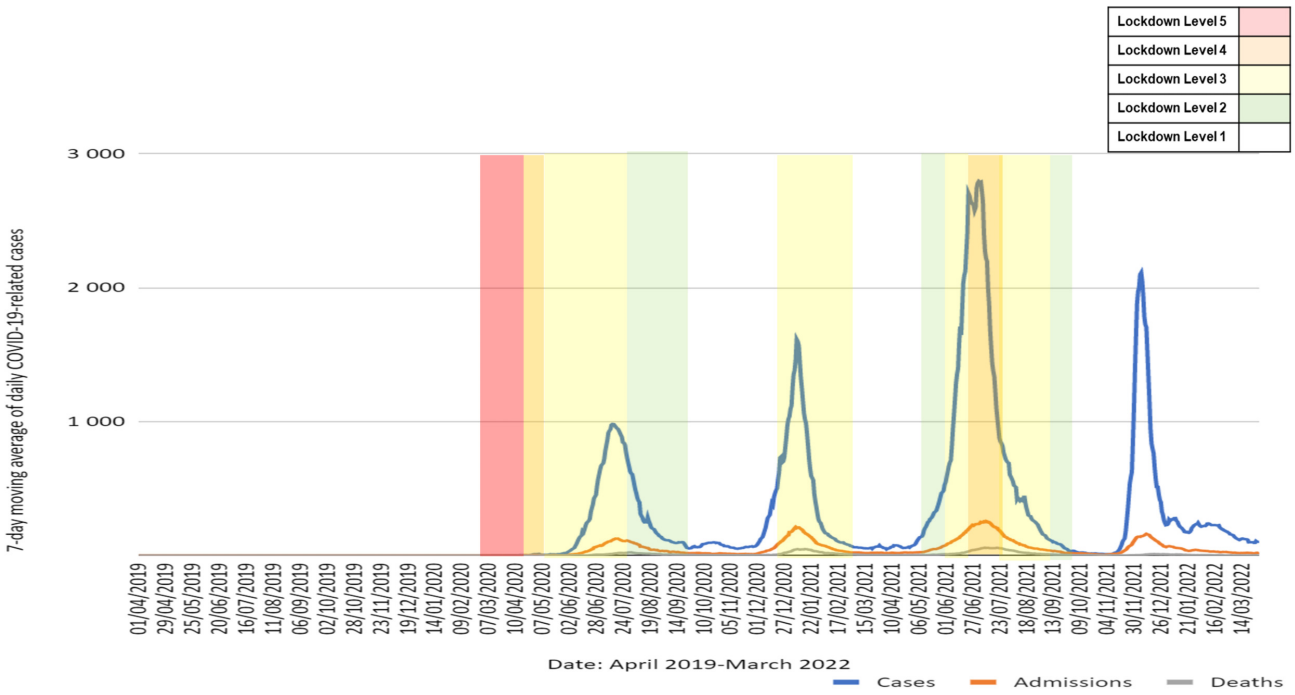
As part of the observational Tshwane Maternal-Child COVID-19 study, routine data sources, including the District Health Information System (DHIS) and other district-based datasets, were analysed from April 2019 to March 2022, to describe the impact of the COVID-19 pandemic over the first four epidemic waves in Tshwane District.[1] The year pre-pandemic was used as baseline. Data elements and indicators included those relating to MNCWH (including reproductive health, termination of pregnancies, cervical cancer screening, clinical forensic medical services, obstetric care, and early infant HIV diagnosis), child health (including immunisations, Vitamin A, deworming, and school health), and COVID-19 surveillance (including cases, hospitalisations and deaths). Only a selection of data elements was included in this analysis due to the large number available; the current focus was on clinical and preventive services provided at public health facilities at different levels of care, together with services provided at schools and community level, in order to study the impact of the COVID-19 pandemic on broader maternal-child health service provision within these different contexts and settings. In-depth analysis of clinical care provided mostly at hospital level, and maternal-child outcomes (including morbidity and mortality rates), were not the focus of this particular study.

Data analysis included descriptive statistics, together with visual analysis of trends over time. Statistical investigation included testing of differences between data from the pre-pandemic year, as baseline, compared with results from the following two pandemic years (2020/2021 and 2021/2022), as per the National Department of Health's financial years (from April to March of the following year). Shapiro Wilk's test was used to determine if data were normally distributed, followed by inferential tests, including the independent t-test as well as the non-parametric alternative, the Mann-Whitney U test, to compare the pre-pandemic baseline results with those obtained in the two pandemic years. Additional investigations included paired comparisons, including the paired t-test and Wilcoxon signed-rank test, comparing the months of the baseline group with those from the pandemic years (2020/2021 and 2021/2022) to investigate changes over these periods. Significance tests were performed at 5% level of significance, and the analysis was performed using the statistical program R.[4]

Research permissions were obtained from the Ethics committees of the University of Pretoria and Sefako Mak-

1 The Tshwane Maternal-Child COVID-19 Study was established to study the burden and impact of the COVID-19 pandemic on maternal and child health in the Tshwane District, South Africa. It was registered under the reference number 822/2020 with the Ethics Committee of the Faculty of Health Sciences, University of Pretoria, South Africa.

Figure 1. Number of recorded COVID-19-related cases, hospital admissions and deaths in Tshwane District from pandemic start to March 2022 with corresponding timelines of COVID-19 lockdown levels



Source. Tshwane District COVID-19 line lists, Tshwane District Health Services, Gauteng Province Description of lockdown levels in South Africa: (1) 'Lockdown Level 1': Low risk of COVID-19 spread with high health system readiness; with precautions and health guidelines in place, but normal activity resumed; (2) 'Lockdown Level 2': Moderate risk of COVID-19 spread with high health system readiness; with physical distancing and restrictions in place on leisure and social activities to prevent virus resurgence; (3) 'Lockdown Level 3': Moderate risk of COVID-19 spread with moderate health system readiness; with restrictions in place on many activities, including at workplaces and socially, to address a high risk of transmission; (4) 'Lockdown Level 4': Moderate to a high risk of COVID-19 spread with low to moderate health system readiness; with extreme precautions in place to limit community transmission and outbreaks, while allowing some activity to resume; and (5) 'Lockdown Level 5': High risk of COVID-19 spread with a low health system readiness; with drastic measures in place to contain spread of the virus and save lives.

gatho Health Sciences University together with relevant provincial and district approvals.

Key findings

The Tshwane District COVID-19 pandemic followed a similar pattern to the rest of South Africa, with four distinct waves occurring between April 2020 and March 2022 (Figure 1).

Women's health and reproductive services

Family planning

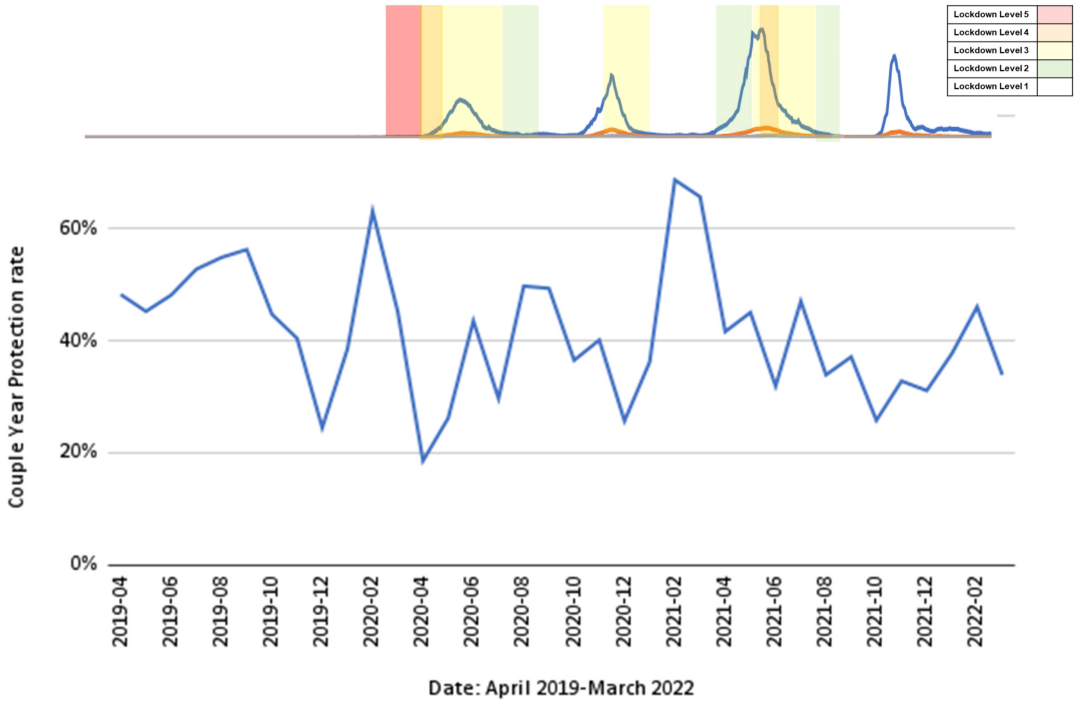
Utilisation of modern contraceptive methods to prevent unplanned pregnancies was measured using the composite indicator couple-year protection rate (CYPR). The year-on-year average CYPR was lower in 2020/2021 (40.8%) and 2021/2022 (37.0%), than in the pre-pandemic year when it was 46.8% (p=0.04; pre-pandemic versus pandemic period). The CYPR showed an annual decrease over the December summer vacation period. There was an additional sharp decrease in April 2020 to 18.6%, which corresponded with the first strict COVID-19 lockdown in South Africa (Figure 2).

Termination of pregnancy services

Termination of pregnancy (TOP) services in Tshwane District were mostly maintained despite an initial drop at the start of the pandemic and lockdown regulations; they increased again from March 2021 onwards (Figure 3). The average number of total TOPs was 508/month (pre-pandemic), 494/month (2020-2021), and 628/month (2021-2022) (p=0.1236 for total TOPs 2021-2022 versus pre-pandemic).

During the study period, Jubilee District Hospital, situated in Tshwane Sub-district 2, was the only site providing both first- and second-trimester TOP services in the entire sub-district and district respectively, and an important contributor to the district's overall TOP numbers. Before September 2020, the hospital's TOP clinic had two allocated clinicians, with only one trained to perform procedures. A new staff member was appointed in October 2020, with more staff added in 2022, increasing the capacity and therefore leading to a subsequent rise in the number of procedures performed and increasing the district's overall TOP numbers (Figure 4). The TOP clinic register, a DHIS source document, showed that the average age of the women utilising the clinic's service, and average gestation at time of TOP, which stabilised around

Figure 2. Couple-year protection rate for Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System and COVID-19 line list, Tshwane District Health Services, Gauteng Province, as per financial years of the South African Department of Health (April to March the following year)

10 weeks' gestation, were both not much affected by the pandemic or the local increase in service capacity.

Cervical cancer screening

There was a marked decrease in the monthly number of cervical cancer screenings, from an average of 5 455 samples/month (pre-pandemic), to 3 453/month (2020-2021), and with a nadir of 2 147 in July 2020 (Figure 5). There was a corresponding decrease in detection of high-grade precancerous cases from 3 609 cases/year (2019-2020), to 2 020 cases/year (2020-2021), and 2 041 cases/year (2021-2022).

This DHIS indicator changed in April 2020, from the number of cervical cancer screenings done in women above 30 years of age, to also include the number of cervical cancer screenings done for women living with HIV above 20 years of age. A discrepancy was noted when comparing the number of cervical cancer screenings captured on the DHIS and corresponding sample numbers received by the National Health Laboratory Service (NHLS), especially during the period from April 2020 to June 2020, which coincided with the strictest lockdown period (Figure 5).

Forensic clinical services

The seven dedicated Clinical Forensic Medical Centres in Tshwane District manage survivors of crime (particularly sexual assault, domestic violence and child abuse), supporting judicial processes through evidence collection and provision of expert witnesses. The monthly total client numbers and subgroups of adult females and children seen for clinical consultations showed a sharp decline, from an average of 230/month (pre-pandemic) to 94 during April 2020, corresponding with the strict lockdown at the start of the pandemic, with subsequent stabilisation afterwards to pre-pandemic numbers (Figure 6).

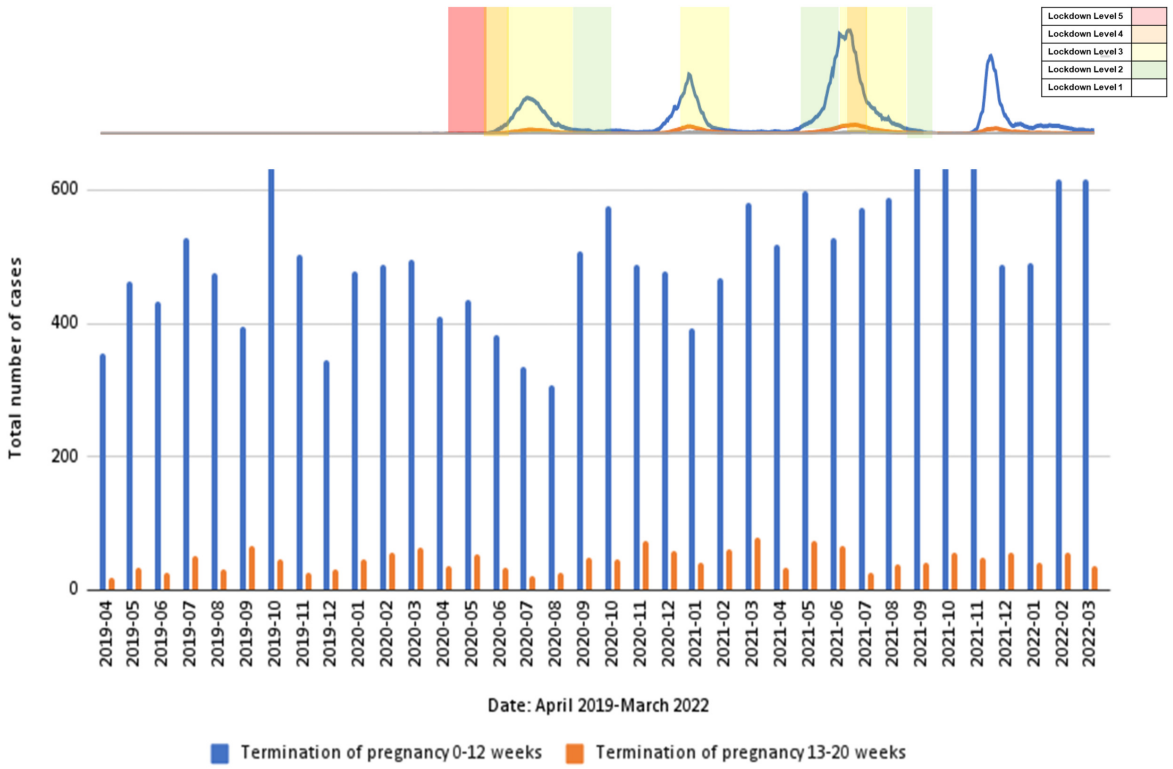
Maternal and neonatal health

Antenatal care

Antenatal care provision was mostly maintained throughout the study period, despite some monthly variations, for instance in April 2020 (the first month of strict lockdown) (Figure 7). Overall, there were slight reductions in monthly numbers of first antenatal visits over the three-year period, with averages of 5 090/month (pre-pandemic), 4 875/month (2020-2021), and 4 754/month (2021-2022) (p=0.261 for total first antenatal visits 2021-2022 versus pre-pandemic).

It is further appreciable that the majority of pregnant women in Tshwane District booked for antenatal care before 20 weeks' gestation (pre-pandemic average of 64.7%), and this was maintained throughout the pandemic period, with a slight decrease to 62.0% in 2020-2021, but with a subsequent increase to 66.4% in 2021-2022.

Figure 3. Monthly numbers of terminations of pregnancies in Tshwane District from April 2019 to March 2022, grouped by pregnancy weeks (first 12 weeks; 13-20 weeks of pregnancy), with corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System and COVID-19 line list, Tshwane District Health Services, Gauteng Province

Deliveries and stillbirths

The average monthly number of in-facility deliveries was 4786/month (pre-pandemic), 4962/month (2020-2021), and 4719/month (2021-2022), showing a reduction at the end of the study period (average of 4554/month in the last six months) (Figure 8). The stillbirth numbers fluctuated, with average numbers of 98/month (pre-pandemic), 109/month (2020-2021), and 98/month (2021-2022), with two spikes noticeable in the first pandemic year – the first occurred just after the first COVID-19 wave, and the second more sustained peak stretched from the second to the third COVID-19 waves (p=0.045; 2020-2021 versus pre-pandemic).

Teenage pregnancies

The 'delivery in 10 to 19 years in-facility rate' indicator is used to monitor the percentage of in-facility deliveries in young women under 20 years of age. This indicator showed an increasing trend over the study period (Figure 9), with average monthly percentages increasing from 8.0% (pre-pandemic), to 8.7% (2020-2021), to 9.4% (2021-2022) (p=0.05 for pre-pandemic versus 2020-2021; p=0.03 for 2020-2021 versus 2021-2022).

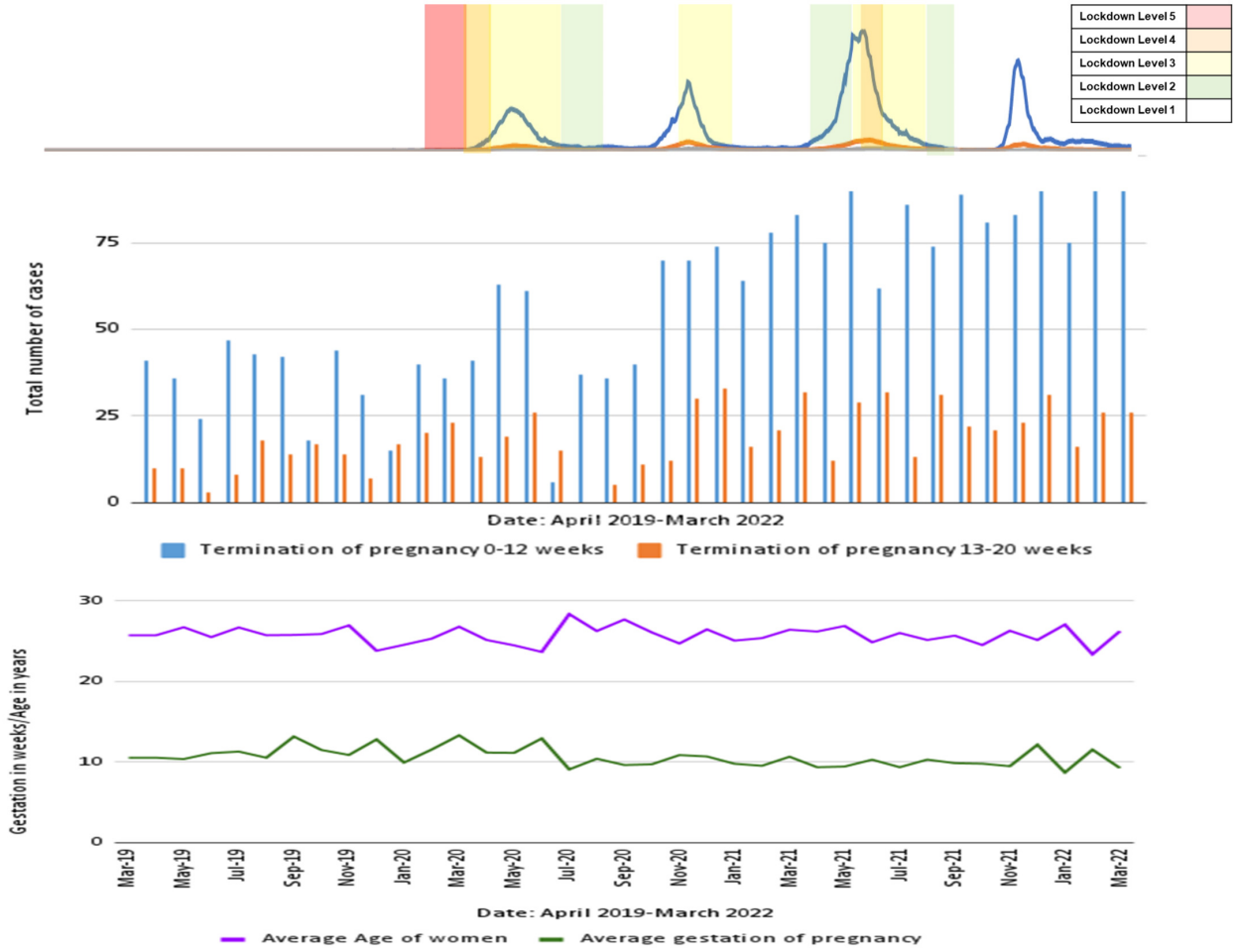
Babies born prior to their mothers' arrival at a health facility

The number of babies born before arrival (BBA) at a health facility gradually increased from 146/month (pre-pandemic), to 177/month (2020-2021), and 191/month (2021-2022) (p<0.001 for pre-pandemic versus 2021-2022) (Figure 10). This timing of the increase corresponded to restrictions on personal movement during the lockdown periods, with no trend reversal seen with easing of lockdown regulations. There was a marked peak in BBA numbers in July 2021 (n=236), just after the third and largest COVID-19 wave in the district.

HIV programme

As a gauge for the robustness of the HIV programme to maintain MNCWH service coverage during the pandemic, the number of infant birth HIV Polymerase Chain Reaction (PCR) Reaction tests was compared with number of live births to HIV-positive women, as recorded in the DHIS (Figure 11). Data showed that the early infant diagnosis programme was well maintained, in terms of infant birth testing. There was a decrease in number of recorded live births to women living with HIV in the last year of study, leading to a corresponding decrease in number of infant birth PCR tests.

Figure 4. Terminations of pregnancies done at Jubilee District Hospital, situated in Tshwane Subdistrict 2, from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels (top); numbers of terminations per month as grouped by pregnancy weeks (first 12 weeks; 13-20 weeks of pregnancy) (middle); and average gestation and age of clients (bottom)



Source. Jubilee District Hospital termination of pregnancy register, Subdistrict 2, Tshwane District Health Services
(For three months of the study period, namely March 2019, April 2019 and August 2019, the source document data were untraceable, with use of extrapolated averages.)

Child health

Deworming and Vitamin A supplementation

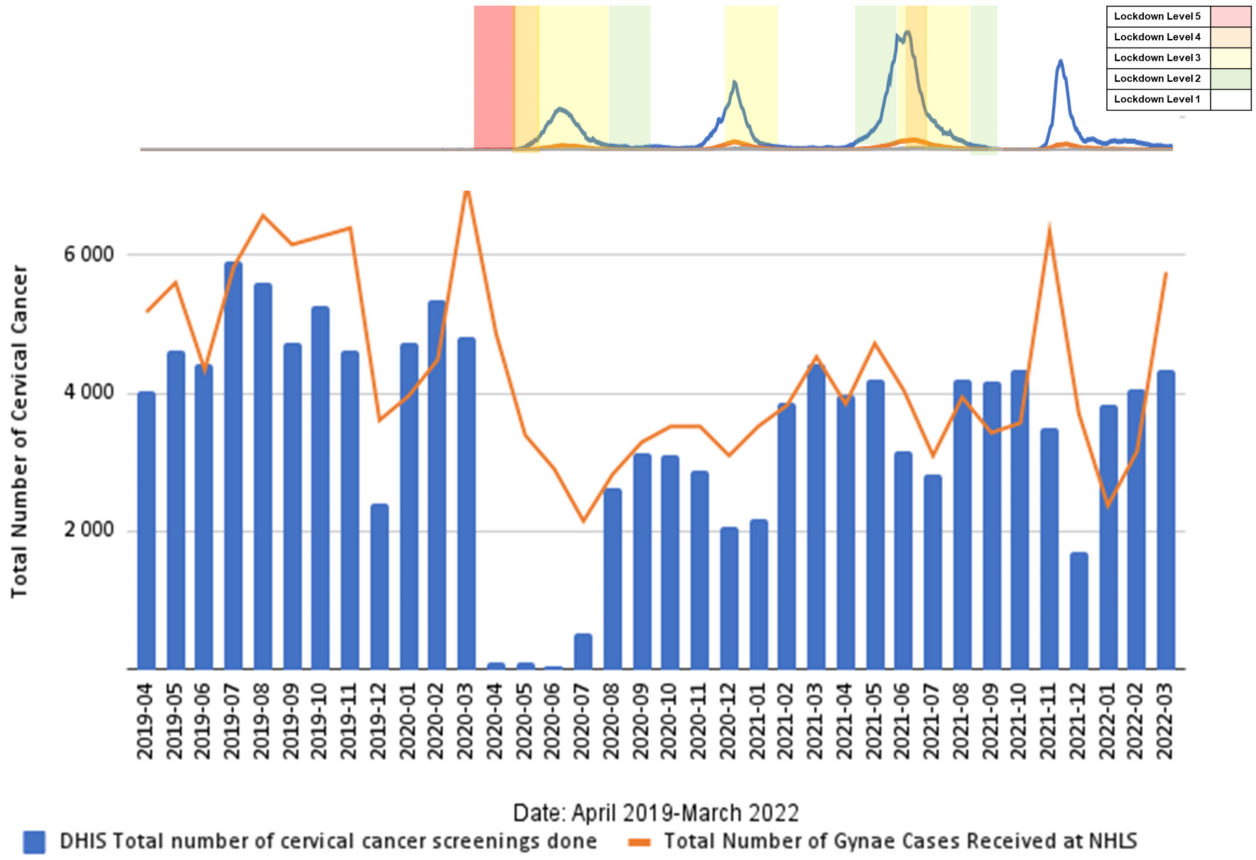
Administration of both Vitamin A supplementation and deworming medication is mainly conducted at PHC facilities and at community level (including administration by community health workers). Both of these preventive health services were reduced by more than 50% during the level-5 lockdown compared with the pre-COVID-19 period, with subsequent improvement in the former as the lockdown restrictions eased (Vitamin A: p=0.002; deworming: p=0.0005; pre-pandemic versus pandemic period) (Figure 12).

Childhood immunisations

The well-established childhood immunisation programme includes multiple vaccinations given at various time points, with the most intensive phase being the first year of life (nine different vaccines, 13 administrations, and seven time points). It is mostly a facility-based health programme, monitored by various data elements and indicators on the DHIS. The measles vaccination (given at six and 12 months of age) is an important coverage marker due to the risk of outbreaks of this highly contagious infection when herd immunity decreases. Another important coverage marker is the data element 'immunised fully under 1 year', defined as a child who has completed his/her primary course of immunisation before the age of one year.

Figure 13 shows the effect of the pandemic on these indicators. The figure also shows a yearly decline during each December, including the pre-pandemic period, corresponding to the holiday period. However, the start of lockdown in April 2020 shows a similar sharp decline, with the measles first dose coverage plummeting to

Figure 5. Monthly numbers of cervical cancer screenings done in Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System, COVID-19 line list and National Health Laboratory Services district report, Tshwane District Health Services

62.8%, but there is evidence of catch-up as the yearly averages moved from 86.2% (pre-pandemic), to 87.8% (2020-2021), and to 90.6% (2021-2022). Additionally, there is evidence of increases in the fully immunised group at the end of the study period (average of 92.7% from January to March 2022) ($p<0.001$ for 2020-2021 versus 2021-2022)

School health: Screening of learners

The Integrated School Health Programme (ISHP) provides a comprehensive screening programme (including vision, speech and hearing, anthropometry, locomotor system, oral health, communicable and non-communicable diseases, mental health and psychosocial risk) for all Grades 1 and 8 and other at-risk learners, undertaken by 23 dedicated teams in Tshwane District during school terms. The screenings are done on site, and screening periods are limited to public school terms. Figure 14 shows the severe ISHP disruption for multiple months in 2020 and 2021 due to COVID-19-related school closures from 18/03/2020, with partial school re-openings from 08/06/2020 and renewed closures from 27/07/2020 to 03/08/2020, with phased reopening thereafter.

Human papillomavirus (HPV) immunisation

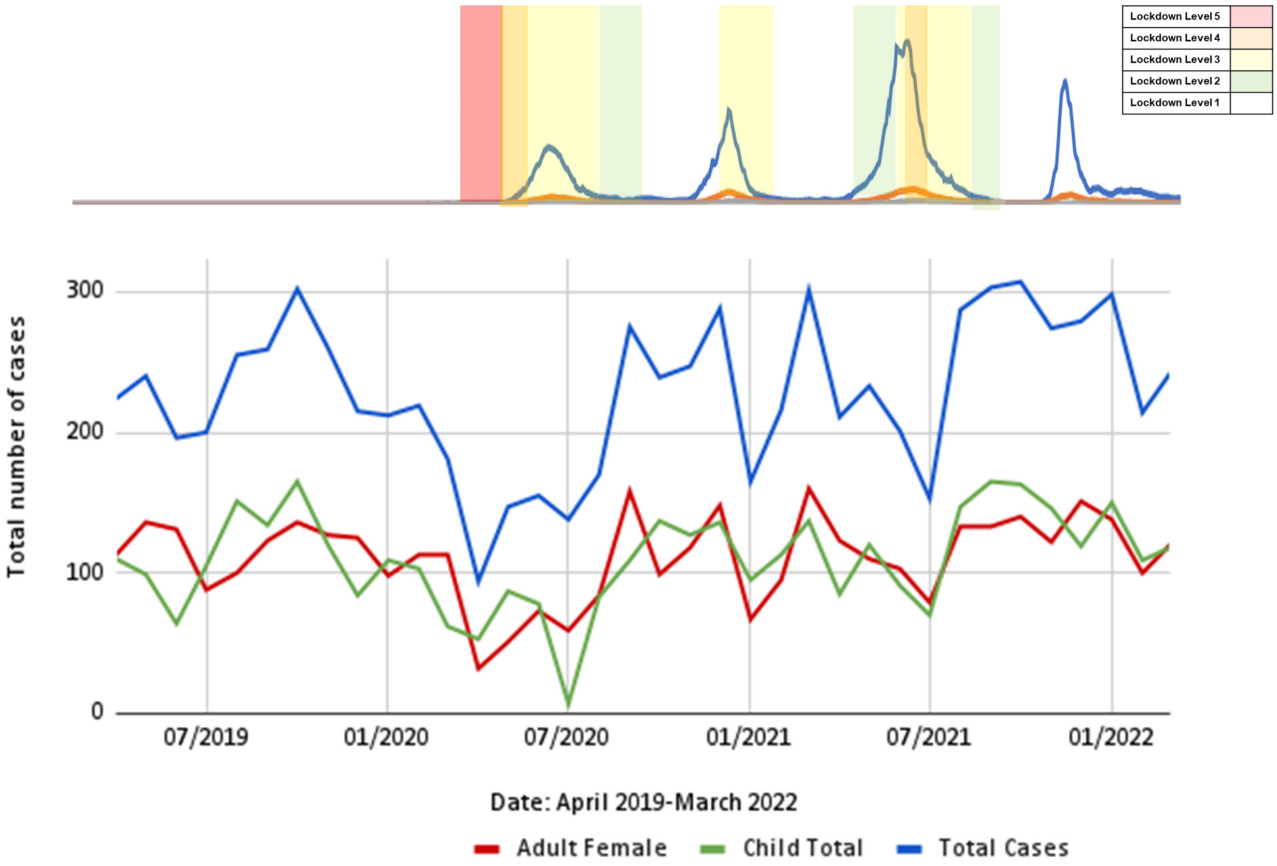
The HPV immunisation campaign is a national school-based vaccination campaign implemented through the ISHP in all public schools. Female learners in grades 4 or 5, aged 9 years and older, are given two doses at six-month intervals, in two campaigns (February/March and August/September). Table 1 shows the relevant data for Tshwane District for 2019-2022.

Review of overall trends for the selected indicators show that most routine MNCWH services were disrupted during the COVID-19 pandemic period, with more severe impacts on preventive services at PHC and community level than on facility-based clinical services (Table 2). The most significant decrease was experienced during the first pandemic year, most notably during the first strict lockdown period, with partial or complete recovery in the second pandemic year.

Discussion

South Africa has seen improved maternal and child health outcomes in the past decade, linked to improved effectiveness and access to large-scale health pro-

Figure 6. Monthly numbers of clinical consultations at Clinical Forensic Medical Centres in Tshwane District from April 2019 to March 2022, with data shown for total cases as well as adult female and child cases, with corresponding timelines of COVID-19 waves and lockdown levels



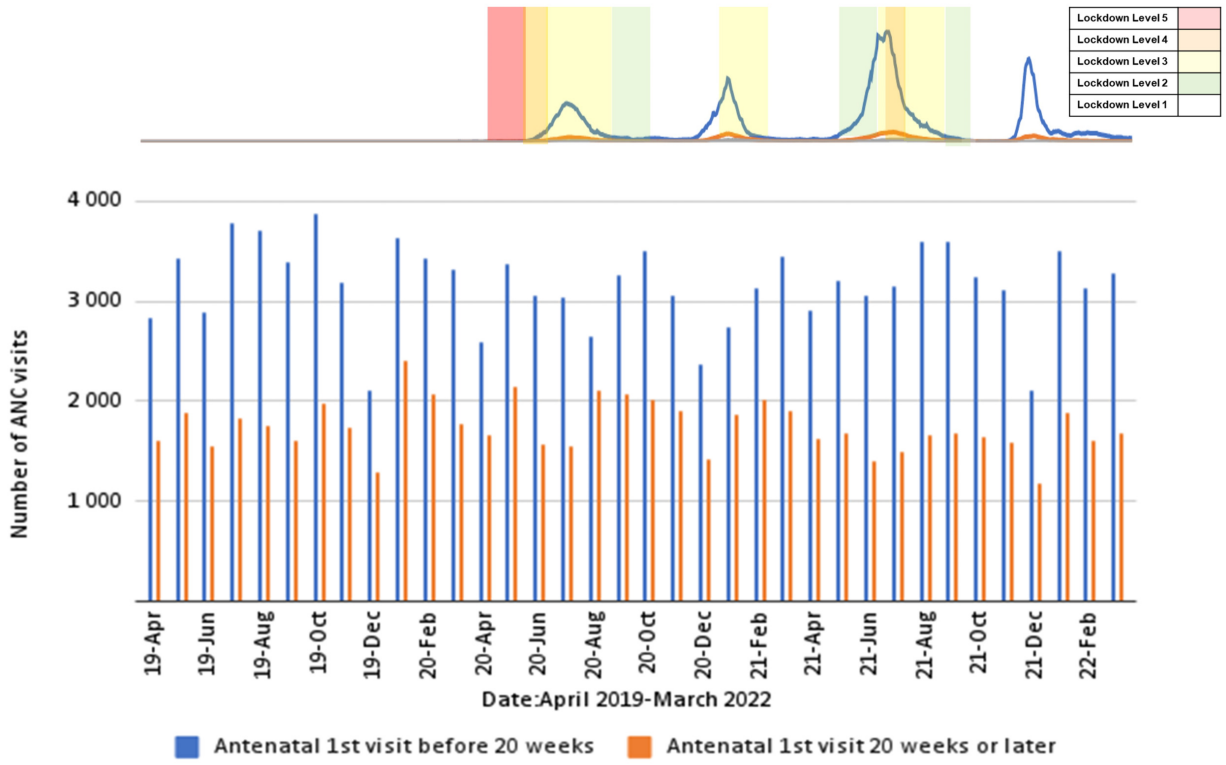
Source. Clinical Forensic Services register and COVID-19 line list, Tshwane District Health Services

grammes, mostly anchored in PHC services at district level.[5] These routine services are accessible to all citizens and mostly free of charge through the public health system. The data presented in this chapter largely exclude curative hospital-based services and services rendered within the private sector.

The COVID-19 pandemic was a major disruptive force, not only due to risk of morbidity and mortality because of infection with this novel pathogen, but also because of the lockdown regulations designed to curb its spread.[6] During the initial strict lockdown period, movement of the entire population was severely restricted outside of their homes.[7] Although PHC facilities in Tshwane District remained open and mostly functional, apart from short-term closures for COVID-19 prevention activities, uptake of many MNCWH services showed a sharp decline during the initial strict level-5 lockdown, despite very few COVID-19 cases at that stage. Preventive health services were most severely affected, particularly services rendered at community level and at schools/crèches. This decreased utilisation at the onset of the pandemic, with subsequent second-year recovery, is consistent with findings of other African and Indian studies.[8-10] Contributing factors included movement restrictions, reduced access to transportation, pandemic-related economic challenges, reduced health-system capacity, and delayed care-seeking behaviours due to fear of infection and misconceptions about transmission. Clients were more likely to avoid or delay routine or preventive services than to delay acute and emergency medical care. This was in line with reports by Czeisler et al.[11] that one-third of adult American respondents delayed or avoided routine medical care during June 2020.

Utilisation of family-planning services decreased markedly, as indicated by the significant decrease in CYPR. However, whereas this decrease reversed in the second pandemic year in the rest of the Gauteng[12] it did not do so in Tshwane District, where it decreased further. The national shortage of injectable medroxyprogesterone prior to and during the pandemic period also affected Tshwane District and may have contributed to some extent to the low CYPR. The cervical cancer screening programme was also significantly impacted, especially during the initial strict lockdown period, possibly because it was not deemed to be immediately life-threatening if temporarily postponed. The discrepancy in cervi-

Figure 7. Monthly numbers of antenatal care (ANC) first visits done in Tshwane District from April 2019 to March 2022, as grouped by first visits done before 20 weeks and on/after 20 weeks gestation, with corresponding timelines of COVID-19 waves and lockdown levels



Source. Clinical Forensic Services register and COVID-19 line list, Tshwane District Health Services

cal cancer screening data from the DHIS and the NHLS, particularly during level-5 lockdown, can likely be attributed to data-quality issues, including incomplete facility-level capturing, similar to reports from other sites during the pandemic.[2,13] The decreased cervical cancer screening led to reduction in early detection of high-grade precancerous lesions, raising concerns about long-term impacts of the missed screening opportunities during the pandemic.

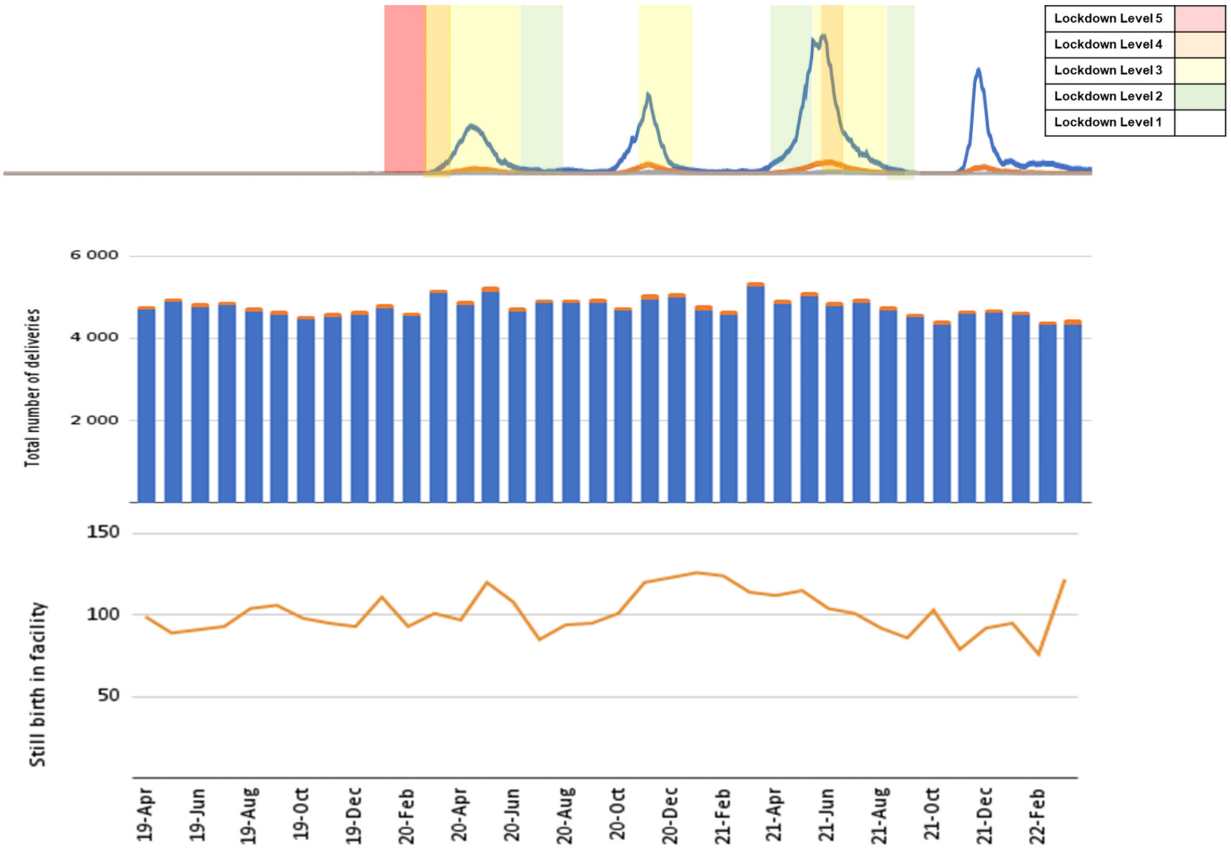
Additionally, the HPV immunisation campaign was significantly affected by COVID-19-related school closures, with the pandemic onset coinciding with a planned change-over in age group of vaccine-eligible girls in 2020, leading to very low HPV numbers in the first pandemic year. On resumption in 2021, the service showed the ability to adapt, despite the erratic school calendar caused by the pandemic's lockdown restrictions, but long-term concerns remain regarding missed HPV vaccinations during this period. Adolescents engaging in risky sexual behaviour are at high risk for HPV infection and more than 90% of HPV-associated cancers are preventable through vaccination.[14]

The inability of community health workers to conduct their usual home visits during the lockdown period to administer routine health interventions is illustrated by significant reductions in Vitamin A and deworming administration. Health screening of learners at schools was also severely disrupted by COVID-19 restrictions, with schools closed for most of 2020, and partial or rotational return of learners still prevalent in 2021. Children who missed preventive healthcare opportunities are at risk of never catching up on these, except if catch-up activities are subsequently prioritised within the health system.

One well-established preventive health programme that showed resilience in Tshwane District was the childhood immunisation programme, despite the programme being known to easily take strain during crisis situations.[15] Data in this study showed immediate large decreases at the start of the pandemic, but then marked increases in both measles and fully immunised (under-1-year) indicators during the second pandemic year, to levels higher than pre-pandemic coverage. Importantly though, despite such successes, a significant number of children who missed vaccinations during the acute crisis period may still not have had catch-up doses, leading to population-level reductions in herd immunity and risks of vaccine-preventable disease outbreaks, as illustrated in the current country-wide measles outbreak.[16]

In September 2019, the high pre-existing level of gender-based violence was declared a national crisis by the South African government. Global research showed an increase in domestic violence during the COVID-19 lock-

Figure 8. Monthly numbers of deliveries, live births and stillbirths in health facilities in Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System and COVID-19 line list, Tshwane District Health Services

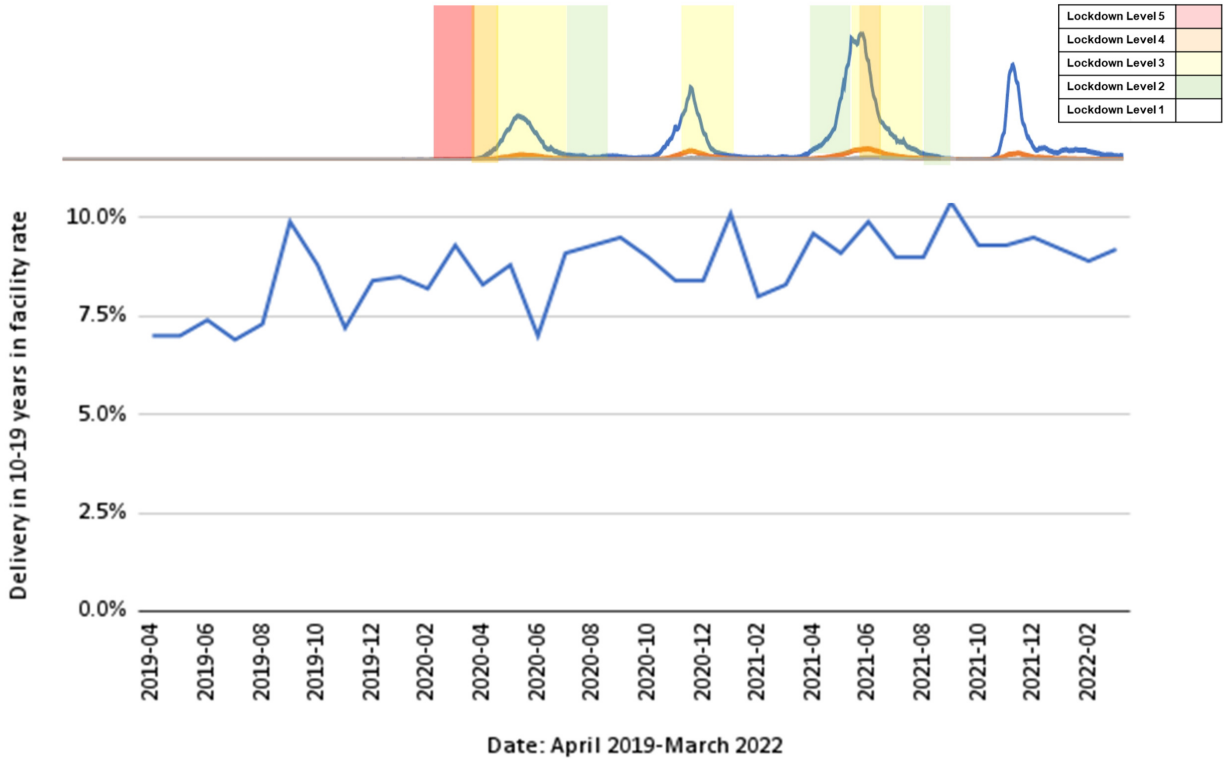
down period, with increased numbers of gender-based violence cases reported in the first seven days of strict level-5 lockdown in South Africa.[17] However, limited local research has been done on the impact of lockdown restrictions on women's and children's experiences of domestic violence, including intimate partner violence and child abuse. Research done by Mahlangu et al.[18] in Gauteng, South Africa, reported that women experienced increased levels of emotional abuse and reported higher levels of paternal physical abuse towards their children, but notably few women reported experiencing physical violence at home. In the present study, the number of clients reporting sexual abuse at the forensic clinical services decreased markedly during the strict lockdown periods. Possible explanations include movement restrictions, night-time curfews, limited social events, and the lockdown-related alcohol ban, potentially decreasing the risk of sexual assault. But the restrictions could also have prevented clients from accessing services and reporting abuse, with children and victims of domestic violence being particularly vulnerable groups.

The significantly improved TOP access in Tshwane District over the study period shows that health-service disruption can be mitigated and even counteracted by planned resource allocation, even when faced with a crisis of the magnitude of the COVID-19 pandemic, with its associated lockdown measures. Gauteng was the only South African province that did not report a decrease in the number of TOPs during the pandemic.[19]

The increased number of teenage deliveries and the number of babies born outside of health facilities recorded during the study period in Tshwane District is of concern, with trends continuing into the second year. Several factors, including transport issues and precipitous labour, could have led to women giving birth before arrival at a health facility, but preference for home deliveries reportedly also increased, particularly among refugee women.[20,21] Nationally, the teenage in-facility deliveries rate increased during the pandemic, although overall teenage pregnancy rates are difficult to calculate because of inaccurate reporting of pregnancies ending in miscarriages or terminations. Pandemic-related school closures and disruption of access to family-planning services, together with previously identified predictors of teenage pregnancies such as lack of parental support and economic challenges, possibly put teenagers in Tshwane District at compounded risk of unplanned pregnancies.[19]

In the present study, MNCWH services that were linked to clinical care provision were less disrupted than

Figure 9. Percentage of in-facility deliveries in teenage girls (aged 10 to 19 years) in Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System and COVID-19 line list, Tshwane District Health Services

preventive services. Despite early concerns regarding the risk of contracting COVID-19 during visits to health facilities, utilisation of antenatal services in Tshwane District was generally well maintained throughout the pandemic. This also extended to in-facility components of large-scale health programmes, such as infant HIV PCR testing. Research from Johannesburg, South Africa, on infant HIV diagnosis during the pandemic utilising NHLS data similarly found minimal disruption to HIV testing for children under two years of age.[22]

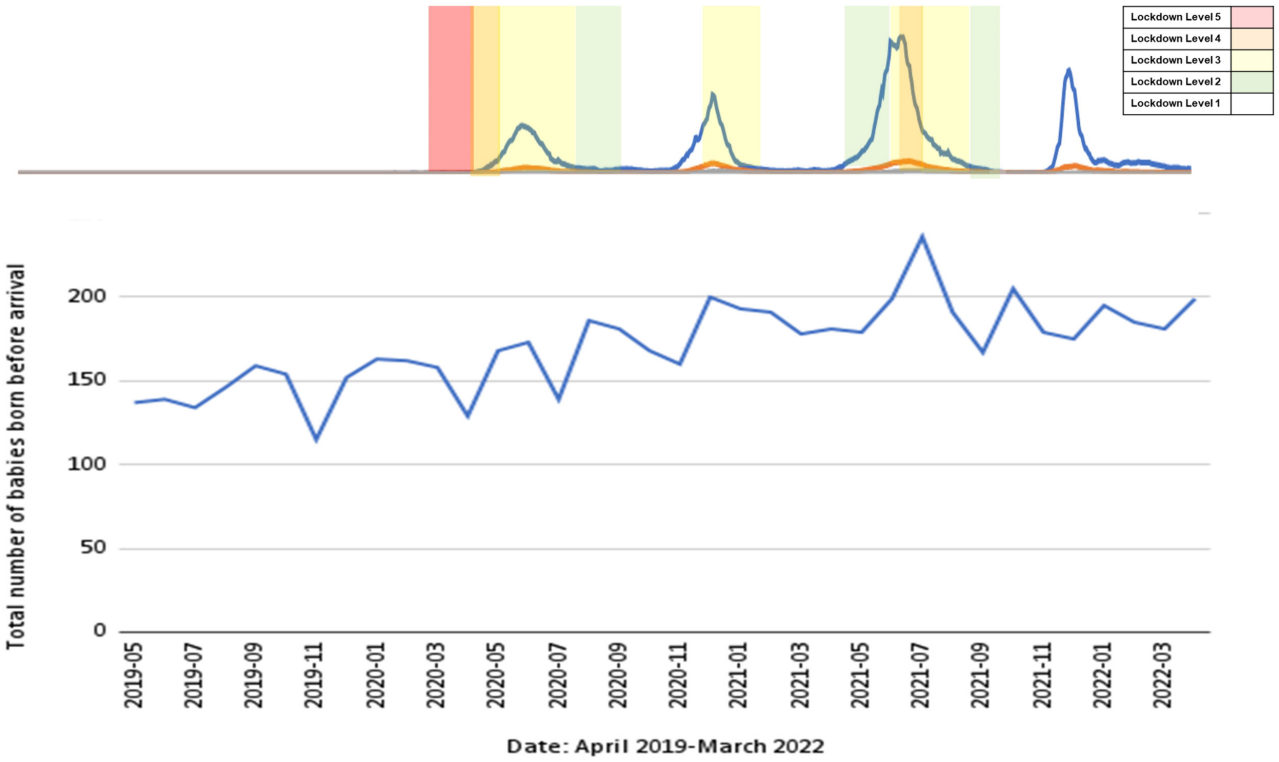
Stillbirth numbers increased significantly during the first pandemic year, in line with international research done by Khalil and colleagues.[23] However, unlike many other indicators studied in this research, the noticeable spikes coincided with the first and second COVID-19 waves, rather than with lockdown periods. It is unclear whether this was due to maternal SARS-CoV-2 infection, or the additional strain on healthcare resources during times of increased infections and admissions.[24]

The strengths of this study include the use of district-wide data from several sources from one of the country's large health districts, with many of the researchers, as staff members of the Tshwane District Health Services, having intimate knowledge of the health-service provision in the district. Limitations include the use of routine data sets with all the inherent difficulties in terms of completeness and correctness, particularly during a time of crisis impacting health workers and administrative staff, although data cleaning was done as far as possible. Local geographical variations may have been obscured by the presented aggregate district-level data. Furthermore, there was a lack of private-sector data with regard to routine data sets, excluding the COVID-19 surveillance data. Quantitative data alone are not sufficient to fully unpack the reasons for particular health-seeking behaviour. In addition, the COVID-19 pandemic and the associated lockdown measures led to changes in both internal and external migration patterns influencing health-service needs in terms of access in specific geographical areas, which was not measurable as part of this research.

Conclusions and Recommendations

The COVID-19 pandemic has been a major challenge to health services globally. The research presented in this chapter indicates its impact on the ability of women and children to access various routine healthcare services in a large peri-urban district in South Africa. Future-proofing the health system for major disruptive events, such as pandemics, needs to include planning of service delivery and client access to service-delivery points at all levels of care, including at community level. While curative services may need to be prioritised in the acute phase, it is crucial that the likely duration of an emergency situation

Figure 10. Monthly numbers of babies born before arrival to a health facility in Tshwane District, from April 2019 to March 2022, also showing corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System and COVID-19 line list, Tshwane District Health Services

be regularly reassessed, with delivery of preventive services also prioritised, despite the emergency situation. Measures that need to be strengthened include use of innovative digital health solutions to assist with health education, and where possible, appointment reminders and use of telemedicine for routine consultations.

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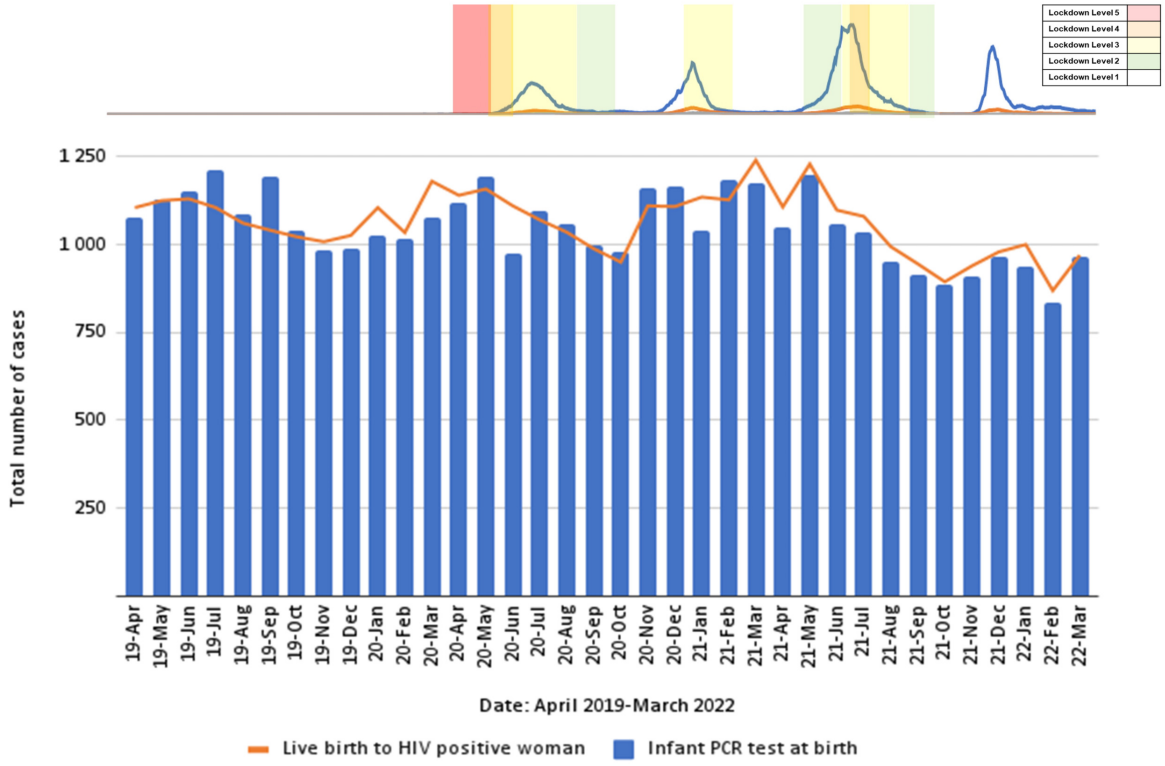
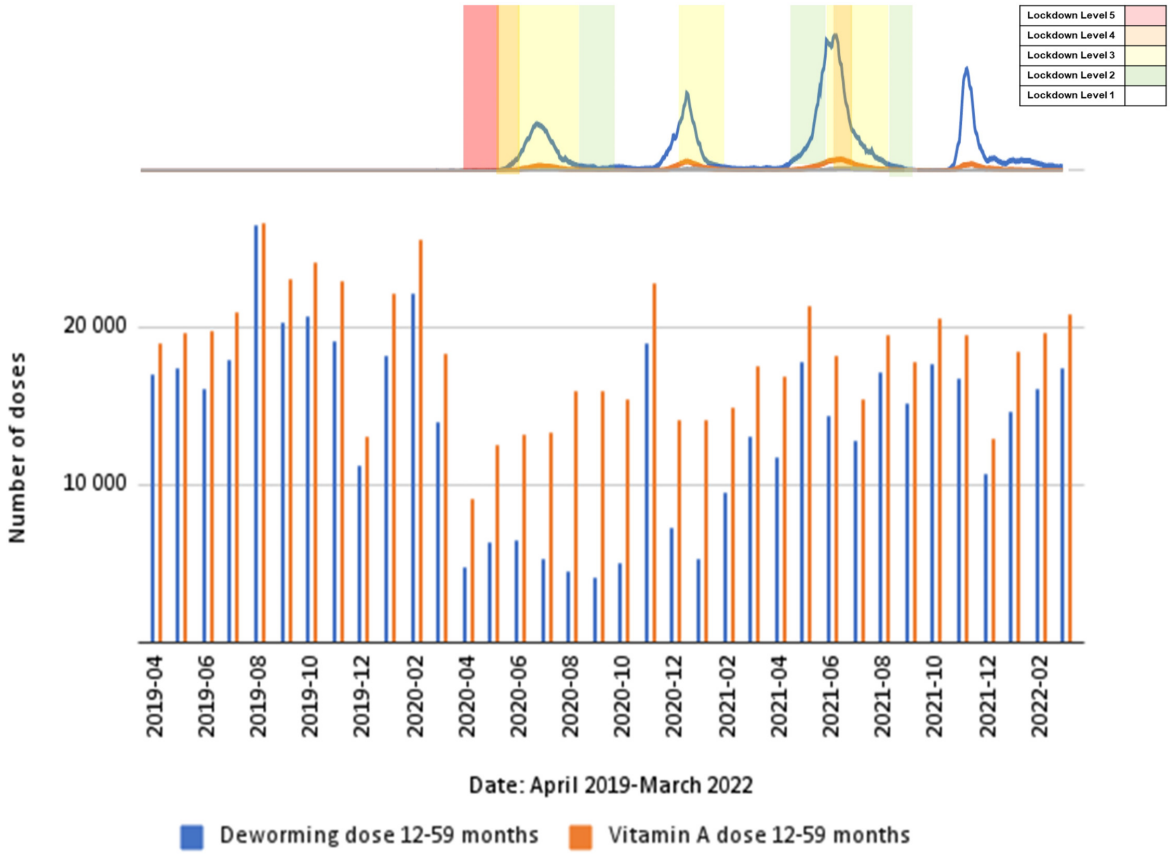
Figure 11. Monthly numbers of births to HIV-positive women and infant birth HIV PCR tests done in Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



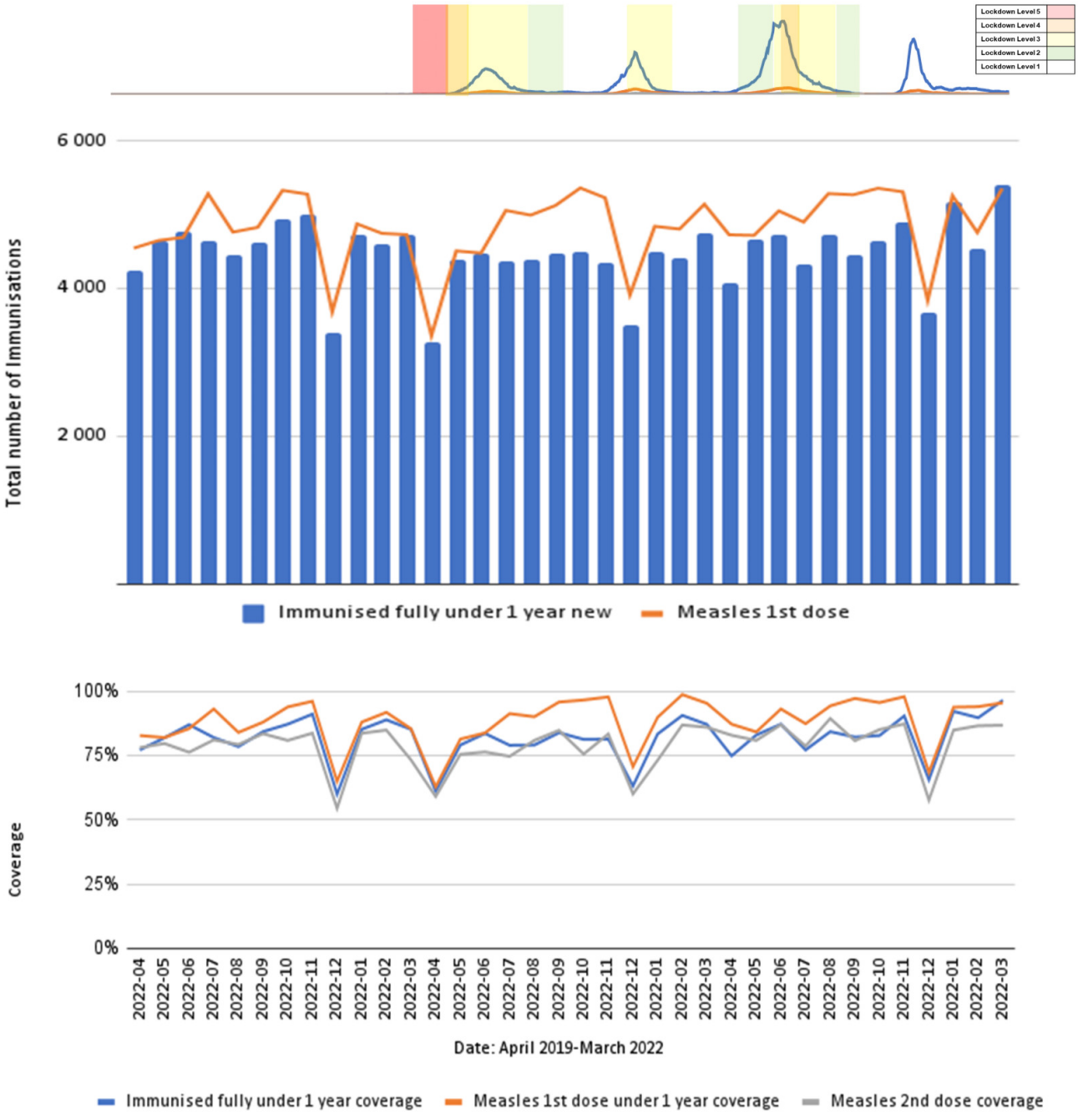
Source. District Health Information System and COVID-19 line list, Tshwane District Health Services

Figure 12. Monthly numbers of deworming and Vitamin A doses administered in Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



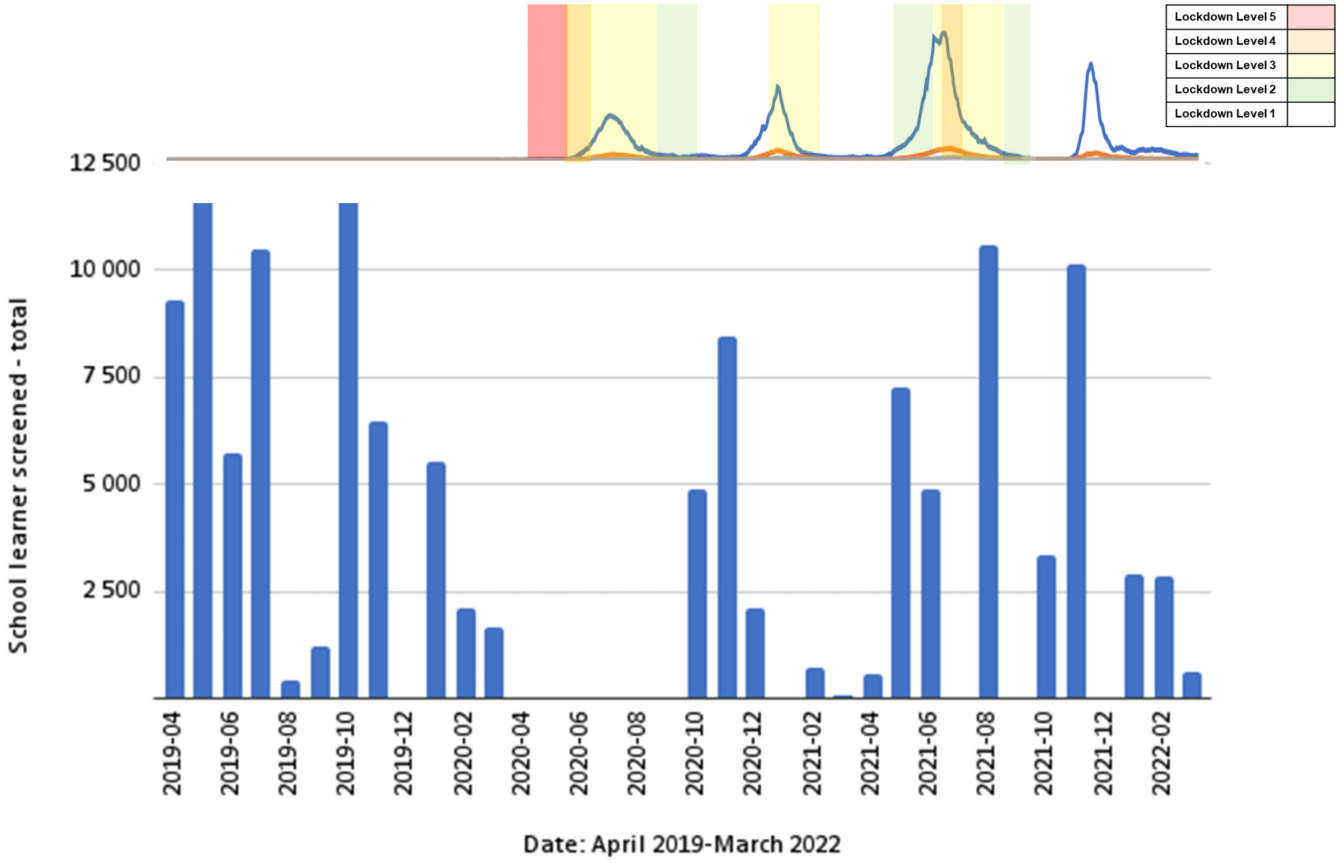
Source: District Health Information System and COVID-19 line list, Tshwane District Health Services

Figure 13. Monthly immunisation doses and coverage rates for Tshwane District from April 2019 to March 2022, as illustrated by number of children fully immunised under 1 year and measles first and second doses, with corresponding timelines of COVID-19 waves and lockdown levels



Source. District Health Information System and COVID-19 line list, Tshwane District Health Services

Figure 14. Monthly numbers of learners screened in Tshwane District from April 2019 to March 2022, with corresponding timelines of COVID-19 waves and lockdown levels



Source. Integrated School Health Programme data and COVID-19 line list, Tshwane District Health Services

Table 1. Consolidated data from HPV campaigns for girls at schools in Tshwane District, 2019-2022

Year	HPV campaign	Campaign coverage	Comments
2019	HPV-1 (February-March)	68% (15 056 targeted learners vaccinated)	Includes catch-up doses (HPV-1 of 2018 = 918; HPV-2 of 2017 = 637; HPV-2 of 2018 = 2 851).
	HPV-2 (August-September)	99% (15 710 targeted learners vaccinated)	Includes catch-up doses (HPV-1 of 2019 = 3 644; HPV-2 of 2018 = 2 691).
2020	HPV-1 (February-March)	114% (1 259 targeted Grade 4 learners vaccinated; 6% of additional girls who were new in school)	Target numbers very low because of transitioning year in which the target group moved from Grade 4 to Grade 5, as many learners were underage in Grade 4 leading to targets not being reached. No catch-up doses were given during this campaign.
	HPV-2 (August-September)	None	Campaign was suspended due to COVID-19-related school closures. Learners not vaccinated were to be rolled over to next year.
2021	HPV-1 (February-April)	81% (18 287 targeted learners vaccinated)	Overall learners vaccinated = 21 828, including catch-up doses (HPV-2 of 2020 & 2019 = 541).
	HPV-2 (August-September)	96% (18 024 targeted learners vaccinated)	Overall learners vaccinated = 19 811; including catch-up doses (HPV-1 of 2021 = 1 570; HPV-2 of 2019 & 2020 = 217).
2022	HPV-1	89% (20 515 targeted learners vaccinated)	Overall learners vaccinated = 20 515; no catch-ups were done, as all outstanding learners planned to be vaccinated during subsequent round.

Source: Integrated School Health Programme data, Tshwane District Health Services.

Table 2. Summary of selected MNCWH indicators and their performance in Tshwane District, 2019-2022

Grouping	Indicator/measurement	Preventive service or clinical care*	Main service delivery platform	Performance over study period**
Women's health and reproductive services	Family planning (couple-year protection rate)	Preventive	Health facilities at all levels; mainly PHC facilities	Decreased during 2020/2021; further decrease during 2021/2022.
	Termination of pregnancy (number)	Clinical	Hospital-level (mostly outpatient service)	Decreased during 2020/2021; with increase in 2021/2022 to higher than pre-pandemic levels.
	Cervical cancer screening (number)	Preventive	Health facilities at all levels; mainly PHC facilities	Decreased markedly during 2020/2021, with recovery in 2021/2022, but not reaching pre-pandemic levels.
Forensic clinical services	Clinical consultations (number)	Clinical	Dedicated sites at health facilities (outpatient service)	Marked decrease during each lockdown period, with severe reduction during 1st strict lockdown period, but otherwise services were maintained.
Maternal and neonatal health	Antenatal care (ANC first visits; ANC first visits <20 weeks) (number)	Preventive & clinical	Health facilities at all levels	ANC visits mostly maintained throughout, despite some monthly variations, with overall slight reductions in monthly first ANC visit numbers. Percentage of early bookings (first ANC visit <20 weeks) remained unchanged.
	In-facility deliveries (number)	Clinical	Health facilities at all levels	Slight increase during 2020/2021; decrease to below pre-pandemic levels during 2021/2022.
	Stillbirths (in-facility) (number)	Clinical	Health facilities at all levels	Stillbirth numbers increased in 2020/2021, with two peaks (after COVID-19 wave 1 & second sustained peak during COVID-19 waves 2&3). Stillbirth numbers in 2021/2022 returned to pre-pandemic levels.
	Teenage pregnancies (Delivery in 10 to 19 years in-facility rate)	Preventive & clinical	Health facilities at all levels	Increased percentage in 2020/2021, with further increase in 2021/2022.
	Born before arrival (number)	Preventive & clinical	Outside of health facilities	Increased number in 2020/2021, with further increase in 2021/2022, with largest peak in July 2021 after COVID-19 wave 3.
	HIV programme: Infant birth HIV PCR (number)	Preventive & clinical	Health facilities at all levels	Infant birth PCR compared with live births to HIV-positive women well maintained throughout entire period.
Child health	Vitamin A dose (age 12-59 months) (number)	Preventive	PHC facilities, community-level, including crèches	Large reduction in 2020/2021 (>50%), especially during level-5 lockdown. Recovery in 2021/2022, but not to pre-pandemic levels.
	Deworming dose (age 12-59 months) (number)	Preventive	PHC facilities, community-level, including crèches	Large reduction in 2020/2021 (>50%), especially during level-5 lockdown. Recovery in 2021/2022, but not to pre-pandemic levels.

Grouping	Indicator/measurement	Preventive service or clinical care*	Main service delivery platform	Performance over study period**
	EPI: Measles first dose (number & coverage)	Preventive	PHC facilities	Sharp decline during 2022/2021 at start of strict lockdown (April 2020), with subsequent catch-up; percentage in 2021/2022 higher than pre-pandemic levels.
	EPI: Fully immunised under 1 year (number & coverage)	Preventive	PHC facilities	Maintained overall, except for sharp declines linked to COVID-19 waves and lockdown levels.
School health	Health screening of learners (number)	Preventive	Schools	Large reductions in 2020/2021, with minimal or no screening in some months. Recovery in 2021/2022, with fewer months with low activities.
	HPV vaccination (number)	Preventive	Schools	Complex pattern due to campaign-based delivery, with confluence of two major impacting factors, namely COVID-19-related school closures and HPV target age adjustment.

PHC = primary health care; ANC = antenatal care; EPI = Expanded Programme on Immunization.
*Preventive services include measures taken for the purpose of disease prevention. Clinical care includes activities involving or relating to the direct medical treatment or testing of patients.
**Colour coding: Red = mostly negative impact; Yellow = complex impact; Green = services largely maintained.

Abbreviations

Abbreviation	Description
ANC	antenatal care
BBA	born before arrival
COVID-19	coronavirus disease of 2019
CYPR	couple-year protection rate
DHIS	District Health Information System
EPI	Expanded Programme on Immunization
HIV	human immunodeficiency virus
HPV	human papillomavirus
ISHP	Integrated School Health Programme
MNCWH	maternal, newborn, child and women's health
NHLS	National Health Laboratory Service
PCR	polymerase chain reaction
PHC	primary health care
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
TOP	termination of pregnancy

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Research

Gender differences in mental health outcomes during the first COVID-19 pandemic lockdown in South Africa

Atholl Kleinhans[1], Antonio Lentoor[2], Mokoena Maepa[2]

[1] Public Health, Sefako Makgatho Health Sciences University,
[2] Clinical Psychology, Sefako Makgatho Health Sciences University

South African Health Review

Background

While the COVID-19 pandemic affected everyone in society, it was women who bore the brunt during the first hard lockdown in South Africa. This study examined the gender differences in mental health outcomes during the first COVID-19 pandemic lockdown in the country.

Methods

A cross-sectional, survey-based study was done, with a total of 327 participants recruited in South Africa via convenience sampling using online platforms such as Facebook, Twitter, university websites, WhatsApp, forums, and emails. The participants completed socio-demographic and COVID-19 threat- and stress-related questions. The Patient Health Questionnaire (PHQ-9) was completed as a measure of depression. The chi-squared test and Analysis of Variance (ANOVA) were applied during analysis. All analyses were conducted using IBM SPSS Statistics version 20 (IBM Corporation, Armonk, NY, USA), with a level of significance set at 0.05, two-tailed.

Results

The study found that fear of COVID-19 disease impacted stress and depression levels in both genders, with a significantly greater impact among women. A higher proportion of women than men reported stress related to the lockdown (62.9% versus 23%, p = 0.01). Subjective risk at work, work stress, and being required to continue work during lockdown were significantly associated with depression among women.

Conclusions

The study highlights the differential effect of stress, fear, and worry during the pandemic lockdown on vulnerability to depression, by gender. This has major implications for mental health interventions post-pandemic. It brings an opportunity to reduce gender difference in mental health through providing tailored care services, especially to working women during times of high stress.

Introduction

In 2019, an outbreak of a novel coronavirus in China shook the world. SARS-CoV-2, or COVID-19, rapidly spread to all parts of the globe and was declared a pandemic by the World Health Organization on 11 March 2020.[1] The South African President imposed a level five (total) national lockdown on 26 March 2020, after the country reported 13 cases of COVID-19.[2] Evidence suggests that when schools and childcare facilities closed, mothers took on the brunt of additional unpaid care work, and correspondingly, they experienced labour-market penalties and stress.[3]

It is well established in the literature that the interaction between biological factors and social determinants of health, particularly gender stereotypes and roles, social stigma, and inequity, put women at greater risk for psychological problems than men.[4-6] Prior to the pandemic, and across countries, women already performed a daily average of four hours and 25 minutes of unpaid care work against one hour and 23 minutes for men.[3] The onset of the pandemic, with its associated closure of schools, childcare and other care facilities, heavily increased the daily time women spent in unpaid care work.[7] While the hard lockdown was a public-health measure designed to halt the disease from spreading, it also imposed restrictions on people's ability to leave their

homes, keeping them confined inside.[8] Most people were required to work remotely from home. However, most women continued, and were expected to continue, to perform unpaid care work at home.[7]

Unpaid care work includes a number of household duties such as cooking, cleaning, fetching water, firewood and fuel, and childcare and/or elder care, with these tasks assigned to women based on gender stereotypes (over-generalisation of the characteristics, differences, and attributes of a certain group based on their gender).[9] These widely accepted social biases perpetuate the notion that each gender and associated behaviours are binary.[9]

A study conducted in Italy found that the mental health impact of the COVID-19 lockdown was worse among females than males, and that the mental health symptoms were positively associated with caring for a person at home.[10] This is of concern given the fact that during 2021 more than two-fifths (42.1%) of all South African households were headed by women, with female-headed households most common in rural areas (47.7%).[11] Equally of concern is the fact that globally women also make up over 70% of health workers, including those working in care institutions[12] and they were on the forefront in the COVID-19 response. Due to the pandemic, women faced a double burden of longer shifts at work and additional care work at home, increasing the likelihood of mental health conditions such as depression among these women.[12]

Researchers[12] mapping depression trajectories in the Swedish working population between 2008 and 2014 found that women generally worked longer hours overall and spent more time doing unpaid work than men. Another study found that household stress seemed to affect women more than men, which is not surprising when one considers the differential effects of the 'double burden' of paid and unpaid work.[13]Women may experience more role strain because of their multiple roles,[14] for example, while focusing on their own health-related concerns, they also take care of other family members.[15] The link between a higher symptom trajectory and more unpaid work hours was found to be stronger for women than men.[13] No association was found for men, while an association was found between more total work hours and a 'high stable' depression trajectory for women.[13]

According to a 30-year global systematic analysis published in *Lancet Psychiatry* in 2019, mental health disorders have been on the increase and remain a significant leading cause of disease burden globally, even prior to onset of the COVID-19 pandemic.[16] The pandemic not only brought to light the growing burden of mental health illnesses in South Africa, but also highlighted the uneven burden that women share in this area. The hard lockdowns further exposed pre-existing toxic social norms and gender inequality, and exacerbated the social and economic stress caused by the pandemic.[17] This put further strain on access to mental health services, and in the absence of tele-health psychology and psychiatry at the time of the first lockdown, this meant most patient care was interrupted.[18]

Evidence is mounting globally, that the COVID-19 pandemic and its economic fallout are having a regressive effect on gender equality, exacerbating an already high burden of mental health among women, which is mainly associated with unpaid care work.[19] Although it safe to say that COVID-19 affected everyone in society, recent incoming data suggest that women may have experienced the greatest effects of the pandemic. If these disparities are not adequately addressed, women and society will continue to suffer the effects for decades to come.

Prior to 2020, mental health disorders contributed significantly to the global health burden, with depression and anxiety disorders in the lead; the pandemic exacerbated this burden, unequally so for women. The need for social restrictions and lockdown measures to curb the spread of COVID-19 significantly restricted access to mental health care services. The impact on mental health was substantial, combining the stress induced by public health measures, including lockdown and social restrictions, and shifting of work-home balance.[20] In light of this, the present chapter undertook to examine the effect of the pandemic on women's mental health in South Africa, and the factors that predisposed them to vulnerabilities and adverse impacts during the first wave of the pandemic.

Methods

A population-based cross-sectional study was conducted during the first wave of the COVID-19 pandemic (between March 2020 and June 2020), among individuals aged 18 years and older living in South Africa. Through convenience sampling, the survey was distributed online over several social-media platforms, and respondents were encouraged to distribute the survey to others (snowballing) in order to have a wide reach across the nine provinces. This method was deemed appropriate as data collection took place during the COVID-19 social restrictions. The sample size was calculated with a 95% confidence level, a 5% margin of error, and a 50% response distribution, which was considered acceptable. A minimum of 300 people was required to complete the online survey.

An online survey was deemed the best method for data collection as it was necessary to minimise face-to-face contact during the lockdown period in line with the South African government's recommendation of social distancing. All participants were invited to complete the survey that was distributed on various social media platforms, including Facebook, Twitter, university websites, WhatsApp, and forums.

The first part of the online survey included questions on socio-demographic details. The second part of the survey explored depressive symptoms on the nine-item Patient Health Questionnaire (PHQ-9), which is validated and used in South Africa. The four-point scale ranges from 0 (not at all) to 3 (nearly every day), and evaluates

the frequency of feeling depressed over the past two weeks. The total score ranges from 0 to 27, with a score above 8 indicating depression. In terms of COVID-19-related stress, participants were asked whether they were struggling with lockdown (feelings of stress and anxiety, sadness, anger, and/or frustration (depressed); problems in family relationships; problems in romantic relationships; stress about finances; thoughts and/or feelings of suicide; or increased use of alcohol/cigarettes/drugs). The survey assessed COVID-19 stress at work (Yes, No), whether it was mandatory to work during lockdown (Yes, No), and whether work was perceived as a risk for contracting COVID-19 (Yes, No).

Descriptive statistics were used to compile socio-demographic and health profiles of the study sample and were expressed in mean (M), standard deviations (SD), and frequency data. Inferential statistics, such chi-squared tests (nominal data) for differences in socio-demographic, psychosocial, and health factors, were calculated in the study. All analyses were done using IBM SPSS Statistics version 20 (IBM Corporation, Armonk, NY, USA), with a level of significance set at 0.05, two-tailed.

Ethical approval was received from Sefako Makgatho Health Sciences University Research Ethics Committee.

Results

A total of 327 respondents completed the online survey, of whom 93 were men and 234 were women. Almost half of the respondents were black (n = 148 , followed by white (n = 49), Indian (n = 21), and Coloured (n = 11). The (20-44 years) age group were the biggest group of respondents (138), while older adults in the age group 65 years and older made up the least of the respondents. Out of the total sample, 23 respondents had a high-school education, 92 had an undergraduate education, and 212 had a postgraduate education. As such, the results showed that the majority of the participants were black women of working age (18 - 64 years), with a majority (158) having a postgraduate level of education. Among all the respondents, (157) were women, who were required to work during the mandatory lockdown period.

Scores on the PHQ-9 ranged from 0 to 27, with a mean of 8.55 (SD = 6.993). The prevalence of depression was 62% (n = 201): 73% (147/201) among women and 29% (54/201) among men (Table 1). Women reported greater severity of depressive symptoms than men (p = 0.005).

Respondents were asked about their experiences of lockdown-related stress (Table 2). The rates reported were higher in women than men (234 versus 93). Gender was found to be significantly associated with lockdown stress; women reported higher rates of financial stress (27), and relationship stress (19) than men, indicating that they were experiencing more self-reported 'anxious and low mood' symptoms (160 versus 49) (p = 0.01) (Table 2).

Analysis of variance was performed to determine the differences in depression by level of education, age and lockdown-related stress in study respondents (Table 3). A statistically significant difference was found between depression and age, F (2, (n) 321) = 3.861, p = 0.022). The Tukey's honestly significant difference test, used to test for multiple comparisons, found that the mean value of depression was significantly different between young adults and older adults (p = 0.017, 95% CI = [0.41, 5.09]). A significant difference was found between depression and level of education, F (2, (n) 321) = 6.049, p = 0.003). Results indicated that the mean depression was significantly higher in the secondary-school group than in those with an undergraduate and postgraduate level of education. Age and education level were significantly associated with depression.

Respondents also completed four items on the association between depression and work-related stress in study respondents (Table 4). Almost 26% of women and 11.6% of men responded positively to the statement "I felt extra stress at work", while close to 19% of women responded positively to "I believe that my job was putting me at great risk" and only 12% of men. The rates of subjective stress X^2 (2, n = 86) = 25.13, p = <0.001 and work-related stress X^2 (2, n = 62) = 9.36, p = 0.009 were significantly higher for women than men (Table 4).

Perceived risk at work (p = 0.009), work stress (p = 0.027), and continuing to work during lockdown (p = 0.053) were found to be significantly associated with depression (Table 4). Of the total sample (n = 327), 41% of respondents who experienced their work as stressful, 40% of those who continued working, and 19% of those who perceived work as a risk for contracting COVID-19, also reported depression. There was a significant association by gender, with women (p <0.001) reporting significantly higher levels of work stress associated with depression than men (p = 0.036). In addition, perceived risk at work for contracting COVID-19 was significantly associated with depression among women (p = 0.031).

Discussion

Analysis of the data (above) showed a significant psychological impact on the study participants during the early stage of the pandemic. Over 60% of participants reported moderate to severe depression. This finding is consistent with findings of several studies conducted from the onset of the COVID-19 pandemic.[21-26] Younger adults (18 - 34 years) reported higher rates of depression than older adults (65 years and older), a finding comparable with that of another study.[27] Elements that have been connected to this outcome are the greater susceptibility of young adults to loneliness, uncertainty, and worry about the future.[28] Higher rates of depression reported in this study may also have been due to reduced access to mental health services in the country. Unlike China, the UK, and the USA, mental health infrastructure in South Africa is poor, as in most other low-resource countries. At the time of the pandemic and first nationwide lockdown, South Africa did not have access to online or digital or tele-health (or tele-psychology) services that would have provided access to care at a time of high levels of fear,

Table 1. Psychosocial profile of the study respondents (n = 327)

Characteristics	Men	Women	
	n	n	p-value
Depression			
No depression	38 (19%)	85 (42%)	
Depression	54 (29%)	147 (73%)	
Depression (severity)			0.005
Low	38 (19%)	85 (42%)	
Mild	16 (8%)	63 (31%)	
Moderate	31 (15%)	69 (34%)	
Severe	7 (3%)	15 (8%)	

Table 2. Lockdown-related stress profile of the study respondents (n = 327)

	Men	Women	
	n	n	p-value
Lockdown-related stress			
No stress	15	28	
Anxious + low mood	49	160	
Substance-use problem	3	0	
Relationship problem	11	19	
Financial problem	15	27	
Subjective stress and work-related subjective stress (yes)			
I felt extra stress at work	38	85	0.001
I believed that my job was putting me at great risk	42	60	0.008
I am required to continue to work during the lockdown period?	70	157	0.005
I consider the work that I do too stressful in general?	59	144	0.027

threat and distress; this may have contributed to the high levels of depression. The current literature shows these figures to be above pre-pandemic prevalence levels,[29,30] mainly due to the significant psychological effects resulting from the isolated circumstances imposed by COVID-19 disease. The pandemic caused major life-altering situations and was considered a significant stressor, invoking fear, loneliness and uncertainty in the daily lives of people.[31]

This study highlights the possible association between stress, fear and worry during the pandemic lockdown, and vulnerability to depression. Similar to another study,[32] this study found that women were more likely than men to perceive stress and display worry about contracting COVID-19. Previous studies have shown that women frequently display more pessimistic thinking and dysphoric mood than men, related to how they appraise stressful events,[33] such as a pandemic. In line with previous findings,[34] this study found that subjective experience of stress was significantly greater for women than men, and was associated with increased stress at work and the risk of contracting COVID-19 at work. This is important to note since close to 70% of the women who participated in this study were required to continue work during the first hard lockdown. Findings from another study[35] have shown that in addition to full-time or part-time employment, working mothers had the added responsibility of taking care of children during lockdown in the absence of support of extended families, nannies, and domestic help, which might have caused additional stress and psychological problems.

The results also showed that lockdown-related stress, including financial stress and relationship stress, was significantly higher for women than men and was positively associated with depression, a finding supported by another study.[29] This may be partly due to what is already known through research, namely that women are more likely to be single parents, who earn less and who are more likely to live in suboptimal financial circumstances than men, heightening their vulnerability to stress and depression.[36] Additionally, there has been concern that intolerance of uncertainty, and the fear created by

Table 3. One-way ANOVA showing differences in depression by level of education, age and lockdown-related stress in study respondents (n = 327)

Group	n	m	SD	df	F	p
Education				2	6.049	0.03
Secondary + below	23	11.96	8.305			
Undergraduate	92	9.78	7.577			
Postgraduate	212	7.65	6.398			
Age group				2	3.861	0.022
Young adult	102	9.56	6.744			
Middle-aged adult	138	8.86	7.207			
Older adult	84	6.81	6.692			
Lockdown-related stress				2	5.133	0.006
No stress	43	2.58	3.361			
Anxious + low mood	207	10.05	7.107			
Substance-use problem	3	12.00	7.937			
Relationship problems	29	8.17	5.619			
Financial problems	42	7.26	6.630			

n = sample size; m = mean; SD = standard deviation; df = degrees of freedom; F = variation between sample means; p= probability value.

Table 4. Association between depression and work-related stress in study respondents (n = 327)

Depression	n	df	X^2	p
I felt extra stress at work	86 (26%)	2	25.131	<0.001
I believed that my job was putting me at great risk	62 (19%)	2	9.362	0.009
I am required to continue to work during the lockdown period?	132 (40%)	2	5.874	0.053
I consider the work that I do too stressful in general?	134 (41%)	2	7.261	0.027

n = sample size; df = degrees of freedom; X^2 = chi-squared; p = probability value; IV = independent variable; DP = dependent variable.

COVID-19, had a disproportionate and negative psychological and socio-economic impact on women.[37,38] Research has shown that the fear is two-fold: on the one hand, fear of COVID-19 contagion in the workplace, and on the other hand, fear imposed by uncertainty, including fear of losing employment, a threat directly created by the pandemic.[39] This fear is associated with an increased risk of depression, especially among women, and induces high levels of stress.

However, the results of this study contrast with findings of some studies that did not find any association between gender, stress and depression.[40] It may be that in our study sample, women generally felt more at risk and were more negatively impacted by COVID-19 than men. Some literature suggests that women had an increased burden in juggling work-home balance.[41] These differences may also be attributed to methodological variability across studies or a factor of response bias based on self-reported measures. Further research is needed to make sense of some of the differences observed across studies. Nevertheless, these findings highlight the possible impact of fear and stress during the pandemic lockdown on mental health challenges. Although both men and women were impacted by their fear of COVID-19 and its effects, this study found that women were more psychologically distressed than men. The results add to the understanding of the role of fear and stress in vulnerability to depression among women in the COVID-19 crisis situation.

There are several limitations to the study. First, self-reported measures were used that rely on subjective reports rather than clinical assessments. The participants may have exaggerated or underreported their symptoms. As a result, the level of mental distress was not captured accurately. Second, data collection was conducted electronically via various social network platforms during the first strict countrywide lockdown. As result, only those who had access to the internet, smartphone or electronic devices were included, which to some extent introduced sampling bias and limited generalisabil-

ity. Third, the study was conducted during the first wave of the pandemic and hard lockdown, and thus the data did not reflect the full trajectory of the pandemic. The significant strength of the study was the use of a reliable and valid measure of depression, namely the PHQ-9, which is used in the local context in clinical practice and research settings.

Conclusions

Women reported significantly higher levels of pandemic stress than men, which in turn was associated with women's susceptibility to depression. Younger working women in particular reported higher levels of depression than older women due to worries and stress associated with COVID-19 and lockdown. This result is in line with concerns that intolerance of uncertainty, and fear during COVID-19, had a disproportionately adverse psychological effect on women. The focus of this study on the psychological consequences of COVID-19 by gender is pertinent in order to reduce the mental health burden, especially among women, and to provide appropriate and tailored care services to the population post pandemic.

Recommendations

This study has policy implications for the employment conditions of women, particularly working mothers. Employers should consider subsidising mental health insurance packages and adjusted working conditions for working mothers to promote better coping. It is also recommended that there be subsidised day care for working mothers as a targeted post-pandemic initiative. Post-COVID, we have the opportunity to minimise the gender mental-health gap and promote better adjustment and coping of working mothers, ultimately minimising gender inequalities.[36]

Abbreviations

Abbreviation	Description
ANOVA	Analysis of Variance
COVID-19	coronavirus disease 2019
df	degrees of freedom
DP	dependent variable
IBM	International Business Machines Corporation
IV	independent variable
PHQ	Patient Health Questionnaire
SD	standard deviation
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

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Review

The 'just transition' and health in South Africa

James Irlam[1], Rico Euripidou[2], Mafoko Phomane[2], Azeeza Rangunwala[2]

[1] Primary Health Care Directorate; Department of Family, Community and Emergency Care, University of Cape Town,
[2] The groundWork Trust, South Africa

South African Health Review

Background

South Africa's long history of dependence on coal-fired power has had severe impacts on climate, environmental health, and public health. Global pressures and local demands for a planned just transition in South Africa have been growing. People are calling for a transition to clean renewable energy that optimises socio-economic and local ecological benefits. The Just Transition Open Agenda is a contribution to the national debate by the Life After Coal civil society campaign. The Open Agenda proposes radical changes leading to a new health system for all. This is needed, especially to address the differential and continual health impacts of unsafe levels of air pollution especially where most of South Africa's coal-fired power stations are located.

Approach

This paper reviews South Africa's climate change response and the role that the healthcare sector (as a significant source of emissions and environmental pollution) can play in reducing global carbon emissions and helping societies to adapt and become more 'climate resilient'. The chapter considers some of the recommendations for public health within the just transition movement in South Africa, with a particular focus on the heavily polluted Highveld Priority Area in Mpumalanga, and the implications of these recommendations for the healthcare sector.

Conclusions

A comprehensive public health plan for the Highveld Priority Area, guided by the principles of communication, collaboration, and active participation, would begin to provide some measure of restorative justice for the communities most affected by coal-related pollution. The plan should include effective health surveillance and air pollution early-warning systems, community outreach programmes, and well-resourced and accessible public health facilities prepared to deal with respiratory emergencies. The Global Green and Healthy Hospitals network agenda's 10 goals towards 'climate-smart' health care, which provide practical guidance for achieving sustainable, low-carbon, and climate-resilient health systems must be urgently pursued as part of global and local efforts towards greater climate justice and health equity.

Introduction

Globally, climate change is recognised as a growing threat to public health in the 21st century, as it amplifies multiple environmental risks to health. However, the climate crisis provides a significant opportunity to achieve meaningful co-benefits for climate, health, and well-being, through mitigating emissions and adapting societies to the multiple impacts of climate change.[1-3] Due to its heavy dependence on fossil fuel-based energy, South Africa is a significant emitter of the greenhouse gases that cause global warming. The country is alarmingly vulnerable to adverse climate impacts, such as extreme heat, increased frequency of drought, and flooding, which are exacerbated by high levels of ill health, malnutrition, homelessness, unemployment, and deep-rooted poverty.[4] South Africa's climate policies and plans therefore recognise the need for urgent climate action through increased climate change mitigation, adaptation, and advocacy efforts.[5,6]

Global pressures and local demands for a planned just transition in South Africa have been growing. People are calling for a transition to clean renewable energy that minimises the socio-economic impacts on those who depend on the coal value chain, and that optimises job creation and local ecological benefits. Furthermore, the economic and health impacts of the current energy supply crisis in South Africa, characterised by frequent load shedding and use of diesel-fired 'peaking plants' and private generators, have strengthened these calls for transition.[4] The framework for this 'just transition' to green the economy in a fair and inclusive manner, has been the

subject of much recent debate and stakeholder consultation.[7,8]

The healthcare sector has a key role to play in reducing global carbon emissions and helping societies to adapt and become more 'climate resilient'. If the health sector was a country, it would be the fifth-largest emitter of carbon emissions on the planet, with more than half of these emissions due to its energy use.[9] Yet health workers are generally well placed and trusted to protect public health from climate and environmental changes, given their proximity and ability to assist those most affected.[10] Strong leadership in the health sector is needed to reduce the huge planetary impact of this sector, including its use of non-renewable energy, water, and transport, as well as its use of large amounts of toxic and plastic waste, which were so evident during the COVID-19 pandemic.[11]

The objective of this chapter is to present some of the recommendations for public health within the just transition movement in South Africa, with a particular focus on the heavily polluted Highveld Priority Area in Mpumalanga, and the implications of these recommendations for the healthcare sector.

Open Agenda for the Just Transition in South Africa

The South African economy has long been dominated by what is known as the 'minerals-energy complex'.[12] The country's reliance on coal as its primary energy source and its long-term policy of providing cheap electricity to heavily polluting industries and mines has resulted in a highly unequal and carbon-intensive economy.[13] Income inequality and high levels of extreme poverty, defined by race, class, gender and geography, have been intensifying since the democratic transition in 1994. The COVID-19 pandemic highlighted these divides, as it exerted its biggest impact in places with the highest levels of inequality in the country.

The Presidential Climate Commission (PCC) was established in 2020 to advise on South Africa's climate change response and transition to a low-carbon and climate-resilient economy and society. The PCC facilitates dialogue between a wide range of stakeholders to define the desired type of economy and how to achieve it. The Just Transition Framework seeks to provide a road map for this process, based on evidence from research and extensive stakeholder and public consultation.[8]

The founding partners of the Life After Coal Campaign (Earthlife Africa, groundWork and the Centre for Environmental Rights) developed an Open Agenda for a Just Transition as a formal declaration of their position on a just and equitable transition. The Open Agenda was launched in May 2022 as a contribution to the national consultative process. It includes 12 key demands (Box 1).

The Open Agenda's demand for a new health system proposes radical changes to address current public health challenges, as well as the losses and damages incurred by slow-onset and rapid climate events (Box 2).

Box 1: Demands for a just transition in South Africa, May 2020

1. A new, sustainable energy system to replace polluting fossil fuels that serve the elite.
2. The end of financing for coal and other fossil fuel investments, including gas.
3. The rehabilitation of land and water ruined by coal mining and burning.
4. Concerted efforts to prepare for and deal with the impacts of climate change.
5. A new health system that works for the health of all people.
6. Transport and communication systems that are inclusive and enable all people to participate in public debates and decision making.
7. Food sovereignty and food security for all people.
8. Local service delivery, and an undertaking to use open democracy and self-provision to achieve this.
9. A new economic system in which economic decision making starts by asking people what their needs are, and how to fulfil them, rather than having an economy that serves profit alone.
10. A society rooted in gender justice.
11. Special attention to youthful citizens and their futures.
12. Open democracy as the basis for decision making.

Source: Life After Coal, Just Transition Open Agenda, 2022.[14]

Box 2: Required health-system changes for a just transition in South Africa, 2020

1. Internalising the public health costs of coal and other fossil fuels to the polluters' accounts, i.e. the 'polluter pays' principle.
2. Active and accountable leadership to urgently acknowledge and address the ongoing public health disaster caused by unsafe levels of air pollution.
3. Recognition by policy and decision makers that economic activity that sacrifices people's health can never be deemed sustainable or justifiable.
4. Mobilising affected people and health professionals to urge government action.
5. Assisting health workers to understand that their actions could have significant climate and health benefits.
6. Building a fully functional health care system that realises the Preamble and objectives of the National Health Act of 2004, which includes sections 24(a), 27, and 28 of the Constitution.
7. Recognising that climate change will bring further pressure to bear on the South African health system, which is already unable to cope with the current burden of disease.
8. Educating health professionals in adaptive management to deal with emergent health threats such as COVID-19.
9. Implementing the Department of Health's Climate Change Health Adaptation Plan by ensuring co-operation between all responsible government authorities.
10. Building a functioning cooperative governance system of industry, government, health, and education role players, informed by a public health approach.
11. The effective and transparent monitoring of environmental health data.

Source: Life After Coal, Just Transition Open Agenda, 2022.[14]

A public health plan for the just transition

The Open Agenda calls for leadership to address the "ongoing public health disaster caused by unsafe levels of air pollution" as a matter of urgency.[14] Air pollution from the burning of fossil fuels, like coal, is the leading global cause of climate change and among the world's greatest risks to health.[15] Besides causing mortality from multiple causes, air pollution is strongly associated with allergies, colds, coughs, headaches, dizziness, fatigue, absenteeism, impaired productivity, and mental ill-health.[16] Linked action against climate change and air pollution, such as investment in universal clean energy, therefore has the potential for significant co-benefits to the climate, the environment, and human health.

Extreme air pollution on the Mpumalanga Highveld has long been a feature of that landscape due to the concentration of coal-fired power stations in the area.[17, 18] The Mpumalanga Highveld was declared the Highveld Priority Area (HPA) in November 2007, acknowledging that the ambient air quality regularly exceeded national standards and hence required specific action.[19] However, only a few studies have assessed the health risks of air pollution in the HPA and no respiratory health studies have been carried out.[20] In 2019, the 'Deadly Air' case highlighted evidence of the health impacts on local communities and compelled the Minister of Environmental Affairs to act (Box 3).[21]

Box 3: The 'Deadly Air' case, Mpumalanga, South Africa, 2019

A 2017 study of the health impacts of coal-fired power plants in South Africa reported a broad spectrum of consequences, including mortality and cardiovascular and respiratory illness.[18] It estimated that 2 239 human deaths per year, and more than 9 500 cases of bronchitis among children aged 6-12 years, could be attributable to coal-related air pollution. This evidence formed the basis for the 'Deadly Air' case, a legal challenge in 2019 by two environmental justice organisations in South Africa. The organisations alleged that consistently poor air quality in Mpumalanga has violated the section 24(a) constitutional right to a healthy environment for people living on the Highveld.[22] On 18 March 2022, judgment was delivered in their favour, declaring a breach of the constitutional rights of residents. Furthermore, it was found that the Minister of Environmental Affairs has a legal duty to prescribe regulations under section 20 of the National Environmental Management: Air Quality Act 39 of 2004.[23]

Despite this, the National Climate Change and Health Adaptation Plan is silent in outlining the concrete steps needed to protect people living in the HPA from the continual impacts of coal-fired electricity and coal mining, and for an ailing public health system to provide better health services.[5] In 2022, a community health needs assessment was conducted in the HPA to explore the health challenges of pollution from coal mining and burning.[1] It found that clinics near the major sources of pollution had no specialised care for people with respiratory disorders, who are most likely to become seriously ill. The available clinics were constantly full, and patients had no guarantee of being seen on the day of presentation, which results in additional lost days and lost income. Shortages of human resources and medications, and limited ambulance services, compel patients to hire expensive transport to health services in emergency situations, and/or to purchase their own medications.

Every community consulted by the PCC during its community and stakeholder engagement on the Just Transition Framework called for reparations and for affordable and effective health services to treat the widespread health impacts from mining and energy operations, particularly respiratory issues.[7]

A health plan for the HPA should be guided by the *Batho Pele* principles for transforming South African service delivery of consultation, redress, and accurate information.[24] Accordingly, the health burden should be determined in affected communities. Exposure data from the National Ambient Air Quality Monitoring Network could be used as an early-warning system and to inform appropriate health management. Better regulation of mining activities could facilitate companies building local hospitals and compensate affected individuals and communities. The provision of free health care to affected communities would also help to redress the long and deadly legacy of air pollution and achieve some restorative justice. The 2022 groundWork report concludes that "restorative justice is crucial for ecosystem health, healthy water sources and people's health. These projects must be designed with effective community participation and create economic and livelihood opportunities for communities".[4]

Decarbonising health care

As understanding grows regarding the vital role of the health sector in mitigating and adapting to climate change, so decarbonisation of the sector has been increasingly championed by health professionals. The COP26 Health Programme, or Alliance for Transformative Action on Climate and Health (ATACH), with 61 member countries to date, includes national commitments to low-

1 Patrick S, Shirinde J. Steps Towards Developing a Community Health Plan for Mpumalanga using a Just Transition Lens. Unpublished report for the Centre for Environmental Rights, 2022.

carbon and climate-resilient healthcare systems, or 'climate-smart' health care. The ATACH Programme is informed by baseline assessments of emissions, includes a comprehensive understanding of supply chains, and has both established and developing action plans for sustainable health systems and reduced air pollution.[25]

The Global Green and Healthy Hospitals (GGHH) programme is a well-established global initiative that is active in South Africa to promote 'climate-smart' health care.[26] The GGHH agenda has 10 interlinked goals encompassing healthcare leadership, chemicals, waste, energy, water, transportation, food, pharmaceuticals, buildings and purchasing. These goals provide practical guidance on how a health system or health facility can reduce its carbon footprint and become more climate-resilient.

Many hospitals in South Africa have joined the global GGHH network of over 1 700 members and have made good progress towards some of these goals. Network members document their initiatives in the form of case studies, which are published on an online platform to facilitate collaboration or guidance on best practices. Management of healthcare waste is a 'low-hanging fruit' on the GGHH agenda, as it has a large carbon footprint and is a major cost driver for public health facilities. Several South African hospitals have well-documented case studies on healthcare waste-management reduction and improved waste segregation.[27]

Groote Schuur Hospital in Cape Town has been a member of GGHH since 2014, with a vision to reduce its emissions and move towards low-carbon or even carbon-neutral health care.[28] Working with different departments and limited resources in the public healthcare system, the hospital managed to reduce its water and coal consumption, eliminate polystyrene, reduce pharmaceutical waste, and introduce recycling initiatives. Khayelitsha Hospital in the Western Cape was the first GGHH member in South Africa to pilot microwave and frictional heating technology as an alternative to the incineration of waste.[29] Based on experience from this hospital, George Hospital followed suit and piloted on-site treatment. Emission reduction was the biggest win, with volume reduction leading to less waste to landfill. However, the alternative treatment of healthcare waste is still under-researched, and sustainable alternatives to incineration must be fully evaluated to determine the most efficient and cost-effective method.

The energy supply crisis and increasing electricity costs in South Africa have driven hospitals to seek alternative sources of energy and to reduce energy consumption without compromising the quality of health care. Netcare Limited, a private hospital group, replaced lighting systems nationwide with more efficient lighting and installed solar photovoltaic panels on hospital rooftops. Khayelitsha Hospital has also harnessed solar and wind energy. Passionate environmental health practitioners and health workers have led other initiatives, such as food gardens; diverting food waste to piggeries; promotion of water, energy, and waste recycling; and reducing pharmaceutical waste.

The GGHH network is a collaborative learning environment, open to new research evidence and the sharing of best practices. However, strong political leadership, supportive government policies, and funding are all required for public hospitals to urgently tackle the exponentially increasing costs related to climate change and its impacts on health and health care.[29] Achieving greater climate justice and health equity relies on climate-smart health care and on committed and competent healthcare professionals to manage the transformation.

Education for sustainable health care

Educating and training health workers for climate action is a key component of national commitments to low-carbon and climate-resilient healthcare systems.[30] An increasing number of global initiatives incorporate climate change and planetary health into education curricula, striving to create a cohort of 'eco-ethical' health professionals who are leaders and advocates for greater climate justice and health equity.[31,32] The World Health Organization-Civil Society Working Group to Advance Action on Health and Climate Change has called on health-education stakeholders to incorporate climate change into curricula and prepare health professionals to ensure functioning healthcare systems in a climate-changed future.[33]

Education for sustainable health care within health-professions education seeks to develop the necessary knowledge, skills, and attitudes regarding the interdependence of human and planetary health. It addresses the health impacts of climate and environmental changes, as well as the environmental footprint of health care.[34] The Consensus Statement on Planetary Health and Education for Sustainable Healthcare by the Association for Medical Education in Europe urges health professionals to systemic planetary health action to help meet environment-related Sustainable Development Goal targets by the year 2030.[35] The need for education on planetary health and sustainable health care in South Africa is consistent with calls for health professionals to be more socially and environmentally accountable.[36,37] As a potential leader and beneficiary of the just energy transition worldwide, South Africa should not delay in investing in education and capacity-building for a more secure climate future.

Conclusion

The just transition will continue to be a dominant feature of the national political and public-health landscape of South Africa in future. The Just Transition Open Agenda produced by the Life After Coal civil society campaign has proposed radical changes to improve the response of the public health system to the severe and continual

impacts of coal-related pollution in South Africa. This is especially needed in the heavily polluted Highveld Priority Area that generates most of South Africa's coal-fired electricity. New knowledge, skills, and values are required from healthcare leaders and health workers in South Africa to act with urgency to realise our constitutional right to a healthy environment and safe climate future.

The promising global and local initiatives to decarbonise the healthcare sector require strong leadership, enabling policies, and funding. Education on planetary health and sustainable health care is needed to develop health worker agency in protecting public health from climate change and environmental degradation, and for leadership in climate-smart health care.

Recommendations

Active and accountable leadership is needed in South Africa to place health firmly on the agenda of the 'just transition', to redress the injustices of coal-related pollution and climate change impacts on already-vulnerable communities, and to develop the capacity of health workers and healthcare institutions towards a low-carbon and climate-resilient healthcare system.

Abbreviations

Abbreviation	Description
ATACH	Alliance for Transformative Action on Climate and Health
GGHH	Global Green and Healthy Hospitals
HPA	Highveld Priority Area
PCC	Presidential Climate Commission

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Good Practice

Learning from COVID and climatic events to build a resilient health system: Western Cape Department of Health

Amanda Quintana[1], Laura Angeletti-du Toit[2], Lucy Gilson[3], Wayne Smith[4], Krishna Vallabhjee[5]

[1] Department of Public Health, Environment, and Society, London School of Hygiene & Tropical Medicine,
[2] Health, Western Cape Department of Health,
[3] Health Policy and Systems Division, University of Cape Town,
[4] Disaster Medicine, Western Cape Department of Health,
[5] Strategy, Western Cape Department of Health

South African Health Review

Background

The devastating KwaZulu-Natal floods in early 2022 were a reminder of the extensive damage to property and loss of life that climate change will exacerbate in South Africa. Extreme weather events are projected to increase in frequency and intensity in the southern African region. In recent years, the Western Cape has experienced fires, floods, drought, load-shedding, and COVID-19.

Approach

This chapter reflects on the experience of the Western Cape Department of Health around a series of adverse events in the province. The main lessons are identified, and a framework is suggested to strengthen the health sector's response to climate change.
The Department has been on an intentional learning journey to strengthen the health system, build health-system resilience, and to learn from these events. In addition to the need to adapt to external events, the health system itself contributes to greenhouse gas emissions. As such, the Department has discussed the mitigation activities it is engaged in to reduce its contribution to climate change. Building on the lessons learned from adverse events, the Department has identified five focus areas to strengthen the health sector's ability to respond to climate change: (i) structural and relational aspects of governance; (ii) stewardship, leadership, and management; (iii) partnerships and intersectoral collaboration; (iv) system capacities; and (v) learning oriented culture.

Conclusions

As the impacts of climate change are increasingly felt, there is an urgent need to share lessons from the health sector's response to adverse events. This learning can assist in implementing adaptive actions that strengthen health-system functions and that mitigate the health sector's greenhouse gas emissions. Health-sector leadership in South Africa needs to participate actively in climate action through the Presidential Climate Commission and other fora. The chapter concludes with recommendations that speak to the focus areas and shared learnings that can be helpful in other settings where health systems face climate risks.

Introduction

With additional increases in global warming the western and southern African region, which includes South Africa, is projected to experience increased pluvial floods, heavy rains, droughts, increased wind speed, sea-level rise, and a decrease in mean precipitation.[1,2] Although further research is required into climate and health impacts in the Western Cape (WC) specifically, climatic projections of increased warming and drying, and increased intensity and frequency of extreme weather events in the province, have been associated with adverse health outcomes.[3] A changing climate also poses additional challenges to the WC health system. However, over the past decade, including during the COVID-19 pandemic, the Western Cape Department of Health (WC DoH) has been on an intentional learning journey to strengthen its health sys-

tem's resilience.[4] The Department has built organisational muscle in the process of responding to a range of shocks and stressors, including specific adverse events (Figure 1) as well as intractable everyday service pressures. With regard to climate change, it will be important both to engage in mitigation activities that reduce the health system's greenhouse gas emissions, and to implement adaptation actions that protect the health system from future climate risks.

Health system resilience in the WC DoH

The literature provides a myriad definitions and frameworks of health-system resilience.[5] For the purposes of this chapter, and within the WC DoH, health-system resilience has been defined as having the capacity to absorb, adapt and transform in the short-term and long-term when exposed to a shock or stressor.[6,7] However, the Department has also considered 'everyday resilience', recognising that system resilience is rooted in the collective capacities embedded in individuals, teams, and organisational routines.[8,9]

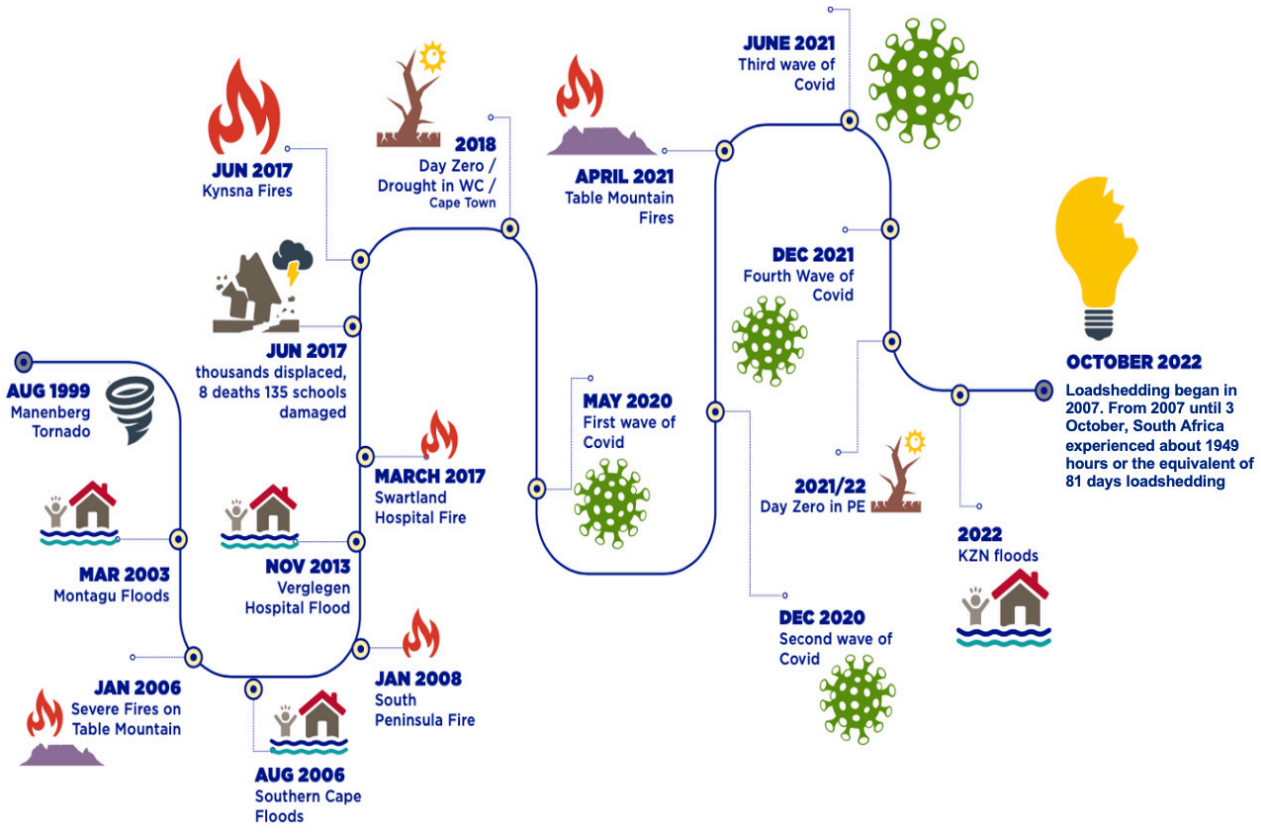
A range of adverse events have impacted the WC health system over the last 23 years, as shown in Figure 1. These can be broadly summarised as fires, floods, COVID-19, drought and load shedding.

Fires are common in the province, whether these be naturally occurring wildfires or due to electrical faults. Apart from infrastructure damage, a significant risk of fires is smoke inhalation, which necessitates moving people. The physical damage to Swartland Hospital in March 2017 included equipment such as X-ray machines, and required interim arrangements over a prolonged period to move services and house patients. In the Knysna fire of June 2017, more than 1000 homes were destroyed, asbestos from infrastructure contaminated surrounding waterways, and connectivity to cellular and landline phones was lost. This required a massive collaborative effort between government, business, and civil society to protect people and property.

Floods experienced in the province have at times damaged transport infrastructure such as roadways and bridges, and disrupted access to healthcare facilities, rendering the latter inaccessible to patients and the emergency medical services (EMS). In the 2003 Montagu floods, helicopter services were required to move patients requiring emergency referral as roads were inaccessible. In the 2013 flood at Vergelegen Hospital, water was a metre deep on the ground floor, damaging equipment and requiring an eight-hour operation to move about 130 patients to other facilities.

The drought, starting in 2016 and peaking in 2018, impacted the Western Cape health system significantly. Water supply to health facilities had to be augmented with

Figure 1. Adverse events impacting health services in the Western Cape, 1999-2022



Source: Western Cape Department of Health.

water tanks and boreholes, water leaks were repaired, water pressure was lowered to save water, water consumption was reduced through changes in staff attitudes and behaviours, and use of sanitisers was introduced for hand washing.

Disruption in electricity supply due to load-shedding began in 2007. The disruption escalated and peaked from October 2022. Health services in the province have been negatively impacted as health facilities are not automatically exempt from load-shedding periods. In the past few years, the Department has had to install an infrastructure of generators, ensure an adequate supply of diesel, and monitor energy use at health facilities.

Adversity caused by the COVID-19 pandemic was on another scale than these events, with tragic loss of patients and staff lives and an immense surge in service pressures. The impact of the pandemic experience has been well described locally and globally,[4] and applicable WC DoH learnings are described in more detail in the following sections.

Lessons from adverse events, shocks, and stressors

The scale and pace of the COVID-19 pandemic tested WC health-system-resilience to its limits. The pandemic forms an important benchmark and reference point in assessing future preparedness. It was a unique adverse event, impacting communities and disrupting systems globally through high death rates, societal disruption, and consequences for livelihoods. In addition to COVID, the various smaller-scale, climate-related and other shocks and stressors (shown in Figure 1) necessitated WC DoH system responses to mitigate their impact. However, both the pandemic and these adverse events also provided opportunities to learn, build organisational muscle, and strengthen the system to ensure continuity of health-service delivery and protection or improvement of patient experience and health outcomes. These experiences showed that the health system could respond in previously unimagined ways, creating new pathways for future system functioning. Responding to these shocks and stressors resulted in five key lessons for the WC DoH.

First, the response to shocks often demands that **structural and relational governance** is quick, agile, and adaptive across internal and external governance mechanisms. Speedy responses are required to protect patients and staff and ensure continuity of patient care. Evacuating patients to alternative, well-equipped settings, as in the 2013 Vergelegen Hospital flood, is one example. Another is how, during the COVID response, the Department was able to convert the Cape Town Convention Centre to an adequately staffed and stocked 860-bed intermediate care facility within a six-week timeframe. These experiences show that in times of crisis, government entities can be very responsive despite bureaucratic red tape. Such interventions require close collaboration between support services, such as infrastructure and supply-chain services, and frontline health services. During COVID-19, surveillance 'huddles', in a variety of settings, enabled rapid stock-taking and decision-making and were invaluable to effective responsiveness. They served as short, sharp connecting points for relevant staff, be it clinicians, management, or technical staff, such as public health specialists.

Wide-ranging adversity across large geographical areas (Figure 1) necessitates mindfulness of specific local conditions, context, risks, and capabilities. Differentiated system responses are needed, rather than a rigid 'one-solution-for-all' approach. For example, during the 2018 drought, the triage system used to track different vulnerabilities and water shortages across the province helped to prioritise targeted interventions.

Second, **stewardship**, **distributed leadership, and management capability** are paramount to provide strategic direction, mobilise around a common cause, and ensure that plans are executed efficiently at provincial and local levels. For this to happen, role players, including the health sector, need to step up beyond their conventional service-provider role, and have skills sets and sensitivity to the dynamics and power relations between various actors across sectors. The recovery phase post-COVID has also provided an opportunity to strengthen decentralised management, creating space for innovative local responses.

Third, **partnerships and collaborations** are critical across sectors, spheres of government, and between government, civil society and business. Across these three stakeholder groups, strong relationships, information-sharing, open and transparent communication, and flexible governance mechanisms are crucial. This enables proper coordination and rapid decision-making. Positive experiences of intersectoral collaboration were seen during COVID through the hot-spot strategy, which addressed vulnerable areas and facilitated social mobilisation across sectors to improve vaccine coverage. Meanwhile, in the response to load-shedding from October 2022 onward, strong leadership and relationships with the municipalities has led to some exemptions for particular health facilities to allow continuous electricity supply.

During the 2013 Vergelegen floods, collaboration and open communication between private and public healthcare facilities allowed for efficient transfer and accommodation of patients. This collaboration and partnership across government, the private sector, and civil society, as well as internal cooperation, were also central to the holistic response during the 2017 Knysna fires. Regular engagement between management across levels, including clinicians and public health specialists among others, helped build cohesion and a culture of joint problem-solving and collaboration.

Fourth, building a range of **system capacities** to strengthen response is a key lesson learnt. Some of the main capacities include staff wellness; transparent and timely communication; use of data and evidence; the

ability to procure products and services rapidly; and surveillance, risk identification and mitigation capability.

- **Staff wellness** and caring for Department staff emerged as a central priority during the COVID response. Wellness included more than the physical safety of staff. Anxiety, stress and trauma were heightened during COVID, and a range of interventions occurred in response. There were visits by senior management to the frontline to support staff, hosting of over 40 healing and grieving sessions to allow staff to share their vulnerabilities and support each other, an expanded counselling service for staff, and weekly bilateral engagements between senior leadership in the Department and organised labour to build solidarity and joint action. Other interventions included the development of Occupational Health Service (OHS) standard operating protocols, access to training, specialist OHS support to advise staff at the frontline, and provision of adequate protective personal equipment to staff.
- **Appropriate, transparent, and effective communication** vertically and horizontally across the system and with external partners is critical to a cohesive response. An example of available and timely communication was seen during the 2017 Knysna fire where active satellite connectivity allowed the WC DoH to access patient records and receive vital communications during the event. The Department also learned the importance of regular, honest communication with the public to build confidence and public trust in Government. During COVID, weekly digicom meetings were hosted by the Premier, Members of the Executive Council, and the Head of Department. These meetings included the public and media, and provided status reports, alerts of immediate emerging risks, information, and required actions. Dashboards were also created to share COVID and vaccine data with the public.
- **Utilisation of accurate data and evidence** is necessary for an effective system response. During the 2018 drought, data were used to monitor dam levels across the province. This allowed the health system to adjust its response to differing conditions across geographical areas. The Department also learned the importance of keeping abreast of emerging evidence, and how to flexibly adapt its responses accordingly. During the pandemic, the pace at which evidence emerged proved challenging. Structures such as the vaccine advisory committee, the OHS collaborative, and the behaviour-change collaborative were created by the WC DoH to harness collective wisdom, and resulted in recommendations to management for better decision-making.
- The ability **to procure products, services** and staff at short notice proved essential to enable efficient and effective system responses during the COVID-19 pandemic. Contracting of staff was critical to expand service capacity rapidly and provide relief for ill staff across the Department.
- A final component for improved system capacity is a strengthened **surveillance, risk identification and mitigation capacity** within the health sector, particularly at provincial level. During COVID-19, surveillance 'huddles' were set up weekly between the Health Intelligence Directorate and local district representatives to share epidemiological and service-utilisation data and intelligence, including data on local outbreaks, to better inform the system response both provincially and locally.

Lastly, **fostering a learning culture across the Department** has led to ongoing reflection, learning, and continuous improvement, enhancing and augmenting the health system response over the years. Provincial responses have been informed and adapted by learning from frontline staff and local management on the ground. Training was also provided to staff during the pandemic to build staff skills and competencies. Ongoing almost weekly online training courses were available to staff, together with available technical advice and support by public health, clinical and other relevant expertise.

Health systems are part of the problem – the case for mitigation

It has been recognised globally that the health sector is a significant contributor of carbon emissions, generating from 4.4% to 4.6% of greenhouse gas (GHG) emissions.[10,11] While the WC DoH has not yet quantified its carbon footprint, it is fair to deduce that it is in the best interests of the province and South Africa to reduce GHG emissions, including from health services. In 2020, South Africa was found to be the most polluting country on the African continent due to its strong reliance on coal, emitting almost 452 million metric tons of CO_2 emissions in that year.[12]

The WC DoH started a journey to reduce GHG emissions and implement mitigation activities almost a decade ago. It is critical to note that some mitigation activities can provide an adaptation co-benefit, helping the health system improve its adaptive capacity to shocks beyond climate risks while reducing emissions that contribute to the climate crisis. An example of a co-benefit activity is the response to load-shedding in South Africa, noted in Figure 1 and described in Box 1.

The WC DoH has been part of the climate change mitigation and adaptation conversations led by the Western Cape Department of Environmental Affairs and Development Planning, with the aim to develop provincial strategies on climate change. Before the COVID-19 pandemic, the WC DoH had been raising awareness among staff to influence behaviour change. Several tools were created to measure energy and water consumption at facility level, and smart metering for electricity consumption was rolled out at 53 hospitals and 15 primary health-

Box 1. Load-shedding in South Africa, an example of an adaptation co-benefit

Since 2007 when South Africa began 'load-shedding' (interruption of the electricity supply to reduce stress on the generating plant), until 3 October 2022, the country has experienced over 1 949 hours or the equivalent of 81 days of no electricity. In 2023 alone (1 January to 8 June), the WC experienced 151 out of 159 days of loadshedding. At the time that these activities began, the health system was not exempt from load-shedding in South Africa. Subsequently the Ministry of Health has negotiated with ESKOM and municipalities to have selected facilities exempted. A recent 2023, court ruling has exempted hospitals, schools, and police stations from load-shedding. However this matter is under appeal as these multiple exemptions would put too much stress on the national electricity supply.

In order to continue the electricity supply to health facilities and services, the WC DoH built relationships with municipalities and invested in a hybrid inverter system with lithium batteries and photovoltaic panels, installed at 50 rural clinics in the province. The system is linked to the essential electricity system, allowing services to be rendered during load-shedding periods.

For example, photovoltaic panels are used as parking-bay roofs at an administration building, ensuring no interruptions during load-shedding. Such activities are helpful in mitigating carbon emissions of health facilities, but they also serve as adaptation activities. The health sector's effort to ensure continuity of services and access to electricity during load-shedding events will also be helpful during a climatic event if power outages are experienced.

Source: Western Cape Department of Health

care facilities. The Department also created governance and coordination structures that include other Departments and external partners. The WC DoH was the first Department on the African continent to join the Global Green and Healthy Hospitals network in 2015. This network is a rich resource of global expertise and provides a platform for sharing experiences and knowledge on mitigation strategies to all members of the network.

The WC DoH continues to scale up, strengthen, and increase the pace at which mitigation strategies are implemented (Box 2). It is now striving to become a net zero carbon emitter by 2050. The rate of global warming makes this initiative even more urgent. These mitigation strategies will increase the Department's resilience in providing future health services, reduce the health sector's dependence on the national energy grid, and reduce its water consumption.

Strengthening the health sector adaptation response to climate change

An important message was relayed in the Adaptation Agenda launched by the South African presidency at COP27, the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change. The message, delivered by Dr. Moheildin, the UN Climate Change High-Level Champion for COP27, was that "at the core of the outcomes is the recognition that adaptation is often locally driven and globally relevant, while simultaneously needing to address equity, diversity and justice". The Adaptation Agenda outcomes are wide ranging and include, among others, food security, agriculture, water and nature, human settlements, ocean and coastal, infrastructure, and cross-cutting planning and finance. However, the health sector does not feature significantly in the current South African Presidential Climate Commission (PCC) plans. The WC DoH responses to climate-related adverse events described in this chapter can inform future PCC plans and support the case for increased investment in health-sector adaptation.

Lessons drawn from past experience in the Western Cape (summarised earlier) form a critical foundation for continuing WC DoH efforts to strengthen health-system resilience in the face of climate change. Figure 2 depicts a framework derived from these experiences, with five interconnected focal areas relevant to strengthening health-system resilience.

Structural and relational governance

Governance is central to enabling rapid decision-making, fostering alignment and cohesion both internally within the health system as well as with external partners, and ensuring efficient and effective execution.[13,14] It is important to review and adapt governance arrangements and processes constantly. A combination is needed of command and control, and participative and inclusive governance mechanisms that are context- and situation-appropriate. Attention should be paid to both the structural elements of governance such as organisational arrangements, lines of reporting and accountability, roles and responsibilities, and decision making, as well as relational aspects such as strengthening relationships, open and honest communication, inclusivity, navigating power dynamics, and trust. Strengthening governance also requires more than policy pronouncements – it also requires attention to daily practice.[15] Finally, the Department is exploring ways to strengthen sub-districts as the pivotal unit closest to the ground for coordination of service delivery as well as intersectoral collaboration.

Stewardship, leadership, and management capacity

System response requires that bold, value-based, decisive and responsive leadership be strengthened at all

Box 2. WC DoH mitigation strategies to reduce emissions 2021 - Present

Some of the main focus areas and strategies include:

Energy and water:

- Increase awareness among staff to adopt energy-efficient behaviours (switch off lights, open windows, etc.)
- Introduce smart metering at facility level
- Ensure air conditioning is off when facilities are closed
- Install heat pumps to all facilities
- Upgrade laundries to achieve a saving of 19.6 million litres of water per annum and 557 tons of carbon emitted
- Introduce visual dashboards to monitor hospital energy and water consumption
- Include energy and water consumption indicators as part of the quarterly formal monitoring and evaluation process for senior management
- Introduce photovoltaic systems
- Encourage engineering and infrastructure designs that minimise the use of electricity for heating and cooling

Proper waste management:

- Encourage re-use, recycling and reduction of general waste
- Introduce environmentally friendly equipment for the treatment of healthcare risk waste as an alternative to the use of incinerators
- Introduce paper recycling and reduction of packages
- Increase digitisation to reduce paper usage (towards a paperless organisation)

Green procurement:

- Use mercury-free blood pressure meters
- Use the WC DoH green procurement policy framework

Travel:

- Reduce travel within the province and nationally
- Encourage virtual meetings (during COVID this was the norm)

Source: Western Cape Department of Health

Figure 2. A framework of focus areas for health-system response to climate change, Western Cape, 2022

Source: Western Cape Department of Health

levels of the organisation. This requires investment in leadership development through formal and informal training, and a culture of constant review, with cycles of reflection, learning, implementation, and improvement. Leadership to provide visionary thinking and inspire change is important; however, management capacity to efficiently execute and implement policy and strategies is just as important.

Partnerships and intersectoral collaboration

Response to climate change requires strategies internal to health departments, as well as intersectoral collaboration through a whole-of-government and society approach. These should be aligned and effectively governed with shared purpose and focus. Partnership with key stakeholders is essential, including other departments, organised labour, the private health sector, and donor organisations, as well as collaboration more broadly with civil society and business. These relationships must be constantly nurtured and strengthened through constructive engagement, information sharing, open communication, and joint action towards shared goals. In early 2022, the Department convened a widely attended Indaba of all the important stakeholders to seek consensus and co-ownership of the strategies towards health and wellness, building on momentum from the pandemic. Health can leverage off this momentum and play a more assertive role in influencing public policy in the commercial and social-service sectors. In this regard, the WC DoH has successfully advocated for violence and mental health to be seen and addressed as whole-of-government and society issues requiring broad intersectoral interventions.

System capacities

Ongoing focus on enhancing agile and adaptive health-system capacities must remain a priority. Some of these capacities have already been described, but others are the generic functions of policy development, strategic and operational planning, resource allocation, learning, monitoring and evaluation, supply chain management, information management, disaster planning and management, surveillance and risk management, service design, communication, and facilitation and navigation among multiple role players and their power dynamics. Access to data, use of data, and evidence for decision-making must continue to be strengthened. A generic approach that includes review, reflection, learning, and improved action should be applied to all these areas.

- **Strengthening surveillance and early warning systems** is an important prerequisite for an effective risk-mitigation and system response. Heightened vigilance for adverse events and risks is critical both globally and locally, as evidenced in the pandemic and with climate change. Among other things, this requires integrated data systems and efficient, timeous communication across disciplines that enable a cohesive intersectoral response. The Department is currently working with other departments and academic partners to create a data dashboard that combines weather data such as rainfall patterns, and geographical data such as flood plains and hospital locations, with population-vulnerability data to help with decision-making and planning.
- **Disaster-planning capability** and processes are essential, both within the health sector and across sectors, to ensure business continuity, safety of staff and patients, and protection of property and infrastructure. The Department has been engaging local hospital management and EMS over many years to strengthen this practice. The process of proactively engaging staff and partners, considering various scenarios, making contingency arrangements, and having disaster test drills, all contribute to better preparedness, as was evidenced in the Knysna Hospital fires in 2017. Lessons learnt from responding to some of the disasters outlined in Figure 1 have reiterated that the province must work as a collective. A team that plans together, trains together, understands common terminology, and builds strong relationships can respond effectively when the need arises. The Department will perform its mandate with regard to medical emergencies; however, to achieve this effectively requires the support of other agencies. This was particularly clear in the response to COVID-19, where Joint Operations Committees worked across sectors, including local government.
- The brunt of adverse events is often shouldered by **emergency services**, including EMS used to transport patients and emergency centres (ECs) within health facilities. The communications centre and control room within EMS are well positioned to obtain an overview of health-system pressures, enabling appropriate transportation and distribution of acute patients. During the pandemic and other adverse events, EMS played a key role in redistributing inpatients between facilities to manage surges in patient demand. The capacity within EMS and ECs, and interrelationships with primary health care (PHC) and other disciplines within hospitals need to be strengthened. Communication and co-operation between public and private health sectors has been good during adverse events, and can help prepare for Universal Health Coverage and National Health Insurance. Currently, an integrated information system is being rolled out across ECs. This will be connected to the provincial data centre, which provides integrated person-level data harvested from a range of different systems. PHC and emergency services are nestled within a broader health ecosystem and must be ably supported by district, regional, tertiary, quaternary, and other specialised services.
- A key focus will be the **community-oriented PHC platform,** which has the largest physical footprint and reach within communities amongst other public sector services. Historically, community-oriented comprehensive PHC services, intersectoral coordination, community involvement, and social accountability have been underdeveloped in the WC health sector. It is critical that they are systematically strengthened in the short to medium term. The Department has made an important decision in this regard to strengthen decentralised management to sub-district level to improve local responsiveness in all the above-mentioned areas.

Learning-oriented culture

The Department started a learning-culture journey several years ago, linked to leadership development. Organisational muscle has been developed through learning and actioning system responses to repeated adverse events over the years. The Department will continue to strengthen the culture, systems, and learning processes more systematically. The 'Learning Health Systems: Pathways to Progress' report by the Alliance for Health Systems and Policy Research and the World Health Organization provides very useful guidance in this regard.[16] Leveraging relationships with academic colleagues, accessing available expertise, and sharing existing data in a timely manner is important as the Department strives to become more data-led and evidence-informed in policy and system response. The learning culture should be built into the existing structures and meetings to become daily practice, as opposed to being seen as an add-on. On-the-job learning is as important, if not more important, than attending formal training courses.

Conclusions and recommendations

As the impacts of climate change intensify, the need for the Department to mitigate its carbon footprint and increase its adaptive capacity is paramount. The 2022 floods in KwaZulu-Natal (KZN) caused significant damage to health infrastructure and required major, rapid, contingency arrangements. Cross-provincial protocols and learning as well as cohesive arrangements are critical to building health-system resilience across South Africa, and may have better supported the KZN health-system response to the flood disaster. Applying lessons learned, scaling-up preventive interventions, and increasing the capacity to execute cohesive social and humanitarian responses as whole-of-government and whole-of-society action is critical to building climate-resilient health systems.

The recommendations below may also be useful to other provinces in South Africa and beyond. These recommendations need to be systematically addressed by health-sector leadership and management at all governance levels:

- The National Department of Health, supported by provinces, needs to engage in climate fora to register the importance of building health-sector resilience to climate change, and elevate it on the PCC policy agenda.
- The structural and relational aspects of governance within and outside the health sector need to be reviewed and adapted constantly, and applied in daily practice.
- Leadership and management needs to be bold, value-based, decisive, and responsive, and must be strengthened across the health sector to this end. Capacity and skills for effective stewardship should also be enhanced across sectors.
- A learning and improvement culture should be built into existing structures, meetings, and daily practice.
- Partnerships and intersectoral collaboration must be constantly nurtured and strengthened through constructive engagement, information sharing, open communication, and joint action towards shared goals.
- An ongoing focus on health-system strengthening that enhances system capacities must remain a priority. In addition to conventional management functions, service re-design (with a focus on emergency services and PHC), communications, innovative technology, surveillance and risk management, and disaster-planning capabilities, among others, must be strengthened significantly.

Abbreviations

Abbreviation	Description
CO_2	Carbon Dioxide
COP	Conference of Parties
EC	Emergency Centres
EMS	Emergency Medical Services
GHG	Greenhouse Gas
KZN	KwaZulu-Natal
OHS	Occupational Health Service
PCC	Presidential Climate Commission
PHC	Primary Healthcare
SA	South Africa
WC	Western Cape
WC DoH	Department of Health

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Good Practice

Cross-border collaboration and capacity-building for improved health emergency response planning in Southern Africa

Joslyn Walker[1], Marieta Liebenberg[1], James Michael Burnett[1], Tonicah Maphanga[1], Judith King[1]

[1] Health Systems Trust

South African Health Review

Background

Many countries were ill prepared for the COVID-19 pandemic and the sudden border closures introduced to stem contagion. To address this planning and response gap, Health Systems Trust and the US Centers for Disease Control and Prevention's Division of Global Migration and Quarantine jointly implemented a capacity-building project among eight Southern African countries during 2022. The intention was to strengthen collaboration among the countries in implementing public health emergency response strategies. Shared analysis of cross-border movement patterns, and building neighbouring countries' capacity to identify priority areas for such response planning, strengthened relationships for communicating health risks and events.

Approach

This chapter presents findings from project participants' perspectives on whether and how the project supported improved regional collaboration for emergency responses to public health events, and their perceptions of how the project strengthened their border health systems.
Country delegates were convened in multi-sectoral regional and sub-regional meetings and workshops to facilitate cross-border public health information-sharing and co-ordination, and to align surveillance for emergency preparedness and response. They drafted procedures to: strengthen cross-border and multi-sectoral communication; prioritise points of entry for cross-border co-ordination; map population movement patterns; and identify national and regional border health priorities. Training focused on points of entry to enhance planning for future disease outbreaks by introducing the Population Connectivity Across Borders Toolkit for analysing population movement data to guide the design of public health interventions.

Conclusions

Collaboration with global and regional institutions strengthened the countries' ability to comply with International Health Regulations in responding to communicable disease outbreaks.
The outcomes indicate that sustained engagement, refinement of standard operating procedures, and multilateral agreements that ensure balancing of country priorities with global health requirements, can be achieved. Continued analysis of and reflection on country work plans are needed to assess similarities and differences in priority identification, which will guide future training and development of regional strategies to build stronger border health systems.

Introduction

Population mobility influences the spread of communicable diseases, which challenges public health system capacity in neighbouring countries.[1] Advancement of regional, bilateral, and multilateral frameworks and agreements developed by partners at all border system levels can shift policy towards improved alignment of cross-border public health strategies for a coherent response approach.[2,3]

The US Centers for Disease Control and Prevention (CDC) Global Border Health Team (GBHT) works with countries to strengthen their ability to prevent, detect, and respond to public health events at points of entry (PoEs) and among mobile populations, and to enhance cross-border information-sharing for improved surveillance and strategy alignment.

Jointly implemented by the CDC GBHT and Health Systems Trust (HST), the Border Health Project supported in-country stakeholders from multi-disciplinary departments in eight Southern African Development Commu-

nity (SADC) Member States (namely Botswana, Eswatini, Lesotho, Mozambique, Namibia, South Africa, Zambia and Zimbabwe) to identify priority areas for border health-system strengthening. These priorities informed the project objectives and activities (as detailed in later sections), and were addressed through capacity-building workshops and regional meetings.

The project approach accounted for the multi-sectoral nature of border health management and the evolution of policies to address public health emergencies by partnering with the World Health Organization (WHO), the East, Central, and Southern Africa Health Community (ECSA-HC), the Africa Centers for Disease Control and Prevention (Africa CDC), and the International Organization for Migration (IOM).

PoEs are strategic spaces for intervention to manage the spread of communicable diseases. They form the nexus of mobility and health where population movement creates joint priority areas for neighbouring countries. While the project's technical aspects were prompted by the countries' response to the COVID-19 pandemic, the project concept was aimed at building sustainability into each country's emergency response and border health monitoring, and epidemiological surveillance of communicable diseases. This was done by describing and mapping mobility patterns and developing procedures for the detection, isolation, management and referral of ill travellers at PoEs.

A range of key international and regional border health strategies and protocols were cited by the participating countries during project implementation. Foremost were the Africa CDC Strategy (2017-2021),[4] the WHO International Health Regulations (IHR) of 2005,[5] the 1999 SADC Protocol on Health,[6] and the One Health approach to addressing zoonotic diseases in countries[7,8] jointly formulated by the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (WOAH)[1], and the WHO.

Also listed were guidelines for cross-border collaboration and transportation[6,9] and public health capacity-building at ground crossings,[10,11] and reports with recommendations on priority communicable diseases such as anthrax,[7,12,13] cholera,[14-16] COVID-19,[6,17,18] HIV,[7,19] malaria,[6,20,21] plague,[22,23] polio,[24-26] rabies,[7] tuberculosis,[6,27] and viral haemorrhagic fevers.[7] Reviews on special population groups, i.e. military personnel[28] and prisoners,[29] were also mentioned.

The chapter presents the findings of semi-structured interviews and an online survey conducted with Border Health Project participants to determine whether and how the project supported improvements in regional collaboration in preparing for and refining responses to limit cross-border disease spread. Also explored were the countries' perceptions of how their border health systems were strengthened through the project, and whether the trainings were cascaded to stakeholders at their key PoEs.

Methods

The methodologies applied are presented in chronological order to reflect how the project unfolded. Common tools were used throughout the process, from site assessments and audit tools, Geographic Information Systems (GIS), Population Connectivity Across Borders (PopCAB), and these were implemented within an approach that incorporated the WHO and SADC guidelines, the Integrated Disease Surveillance and Response (IDSR) framework, and individual country monitoring tools.

Country need assessments

In-country introductory meetings and PoE site visits were held to assess and collate capacity-building needs; this process informed the development of training plans and workshop content. The assessments were populated by the participating countries, which identified their priorities in driving the capacity-building project agenda.

Regional consultative meetings

Regional meetings held during 2022 supported the eight countries in identifying border health priorities, aligning strategies to strengthen regional cross-border public health information-sharing, and improving co-ordinated public health surveillance, communication, preparedness and response.

The specific objectives of the first regional meeting, held in Zimbabwe from 20 to 24 June 2022, were to:

- facilitate peer-to-peer sharing of lessons learnt from recent national and regional public health responses (including COVID-19 and polio outbreaks) and identify best practices for responding to public health events with cross-border implications;
- develop procedures to strengthen cross-border public health information-sharing and co-ordination at national and local levels in support of operationalising existing frameworks; and
- characterise regional cross-border movement dynamics towards identifying shared priority areas for enhanced cross-border co-ordination.

This meeting enabled participants to share border health best practices, list priority diseases, and articulate existing communication structures and channels for information-sharing. The participants drafted procedures to facilitate the operationalisation of existing cross-border frameworks and bilateral and multilateral agreements. Table 1 lists each participating country's best practices and challenges.

1 Founded as Office International des Epizooties (OIE)

Table 1. Perceived border health best practices and challenges per country

Country	Perceived best practice	Perceived challenge
Botswana	Points of entry linked to nearest facilities for assessing ill travellers	No memorandum of understanding for sharing information
Eswatini	Openness to sharing data and information	Late sharing of public health information
Lesotho	Personnel appointed as Focal Points were stationed at district and national level for cross-border sharing of public health information	Due to trade- and travel-related economic considerations, relevant data on zoonotic diseases and food-related illnesses may be withheld or moderated.
Mozambique	Establishment of cross-border committee with South Africa	Language barriers at ports of entry
Namibia	Memorandum of understanding signed between five Ministers of Health (Angola, Republic of Congo, Democratic Republic of Congo, Namibia and Zambia)	Lack of clear mechanisms for data-sharing
South Africa	Bi-annual meetings with neighbouring countries	Data comparability and systems interoperability: reliability of information systems and trustworthiness of information
Zambia	Regional and multinational agreements as well as agencies participating in cross-border information-sharing	Late data/information-sharing on shared platforms
Zimbabwe	Regular meetings with Mozambique, South Africa and Zambia	Exchange of data and information through a multi-country platform, i.e. disease trends

Mapping exercises helped to illustrate population movement across borders, and the delegates drew up a regional map of bi- and multi-national PoEs per country and overlapping between countries, prioritised for cross-border information-sharing and co-ordination (Figure 1).

Presentations delivered by the CDC GBHT and various partners - Africa CDC, ECSA-HC, the IOM, the SADC, and the WHO - provided perspectives on how existing systems for cross-border collaboration could be strengthened.

Through an iterative and collaborative process, the participants redirected the workshop programme for the second regional meeting (held in South Africa from 12 to 16 September 2022) for closer synergy of the countries' identified needs. The final agreed objectives resulted in the following outcomes:

- case definition comparison;
- refinement of procedures drafted during the first regional meeting;
- the development of a comprehensive report for participants to share with their respective leadership to advance cross-border co-ordination; and
- the distribution of a draft Memorandum of Understanding (MoU) template.

Each country presented its input on these core aspects during facilitated group working sessions organised for country- and regional-level deliberation. The group results were synthesised in plenary sessions for documentation purposes.

Training on cross-border health and population mobility

The CDC GBHT developed training materials to capacitate stakeholders with skills and knowledge for responding to public health events at PoEs, and for routinely collecting information on mobile populations.

The project's skills-development component, delivered from June to August 2022, comprised a PoE capacity-building workshop; training on the PopCAB Toolkit; and orientation on GIS to deepen stakeholders' understanding of geospatial information on regional cross-border movement dynamics.

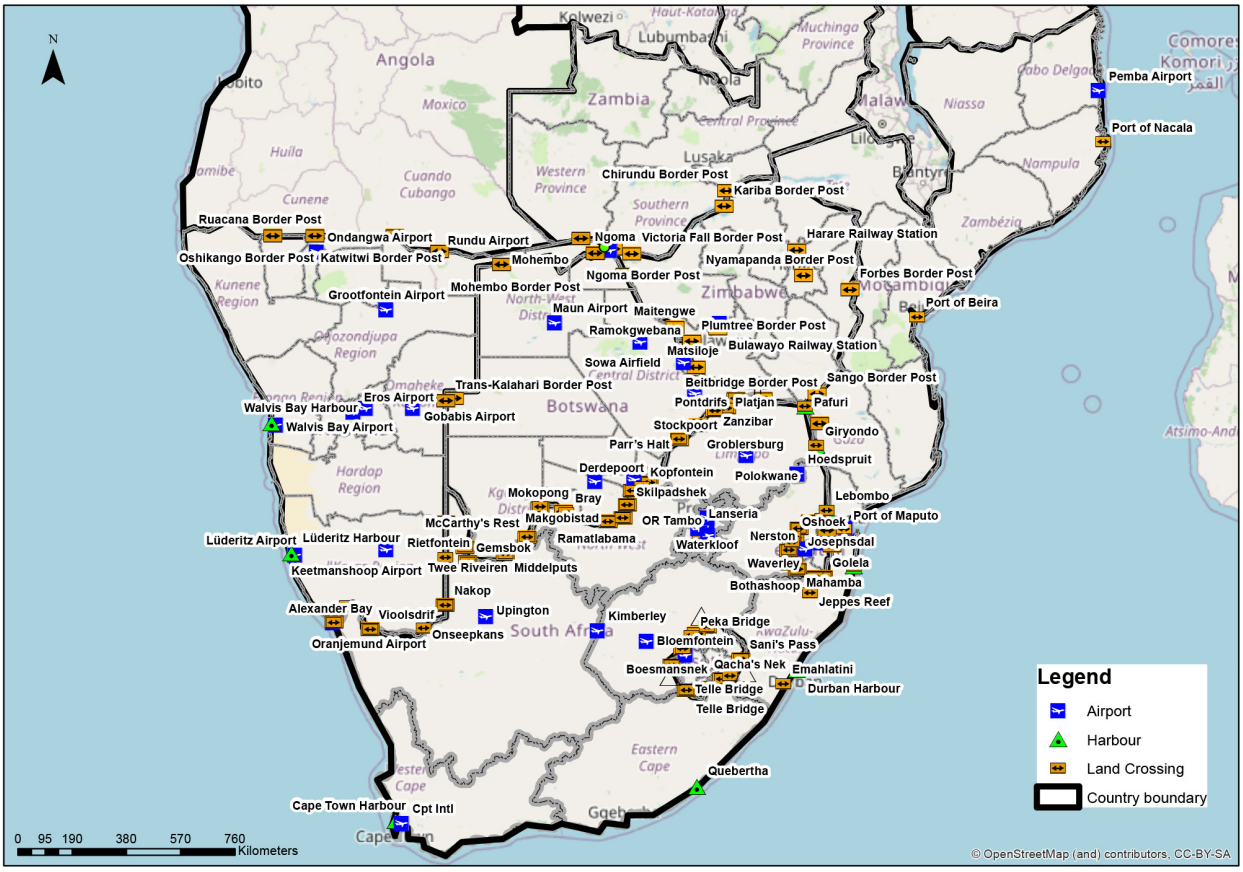
Each country sent five delegates from their Ministry of Health and other departments managing border health activities to attend the workshops. They represented departments of Agriculture and Veterinary Services, Immigration, and Health, and in their various capacities play a role in cross-border movement control, disease surveillance including cross-border/Port Health control activities, information-sharing, regulation, and human and animal health sector involvement..

Point-of-entry capacity-building

Two sub-regional workshops for PoEs were conducted, the first in Eswatini from 18 to 23 July 2022, and the second in Lesotho from 26 to 30 July 2022, with 40 participants trained overall.

This training-of-trainers programme focused on building capacity to improve border health systems at PoEs

Figure 1. SADC regional map showing points of entry per country, 2022



Source: Existing map template sourced from OpenStreetMap; boundaries sourced from the Municipal Demarcation Board, with country detail added by Regional Meeting participants from each of the country teams.

through cascaded training to other Port Health and non-health border staff in the following areas:

- routine roles and responsibilities;
- developing and operationalising multi-sectoral public health emergency and response plans (PHERPs) and standard operating procedures (SOPs) in line with the IHR; and
- implementing exercises to test public health responses at PoEs.

The PoE training consisted of didactic sessions, country presentations, working group exercises to practise applying the guidance gleaned during the training, and plenary sessions. The content covered the IHR, conducting ill-traveller risk assessment, training non-health partners on RING (**R**ecognise, **I**solate, **N**otify, and **G**ive support), developing SOPs and PHERPs at PoEs, and public health exercises to evaluate and strengthen response plans and procedures. The participants also consulted with the facilitators to address areas needing clarity or elaboration. A key resource in this training was a GBHT publication on strengthening comprehensive national and regional border health responses to communicable diseases.[30]

PopCAB Toolkit and GIS training

The PopCAB training was delivered in two sub-regional workshops, the first in South Africa from 13 to 15 July 2022, and the second in Zimbabwe from 2 to 4 August 2022, for five Ministry of Health representatives from each participating country.

A key GBHT resource used was an approach integrating population mobility patterns and socio-cultural factors in communicable disease preparedness and response.[30] The didactic and practical activities included orientation on the PopCAB Toolkit[31] - a resource designed to gather and analyse information on population mobility patterns to inform public health interventions – as well as map annotation, data application and processing, and group-work presentations on results from a practice PopCAB.

The PopCAB Toolkit enables identification of routes taken, travellers' reasons for travel, and the types of travellers moving through an area, to inform response strategies for infectious diseases.

This workshop built the participants' skills in conducting focus-group discussions and key informant interviews to gather qualitative and geospatial information on country and regional cross-border movement dynamics.

GIS training was held in Gaborone from 15 to 19 August 2022. The country officials were introduced to meth-

ods of managing, visualising and analysing qualitative and participatory mapping data on population mobility at local and national levels for sustainability, and were guided on how such data can be used to inform public health interventions.

The intended outcomes of the PoE capacity-building and PopCAB Toolkit trainings were that countries would be equipped to proceed with information-gathering on mobile populations to inform public health interventions and cross-border collaboration; and that countries would establish and/or enhance border health systems with relevant PoE-level SOPs and PHERPs. Where time and budget allowed, the project supported in-country cascade of the trainings to other health and non-health border staff members.

Data collection

This investigation deployed two data-collection methods:

Firstly, responses were extracted from summarised transcriptions of video-recorded, semi-structured interviews conducted with a lead representative from each of the eight countries during the first regional meeting held in Zimbabwe from 20 to 24 June 2022 (Table 2).

The country leads were interviewed by a Division of Global Migration and Quarantine (DGMQ) facilitator. The following question prompts were provided to the interviewees in advance of each 20-minute interview:

- Name, position and portfolio description
- The role of their division in monitoring border health and population movement
- The primary challenges encountered and lessons learnt during the COVID-19 pandemic and/or other disease outbreaks
- Their insights gleaned during the first regional workshop
- Their expectations for the forthcoming training.

The team reviewed the video content to identify key themes.

Secondly, a survey with closed and open-ended questions was administered in October/November 2022 to each of the eight countries' lead representatives (16 in total), using Survey Monkey. The eight questions required a combination of Yes/No and explanatory responses. Respondents were given 14 days to respond. Feedback was solicited on the project's various trainings and meetings: whether these met the objectives for strengthening capacity at PoEs in the respective countries; how many countries had cascaded trainings to other staff members who had not attended the workshops; and lessons learnt from the trainings and meetings.

Qualitative analysis was done on the 13 responses to the questionnaire. Analysis was conducted in line with a Code Book of identified themes, sub-themes and inclusion criteria, using NVivo software to organise the data for distillation of meaning in relation to the coding strategy. Microsoft Excel was used for quantitative data analysis.

Table 2. Country leads interviewed at the first regional meeting, 20–24 June 2022

Country	Roles
Botswana	IHR Officer, Ministry of Health
Eswatini	Head of Environmental Health Services, Ministry of Health
Lesotho	Epidemiologist and Medical Officer
Mozambique	Director of Environmental Health, Ministry of Health
Namibia	Director of Health Information and Research, Ministry of Health and Social Services
South Africa	Assistant Director: Public Health Surveillance – Directorate of Epidemiology and Surveillance, Ministry of Health
Zambia	Assistant Director of Environmental Health, Ministry of Health, and IHR Team Lead for Points of Entry
Zimbabwe	Director of Environmental Health Services, Ministry of Health and Child Care

Key findings

Analysis of the video content yielded the following main findings:

- MoUs finalised between the neighbouring countries are effective mechanisms for cross-border collaboration, and should detail the roles and responsibilities of countries, the conditions under which information will be shared, and the intended use of the information.
- Border health capacity-building is crucial to ensure improved country preparedness, heightened alertness to situations in neighbouring countries, reduction in the spread of diseases across borders, and optimised disease management in the country of origin.
- The Border Health Project enabled face-to-face meetings between country counterparts to discuss important issues such as PoE capacities; the project also provided a common framework template for the creation of cross-border MoUs, and operationalised the drafting thereof. This was seen as a vital capacity-building opportunity that highlighted the importance of strengthening cross-border collaboration to manage pandemics. It was noted that the project had been offered at the right juncture following the harrowing experience of countries during the COVID-19 pandemic.
- The most important aspects of the project support cited were joint identification of challenges and

best practices, and collective adoption of these for cross-border collaboration.

"The training was beneficial; it provided support for border health which has always had limited funding in Zimbabwe."
"We learnt from COVID-19 that each country's capacity must be strengthened."
"We don't know where to start; this meeting provided a common framework and common language."
"Through this support, we can define communication channels for information- and knowledge-sharing."

Qualitative analysis of the 13 responses to the survey questionnaire generated the following findings:

PoE capacity-building

The most frequently mentioned topic centred on the PoE capacity-building delivered through the project, with 33 references made regarding completed, current, or planned capacity-building at various PoEs. Capacity-building ranged from border co-ordination and collaboration:

"The trainings integrated border co-ordination, collaboration, [and] role definitions during outbreaks."

to formalisation of communication structures:

"...training has been conducted for point-of-entry staff to establish structures at that level..."

Some countries expanded on their plans to cascade training and capacity-building to more PoEs:

"Capacity-building is required; the trainings need to be cascaded to the PoE so that all the staff members are on board. The PoE capacity-building training also has to be cascaded to the other PoE staff."

while others advised that although PoE capacity-building was a priority area, lack of funding prevented cascade of the project training to other PoEs:

"We do not have funding but these are priority areas."
"Lack of funding..."
"We want to conduct this training, though there is no funding now for the activity."

Standard operating procedures and Public Health Emergency Response Plans

The second most frequently mentioned theme was the importance of SOPs and PHERPs, with 21 references made. While most countries had SOPs pertaining to the screening of travellers:

"Screening of travellers during outbreaks."
"SOPs on identification and notification of an ill traveller for PoEs."

some countries were yet to expand their SOPs for ground crossings:

"Only airports have procedures formulated during COVID-19 but [this] needs to be refined to be holistic plans. Ground crossings do not have [SOPs]."

Some countries had fully developed PHERPs, and these were used as exemplars by other countries during the meetings to gauge their levels of preparedness and to support the development of their own PHERPs:

"The plans were developed during this project and they include cross-border collaboration, co-ordination and data management."

In-country communication

In-country communication channels and structures emerged as a diverse theme across the eight countries. Some respondents indicated that while in-country structures were fully developed, the project had led to the enhancement of certain sections of the structures:

"The Ministry's communication structures remain the same, but there ha[ve] been deliberate efforts to strengthen the communication with the district level."
"[The project] enhanced and strengthened the already existing internal reporting and communications structures between district, regional and national levels when responding to a cross-border public health concern."

Other countries noted that their structures were not fully established and required urgent attention:

"The structures are not fully established but there is an existing high-level structure, but training has been conducted for point-of-entry staff to establish structures at that level."

Inter-country collaboration

Inter-country collaboration and communication formed a dominant theme that emerged from the feedback. While some countries already had clear structures and agreements in place, the project strengthened them:

"There are clear structures and agreements in place and the regional meetings have strengthened them."

Although there were active cross-border committees in place in certain countries, the responses highlight that data-management and information-sharing across international borders is a crucial component requiring enhancement, as indicated by one of the country respondents:

"Cross-border collaboration committees with countries such as Zimbabwe, Mozambique and Angola [exist], but [are] not distinct on external information-sharing as prior approval is required. MoUs and other collaborative agreements are required to enhance the collaboration..."

For other countries, the project had highlighted the need to update current structures, and to develop MoUs to simplify the process of cross-border collaboration:

Table 3. List of border health capacity-building requests by country

Capacity-building training request	BWA	SZ	LES	MOZ	NAM	RSA	ZMB	ZWE
Capacity-building/ refresher training of PoE staff		X		X				X
Exchange visits with other countries								X
Support to attend international trainings and meetings								X
Developing/reviewing PHERPs/SOPs on health threats	X		X		X	X	X	
PopCAB training				X				X
GIS training				X			X	X
Surveillance, statistical analysis, data management and information-sharing	X	X					X	X
Conducting risk assessments	X		X					
International Health Regulations							X	
In-country and inter-country communication		X						
Benchmarking and simulation exercises		X	X		X			

BWA = Botswana; SZ = Eswatini; LES = Lesotho; MOZ = Mozambique; NAM = Namibia; RSA = South Africa; ZMB = Zambia; ZWE = Zimbabwe.

> "*...we are in the process of reviewing our external communication protocols and working with some countries to develop a memorandum of understanding*."

Routine inter-country information-sharing

The need for routine inter-country information-sharing did not feature dominantly in the responses. However, they indicated that the project had provided the countries with a vital platform to discuss important issues pertaining to information-sharing:

> *"The meetings also helped, as they provided a platform for information-sharing and future cross-border collaboration*."

Reference was made to the plans developed during the project to strengthen cross-border co-ordination and information-sharing:

> *"The plans were developed during this project and they include cross-border collaboration, co-ordination and data management*."

Requests for additional border-health capacity-building

The respondents listed their requests for various types of additional capacity-building needed for prioritising any infectious diseases that might present public health threats. Table 3 shows the requests by country.

Quantitative analysis of the survey questionnaire feedback indicated that 13 responses were received from the eight countries. Of these, 10 responses were complete while the remaining three were incomplete. Table 4 sets out the quantified data for the survey responses.

In response to whether countries had managed to establish or enhance clear internal and external communications structures for reporting and responding to a cross-border public health event, 10 respondents (77%) indicated that they had established internal communication structures, two (15%) indicated that they had not, and one respondent (8%) did not answer the question. Ten (77%) indicated that external communication structures had been established, one (8%) indicated that this had not been done, and two (15%) did not answer the question.

Figures 2 and 3 show the percentage of respondents who indicated that internal and external communications structures had been established in their country.

During the sub-regional trainings, country representatives were urged to ensure the roll-out of capacity-building to other colleagues to strengthen border health systems. Of the 13 survey responses, four indicated that their countries had cascaded trainings to other colleagues, while five indicated that they had not, and four did not respond to the question. Mozambique indicated that the IOM and WHO also conducted trainings related to cross-border health issues in their country.

The respondents were asked to list any specific trainings and other PoE activities planned for the near future, and these are presented by country in Table 5. Six of the countries indicated that they had training plans in place, among which were modules for the development of contingency plans and SOPs, risk assessment, and sur-

Table 4. Quantified data for questionnaire responses

Communication and inter-country collaboration	
Has your country established or enhanced clear internal communications structures for reporting and responding to a cross-border public health event?	n (%)
Yes	10 (77%)
No	2 (15%)
No response	1 (8%)
Has your country established or enhanced clear structures for external communications with other countries - particularly those in the SADC region - regarding any public health threats?	
Yes	10 (77%)
No	1 (15%)
No response	2 (8%)
Points-of-entry capacity-building, PopCAB training and GIS-PopCAB training	
Has your country conducted cascaded trainings to other staff members at the point of entries?	
Yes	4 (31%)
No	5 (38%)
No response	4 (31%)
Specific to PopCAB & GIS-PopCAB trainings, has your country conducted any training(s) related to gathering of population mobility data or plans?	
Yes	1 (8%)
No	7 (54%)
No response	5 (38%)
List any plans related to capacity-building at the points of entry in your country	
Does your country have a plan or plans for responding to public health events at the points of entry?	
Yes	9 (69%)
No	0
No response	4 (31%)
Has your country developed standard operating procedures (SOPs) at the points of entry?	
Yes	9 (69%)
No	0
No response	4 (31%)

veillance training. Lesotho and Namibia did not indicate whether they had training plans.

Nine respondents indicated that their countries had PHERPs at PoE level, and four did not answer the question. Nine respondents indicated that their countries had developed SOPs for guidance on emergency public health events, while two participants from Lesotho, one from South Africa, and one from Namibia did not respond to the question.

Conclusions

During the project's first regional meeting, participants expressed that their countries had become increasingly isolated following the outbreak of COVID-19, and had made unilateral decisions that were often not understood by their neighbouring countries. The survey responses indicate that the project's face-to-face meetings were therefore critical for enhancing communication at all levels for regional knowledge-building. Moreover, the project provided a valuable platform for facilitating the development of MoUs between neighbouring countries.

Disrupted trade and supply chains caused by border closures to control cross-border disease transmission have been shown to impair livelihoods, and in turn, to impact household health and welfare in African countries.[1, 32] Understanding the effectiveness of cross-border and PoE health measures used in regional settings can help to inform evidence-based rationales for policy and practice that balance public health goals with other societal needs.

The project's support for instilling national and regional good practice in internal and inter-country col-

Figure 2. Proportion of countries reporting establishment of internal communication structures to respond to public health threats

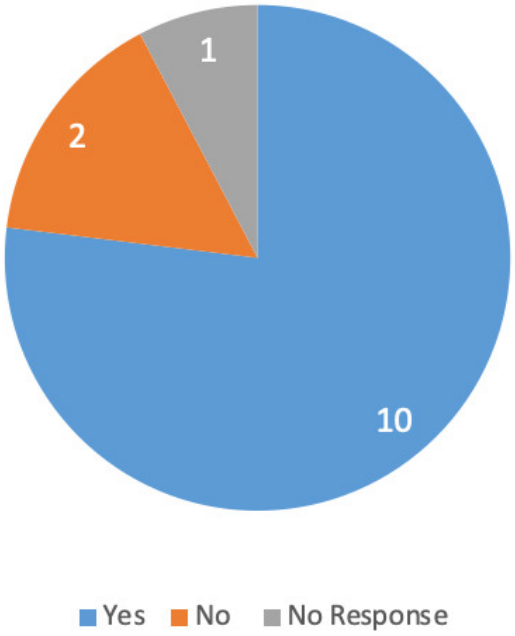


Figure 3. Proportion of countries reporting establishment of external communication structures to respond to public health threats

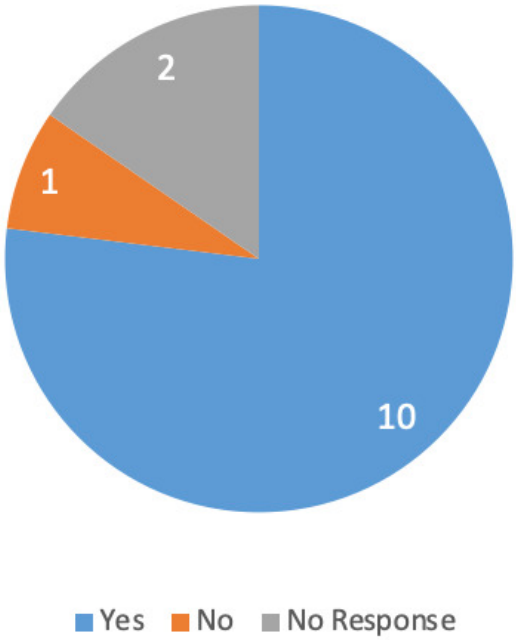


Table 5. Planned PoE activities by country

Country	Planned PoE activities by country
Botswana	Expected to do a risk assessment and start developing contingency plans
Eswatini	Quarterly refresher trainings; periodic review of plans and SOPs; conducting simulation exercises; benchmarking/study tour
Lesotho	No response
Mozambique	Updating contingency plans at PoEs; PoE surveillance training; and in-service training on monkeypox
Namibia	No response
South Africa	Training on: • IHR Assessment Tool; • refresher training on Ebola; • IDSR in the country
Zimbabwe	Plan to train all Port Health personnel on PopCAB and GIS; cascade PoE capacity-building to all PoE staff
Zambia	IDSR, GIS, and Event-based Surveillance (EBS) trainings; statistical analytics tools; Infection Prevention and Control; SOPs for PoEs, and IHR training

laboration on disease mitigation, and a renewed focus on data management and information-sharing for public health initiatives, laid a strong foundation for more co-ordinated management of cross-border health measures.

Recommendations

- The evidence gleaned from the respondents' feedback indicates that further exploration using key informant interviews could define the countries' needs for specific interventions and role-players' transfer of skills developed through the project.
- All the respondents noted that time constraints had obviated cascade of the PopCAB training at this stage. Three countries expressed interest in doing so, suggesting that this is an area for continued action as a region.
- Bi-monthly follow-up with country leads to monitor progress with preparedness planning and implementation should be undertaken internally by each country.
- Master trainers in each country should provide additional PoE capacity-building support where needed.
- The leads in each country should continue to refine their SOPs and PHERPs.
- Where they do not exist, MoUs should be established between neighbouring countries. Senior-

level implementers who took part in the training undertook to engage with relevant ministry principals to finalise such MoUs.

- Timeframes for inter-country communication (e.g. monthly or bi-annual meetings) should be established by the respective countries.
  DGMQ and the HST should engage with countries for post-project analysis to measure the sustainability of the project, subject to availability of funding. A regional body should bring countries together to chart a way forward for standardising use of tools and frameworks for policy coherence. Dialogue among member states for such harmonisation should be facilitated through a regional bloc such as SADC.
  External partners such as the IOM, SADC, ECSA-HC, and WHO should facilitate clearly delineated guidance.

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Abbreviations

Abbreviation	Description
Africa CDC	Africa Centres for Disease Control and Prevention
BWA	Botswana
CDC	Centers for Disease Control and Prevention
COVID-19	coronavirus disease
DGMQ	Division of Global Migration and Quarantine
EBS	Event-based Surveillance
ECSA-HC	East, Central, and Southern Africa Health Community
FAO	Food and Agriculture Organization of the United Nations
GBHT	Global Border Health Team
GIS	Geographic Information System
HIV	Human Immunodeficiency Virus
HST	Health Systems Trust
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulations
IOM	International Organization for Migration
LES	Lesotho
MoU	memorandum of understanding
MOZ	Mozambique
NAM	Namibia
OIE	World Organisation for Animal Health
PHERP	public health emergency and response plan
PoE/s	point of entry / points of entry
PopCAB	Population Connectivity Across Borders
RING	Recognise, Isolate, Notify, and Give support
RSA	South Africa
SADC	Southern African Development Community
SOP	standard operating procedure
SZ	eSwatini
WHO	World Health Organization
ZMB	Zambia
ZWE	Zimbabwe

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Review

Health and related indicators 2022

Noluthando Ndlovu[1], Andrew Gray[2,3,4], Bonga Mkhabela[1], Nqobile Myende[1], Candy Day[5]

[1] Health Systems Trust,
[2] Division of Pharmacology, University of KwaZulu-Natal,
[3] WHO Collaborating Centre on Pharmaceutical Policy and Evidence Based Practice,
[4] Centre for the AIDS Programme of Research in South Africa (CAPRISA),
[5] The DG Murray Trust

South African Health Review

Background

This chapter aims to provide a repository of data, focusing on the national and provincial levels, that describes the broad status of the South African health system (socio-demographic indicators and determinants and health status indicators, as well as health service indicators). It examines the available health information data sources in South Africa, with a particular focus on whether they have been strengthened during and after the acute phase of the COVID-19 pandemic. The broader context for this chapter lies in the desire to see the lessons learned from the COVID-19 pandemic translated into systemic changes that advance the reform of South Africa's fragmented health services and hasten the attainment of effective and sustainable universal health coverage.

Methods

Data were sourced primarily from national routine data sources, but also captured from major surveys and global reports. Using monthly routine data sources, the difference between expected and actual routine measures were calculated and expected trends were forecast. These graphs enabled the depiction of the changes that occurred pre- and post-COVID in South Africa for key health indicators.

Conclusions

Progress is discernible, but there is also evidence of back-sliding, of a revision to previous positions, and therefore a need to refocus attention on important lessons, lest they be lost.

Recommendations

Strong health information systems should be the foundation on which evidence-based decisions can be made to support strong governance and leadership, where human resources for health are also supported and healthcare funding is prioritised.

Introduction

The *South African Health Review 2022* focuses on the response, mitigation, recovery, and health-systems-strengthening strategies employed to rebuild the health system in South Africa in the wake of the COVID-19 pandemic. Information systems form a key health-systems building block. The World Health Organization (WHO) has described a well-functioning health-information system as "one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status".[1] This chapter examines the available health-information data sources in South Africa, with a particular focus on whether they have strengthened during and after the acute phase of the COVID-19 pandemic.

An upcoming book written by Dr Jonathan Kennedy, entitled *Pathogenesis: How Germs Made History*, examines the role of eight pathogens in shaping global history. Kennedy has been quoted as saying: "We're living in a golden age for microbes. Population densities are increasing, people are moving more quickly around the world, the climate is changing. We've seen the emergence not just of COVID-19, but of HIV/AIDS, Zika, Dengue fever, SARS and Ebola. It seems now that we won't be able to conquer infectious diseases. Rather, we're going to have to learn to deal with the new diseases that periodically arrive to threaten us."[2] There are indications that the world is starting to 'live with' SARS-CoV-2, the novel coronavirus responsible for COVID-19. However, whether global and national health systems will be left more resilient, better resourced and more agile, or whether they

Box 1. Key new or updated health data sources, 2022

International	South African
• World Health Statistics 2022 • Human Development Report 2021/2022 • World Malaria Report 2022 • Global Fund Results Report 2021 • Global Tuberculosis Report 2022 • The State of the World's Children 2021 • Mental State of the World Report 2021 • The State of Air Quality and Health Impacts in Africa 2022 • Joint United Nations Programme on HIV and AIDS (UNAIDS) Update 2022 • Global COVID-19 data repositories and dashboards • Global Cancer Incidence, Mortality and Prevalence (GLOBOCAN) 2020 • International Diabetes Federation (IDF) Diabetes Atlas 2021	• Web-based District Health Information System (webDHIS) • Tier.Net, now incorporating the Electronic TB Register • Electronic Drug-Resistant TB Register (EDRWeb) • Stats SA Mid-year population estimates 2022 • Stats SA General Household Survey (GHS) 2021 • Stats SA Labour Force Surveys up to the 4th quarter of 2022 • Recorded live births 2020 & 2021 • National Treasury health expenditure data • Personnel Administration System (PERSAL) • Thembisa v4.5 HIV and AIDS model • South African Community Epidemiology Network on Drug Use (SACENDU) • Council for Medical Schemes Annual Report 2021/22 • Blue Drop Progress Report 2022 • Rapid Mortality and Surveillance Report 2019 & 2020 • Surveillance data, surveillance bulletins and other reports issued by the National Institute for Communicable Diseases (NICD)

will regress to the state of fragmentation and vulnerability exposed in 2020, remains to be seen.

The immediate signals are less than convincing. Health-information systems created under pandemic pressures are being allowed to close, are being defunded, or are simply becoming less timely and less effective. The lessons of this pandemic are at risk of being lost, even before the pandemic has formally been declared over. In a 2022 commentary, Pillay et al. pointed out that the post-COVID-19 recovery effort not only aims to ensure that services recover to "2019 levels at least", but "to use the lessons from the COVID-19 response to radically transform the SA health system".[3]

Data Sources

Box 1 shows the key new or updated sources relied on at both international and national level. Specific references and the current indicator definitions are provided in the data tables in the chapter. Many of the indicators have been normalised using population denominators. Routine data were obtained from web-based District Health Information System (WebDHIS), covering especially the 2021/22 financial year, which ran from April 2021 to March 2022. In a number of the sections below, the difference between expected and actual routine measures has been depicted graphically. The expected trends have been forecast using the Holt-Winters method.[4,5]

As highlighted in previous editions of the *Review*, caution is warranted when using data that are presented for several years. As data may be drawn from multiple sources, care should be taken in assessing trends and changes over time. Differences in methodology and data presentation may make comparisons challenging. Data from regular surveys may also not be comparable over time. In some cases, revised data for a historical time series may be released, for example with the Statistics South Africa General Household Surveys. This may result in different values being published than in previous editions of the *Review*. When using time-series data, the most recent revisions should be obtained from the online database and not from previous printed editions of this chapter.

1. Demographic indicators

There has been a lot of speculation about the impact that the COVID-19 pandemic will have on demographic trends, particularly because population ageing is driven by fertility and mortality trends. In European and other Western countries, data suggest that births had fallen sharply by the end of 2020.[6] This finding is consistent with responses to pandemics in the past, where a sharp decline in births has typically been followed by gradual increases in births and then a 'baby boom'. However, previous pandemics have also been characterised by high mortality among younger people and those of childbearing age. COVID-related deaths have been more prevalent in the older population, therefore the motivation for high birth rates to replace those who have died is not there. More than anything, the disruption of maternal health services, particularly a lack of contraception in low- and middle-income countries (LMICs) due to lockdowns, and interruptions to health services and supplies, could have inadvertently led to as many as 1.4 million unintended pregnancies.[7]

South Africa has the highest proportion of elderly people among countries in the African region.[8] Although population ageing is still in its early stages in the country, the proportion of persons aged 60 years and older is increasing over time, as shown in the South African national population pyramid (Figure 1). This will ultimately have implications for the health system overall as it will intensify the disease burden related to multiple chronic conditions.[9] Consequently, programmes and policies to address this ageing population should be prioritised as

older adults have different health needs to a younger population. In addition, the country's quadruple burden of communicable and non-communicable diseases also manifests in high levels of unhealthy ageing.[9]

The total population in South Africa is estimated to have increased from 60.1 million in 2021 to 60.6 million people in 2022, with females still accounting for 51.1% of the population (Table 1). South Africa's expected national Census could not be completed in 2021 because of the COVID-19 pandemic. The Census was postponed to 2022, and has been completed. However, the 2022 mid-year estimates do not take account of the Census data, as these figures will only be released later in 2023. The estimates are therefore continuations of the projections from the 2011 Census. As estimated, the province with the highest share of the country's population remains Gauteng (26.6%, 16.1 million people), while the smallest share of the population is still found in the Northern Cape (2.2%, 1.31 million people). The population density has also increased in Gauteng, from 870 to 886 people per square kilometre.[11] The 2022 Census may well present data showing even more marked internal migration, with populations in more rural provinces, depleted by migration, moving to the economic hubs of Gauteng and the Western Cape. Such changes in population will have major implications for the allocation of funds from the fiscus, in the form of the equitable share formula.

COVID-19 mortality rates dramatically increased the crude death rate in South Africa within just a year from 8.7 deaths per 1000 population in 2000 to 11.5 per 1000 population in 2021. However, in 2022 the modelled crude death rate decreased slightly to 11.0, which could be signalling a recovery post-COVID.[11]

The Council for Medical Schemes (CMS)[20] and the most recent General Household Survey[18] reported on the number of medical scheme beneficiaries in 2021. According to the CMS, the number of beneficiaries covered by medical schemes increased by 0.5% between 2020 and 2021; however, overall, both estimates indicated a greater increase in the number of public sector-dependent (uninsured) population.

Table 2 and Table 3 show the webDHIS 2021/22 population estimates per 5-year age band per province, and the population estimates under 1 year of age by district, respectively. Table 4 shows the total and uninsured national, provincial and district population estimates.

2. Socio-economic and environmental risk factors

As expected, COVID-19 exacerbated pre-existing poverty and inequalities on a global scale. As much as it was a health crisis, it also disrupted livelihoods and exposed societal weaknesses, which ultimately intensified the impact of the pandemic. As one of the most unequal countries in the world, South Africa experienced a widening gap between the rich and the poor during the pandemic. The poor were hardest hit after many lost their jobs and had their income reduced. From an economic perspective, the pandemic led to a sharp 7% decline in the country's Gross Domestic Product (GDP) in 2020, and a rise in unemployment rates. When comparing unemployment rates in the fourth quarters of the period from 2020 to 2022, unemployment was highest in 2021 at 35.3%. Unemployment does appear to be easing, as total employment increased by 1.4 million people between the fourth quarters of 2021 and 2022.[21]

An interesting phenomenon of the COVID-19 lockdowns was how blue skies appeared in some of the world's most polluted areas due to reduced industrial activity and fewer cars on the roads.[22] This was a temporary fix, however, as air pollution continues to be one of the leading and most direct environmental threats to human health. Pollution is linked to increased susceptibility to respiratory infections, including COVID-19. Furthermore, long-term exposures to air pollution have been linked to increased risk of illness and death from chronic diseases such as stroke, lung cancer, ischaemic heart disease, chronic obstructive pulmonary disease (COPD), type 2 diabetes[23,24] and even stillbirths.[25] The State of Air Quality and Health Impacts in Africa report summarised data on air pollution exposures and associated health impacts in Africa using data from the Global Burden of Disease (GBD) project. South Africa has some of the highest levels of air pollution in the world, and was one of the five countries whose data were analysed in the report, in addition to Egypt, Ghana, Kenya and the Democratic Republic of Congo. The report estimated that in 2019, the death rate linked to household and ambient air pollution in South Africa was 44.6 (35.4-53.8) per 100 000 people per year. Figure 2 shows the percentage of cause-specific deaths linked to air pollution, with estimates being highest for COPD and diabetes in South Africa.[23] The latest data from the Air Quality Life Index (AQLI) illustrates that permanently reducing global air pollution to meet the WHO's guideline would add 2.2 years onto average life expectancy globally, and 1.5 years for South Africa specifically. However, in order for that to happen, strategies that reduce exposure and vulnerability to air pollution need to be developed to reduce the burden on public health.[22,24]

The 2021/22 Human Development Report developed a COVID-19-adjusted human development index (HDI) quantifying the complexity of the crisis from a multi-dimensional view.[26] Interestingly, South Africa's human development rank (HDR) improved from 115 in 2019 to 102 in 2020, while the HDI remained relatively constant in 2019 (0.736), 2020 (0.727), and 2021 (0.713), as illustrated in Table 5. The countries with the highest HDI ranking were Norway, Iceland and Switzerland. Coincidentally, these three countries were also ranked among the top 10 happiest in the world according to the 2023 World Happiness Report.[27] South Africa was ranked 85th among 109 countries between 2020 and 2022. The happiness scores were determined based on six key variables: GDP per capita, social support, healthy life expectancy, freedom to make life choices, generosity, and freedom

Table 1. Demographic indicators by province, 2020-2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Ageing index	2021	both sexes mid-year	21,6	25,1	23,2	23,0	17,7	18,6	18,6	23,8	20,6	28,2	a
	2022	both sexes mid-year	22,1	25,3	23,5	23,5	17,6	18,8	19,7	24,1	20,8	29,4	b
Annual population growth rate	2021	both sexes mid-year	1,0										a
	2022	both sexes mid-year	1,1										b
Crude death rate (deaths per 1 000 population)	2020	both sexes all ages mid-year	8,7										c
	2021	both sexes mid-year	11,5										a
	2022	both sexes all ages mid-year	11,0										b
Live birth occurrences registered	2020	vital registration total	1 003 307	114 881	46 265	228 299	205 781	132 893	95 898	23 540	57 979	97 771	d
	2021	vital registration total	1 087 526	129 381	52 260	247 378	223 712	137 780	104 061	27 980	61 605	103 368	e
Population	2021	both sexes all ages mid-year	60 142 979	6 676 590	2 932 441	15 810 388	11 513 575	5 926 724	4 743 584	1 303 047	4 122 854	7 113 776	a
		both sexes all ages Stats SA 2019-30 FinYr total	60 354 419	6 544 060	3 004 609	15 874 780	11 738 948	5 959 813	4 745 703	4 176 475	1 269 273	7 040 757	f
		female all ages mid-year	30 754 931										a
		male all ages mid-year	29 388 047										a
	2022	both sexes all ages Stats SA 2019-30 FinYr total	61 220 537	6 551 888	3 020 662	16 271 412	11 847 316	6 004 534	4 815 440	4 242 620	1 283 976	7 182 690	f
		both sexes mid-year	60 604 992	6 676 691	2 921 611	16 098 571	11 538 325	5 941 439	4 720 497	1 308 734	4 186 984	7 212 142	b
		female mid-year	30 980 110										b
		male mid-year	29 624 882										b
Population % by province	2021	both sexes all ages mid-year	100,0	11,1	4,9	26,3	19,1	9,9	7,9	2,2	6,9	11,8	a
	2022	both sexes mid-year	100,0	11,0	4,8	26,6	19,0	9,8	7,8	2,2	6,9	11,9	b
Population density	2021	mid-year	49,3	39,5	22,6	869,8	122,0	47,1	62,0	3,5	39,3	54,9	a
	2022	mid-year	49,6	39,5	22,5	885,6	122,3	47,2	61,7	3,5	39,9	55,7	b
Population under 1 year	2021/ 22	both sexes under 1 year DHIS	1 139 382	130 901	50 371	263 761	255 744	124 972	96 828	25 739	81 115	109 951	g
Public sector dependent (uninsured) population	2020	both sexes all ages GHS	49 798 387	5 955 518	2 501 372	11 873 601	10 005 297	5 339 978	4 145 892	1 051 559	3 450 829	5 399 356	h
		both sexes all ages non med schemes	51 256 046	6 012 497	2 535 990	12 375 348	10 223 911	5 454 669	4 192 033	1 121 438	3 666 797	5 727 477	i
	2021	both sexes all ages GHS	50 847 588	5 968 962	2 445 388	12 234 914	10 326 801	5 454 241	4 290 932	1 052 222	3 546 375	5 502 864	j
		non med scheme	51 599 090	6 209 323	2 804 747	9 820 128	9 922 960	5 644 367	4 437 267	1 282 559	3 977 635	6 130 321	k
Total fertility rate	**2022**	**both sexes mid-year**	**2,3**	**2,9**	**2,3**	**1,8**	**2,5**	**3,0**	**2,3**	**2,6**	**2,5**	**2,0**	**b**

Reference notes

a Stats SA MYE 2021.[12]
b Stats SA MYE 2022.[11]
c Stats SA MYE 2020.[13]

d Recorded Live Births 2020.[14]
e Recorded Live Births 2021.[15]
f Pop Est 2019-30.
g webDHIS.[10]
h Stats SA GHS 2019.[16]
i Medical Schemes 2020-21.[17]
j GHS 2021.[18]
k Medical Schemes 2021-22.[19]

Definitions

- Population [Number]: Total number of people. Projected population figures are based on various projection models attempting to quantify the expected effects of HIV and AIDS on population growth.
- Adolescent fertility rate (per 1 000 girls aged 15-19 years) [per 1 000 girls aged 15-19 years]: Annual number of births to women aged 15-19 years per 1 000 women in that age group. Also referred to as the age-specific fertility rate for women aged 15-19 years.
- Ageing index [Number]: Ratio of the number of people 65+ to the number under 15 years, i.e. a value of 16 means there are 16 people aged 65 and over for every 100 under 15 years of age. Calculated as ([65+/0-14]*100).
- Annual population growth rate [Percentage]: The rate at which the population is increasing or decreasing in a given year expressed as a percentage of the base population size. It takes into consideration all the components of population growth, namely births, deaths and migration.
- Crude death rate (deaths per 1 000 population) [per 1 000 population]: Number of deaths in a year per 1 000 population.
- Live birth occurrences registered [Number]: The number of live birth occurrences registered.
- Population % by province [Percentage]: Proportion of South African population in each province (calculated from population per province and population for whole of South Africa).
- Population density [people per km^2]: The number of people per square kilometre.
- Population under 1 year [Number]: Population under 1 year of age.
- Public sector dependent (uninsured) population [Number]: This is an adjustment of the total population to the number assumed to be dependent on services in the public health sector based on medical scheme (health insurance) coverage. It is calculated by subtracting the number of people with medical scheme cover (determined from medical scheme membership reports, or surveys indicating percentage of population on medical schemes) from the total population.
- Total fertility rate [Number]: The average number of children that a woman gives birth to in her lifetime, assuming that the prevailing rates remain unchanged.

Table 2. National and provincial population estimates by age group, 2022

Data Age group	EC	FS	GP	KZ	LP	MP	NC	NW	WC	ZA
00-04 years	672 324	255 736	1 312 439	1 254 648	640 842	474 862	126 615	401 940	559 465	5 698 871
05-09 years	742 073	275 225	1 269 176	1 206 334	683 923	464 812	122 417	403 240	580 581	5 747 781
10-14 years	754 831	286 436	1 232 104	1 184 767	672 127	468 020	120 660	407 962	587 345	5 714 252
15-19 years	641 423	261 710	1 172 725	1 054 280	560 776	417 641	111 696	359 788	547 677	5 127 716
20-24 years	446 362	226 710	1 361 696	942 756	438 857	379 056	95 907	308 020	544 816	4 744 180
25-29 years	448 862	234 559	1 676 705	1 007 870	459 359	415 475	102 623	340 336	627 099	5 312 888
30-34 years	509 302	255 819	1 765 548	1 037 819	503 828	449 514	115 352	383 469	684 309	5 704 960
35-39 years	477 079	237 118	1 551 317	922 228	467 497	415 064	109 589	359 327	651 745	5 190 964
40-44 years	376 074	185 817	1 204 748	691 506	373 113	318 885	86 589	288 422	524 513	4 049 667
45-49 years	316 706	154 270	958 401	556 498	302 871	250 403	70 290	234 740	437 730	3 281 909
50-54 years	272 493	133 078	766 418	444 613	242 391	199 836	59 743	192 645	384 670	2 695 887
55-59 years	247 062	115 550	631 025	384 910	207 573	166 681	50 210	162 607	329 427	2 295 045
60-64 years	228 979	96 863	518 950	322 761	170 566	129 856	42 317	134 595	268 461	1 913 348
65-69 years	189 870	78 534	395 579	254 007	139 852	101 388	34 838	100 365	201 474	1 495 907
70-74 years	140 214	57 013	274 282	192 803	104 293	71 045	25 762	67 595	144 581	1 077 588
75-79 years	98 996	35 341	164 093	123 743	65 202	41 869	17 194	44 547	94 417	685 402
80+ years	148 765	30 699	106 946	101 622	91 372	50 653	19 006	41 681	75 211	665 955
Total	6 711 415	2 920 478	16 362 152	11 683 165	6 124 442	4 815 060	1 310 808	4 231 279	7 243 521	61 402 320

Source: webDHIS Pop Est 2000-30.

from corruption. One of the central findings of the report was that the quality of social context, particularly the extent to which people trusted the government and the extent to which they trusted the compassion of their peers, supported their happiness before and during the pandemic, and likely after the pandemic too.

In 2022, the Department of Water and Sanitation released the first Blue Drop Progress Report since 2015, reporting on the current status and risk trends of municipal potable water-treatment facilities.[29] A total of 144 water service authorities, comprising 1 186 water-supply systems in South Africa, were assessed to calculate the Blue Drop Risk Rating (BDRR). Overall, the National BDRR profile for the country was summarised as follows:

- 48% of water-supply systems were found to be in the low-risk category,
- 18% were in the medium-risk category,
- 11% were in the high-risk category, and
- 23% were in the critical-risk category.

The Green Drop Report, which was also released in 2022, focused on the state of wastewater treatment plants.[35] The report covered audits of 995 wastewater networks and treatment works, operated by 144 water-service authorities (850 systems), 12 Department of Public Works operations (115 systems), and five private- and state-owned organisations (30 systems). Only 23 systems scored 90% or more, with most rural municipalities struggling to score more than 50%. A total of 334 (39%) of the municipal wastewater systems were identified to be in a critical state in 2021. Overall, the assessed risk deteriorated between 2013 and 2021.

Safe and readily available water is important for public health as contaminated water and poor sanitation are linked to transmission of gastrointestinal diseases such as cholera. During COVID-19, access to clean water was considered critical in the prevention of transmission. Water assessments should be conducted more frequently to ensure that systems and strategies are in place to reduce the risk to the people supplied by these two critical systems.

3. Disability

South Africans with disabilities were greatly and uniquely affected by COVID-19. They were at greater risk of poor outcomes from the disease; lockdown periods reduced their access to routine health care and rehabilitation services; and efforts to mitigate the pandemic led to adverse social impacts in this group.[36] This situation was not unique to South Africa. The International Disability Alliance urged policy makers to make those living with disabilities a priority during the vaccination roll-out to prevent them from being left further behind, having to struggle with disproportionate loss of lives and livelihoods, inability to access healthcare services, and disconnection from the general population.[37] In November 2022, the National Department of Women, Youth and Persons with Disabilities released a report on the impact of COVID-19 on persons with disabilities in South Africa, which stated that the rights of many persons with disabilities were either denied or limited during the pandemic, even though there were a few positive stories and experiences shared by some. With regard to health-related issues, the report highlighted that persons living with disabilities experienced difficulties with adhering to the mandatory COVID-19 guidelines such as social distancing and wearing of personal protective equipment (PPE), and accessing health care, therapy, medication, specialist care and assistive devices. Figure 3 shows that provision of assistive devices dropped substantially in 2020.[38]

It has been found that people with disabilities are more likely to be older, female, poorer, and to have additional comorbidities than their able peers.[36] As of 2021, more women were classified as disabled (4.9%) than men (4.1%).[18] Living with disabilities leads to challenges in all aspects of life, including access to healthcare services, aids or devices, medication and support (for example, when caregivers are infected with COVID-19). These impacts are exacerbated in local and middle-income countries (LMICs), which often face additional challenges of corruption, political instability, lack of suitable transportation, and a general negative attitude to those living with disability, and to disability overall.[39] Table 6 shows how the provision of assistive devices slowed down in 2020/21, particularly for spectacles. However, there was a steady improvement in the 2021/22 financial year, in some instances even returning to pre-pandemic levels.

The COVID-19 pandemic has highlighted the need for strategies to better reach the 15% of the population living with disabilities worldwide.[36]

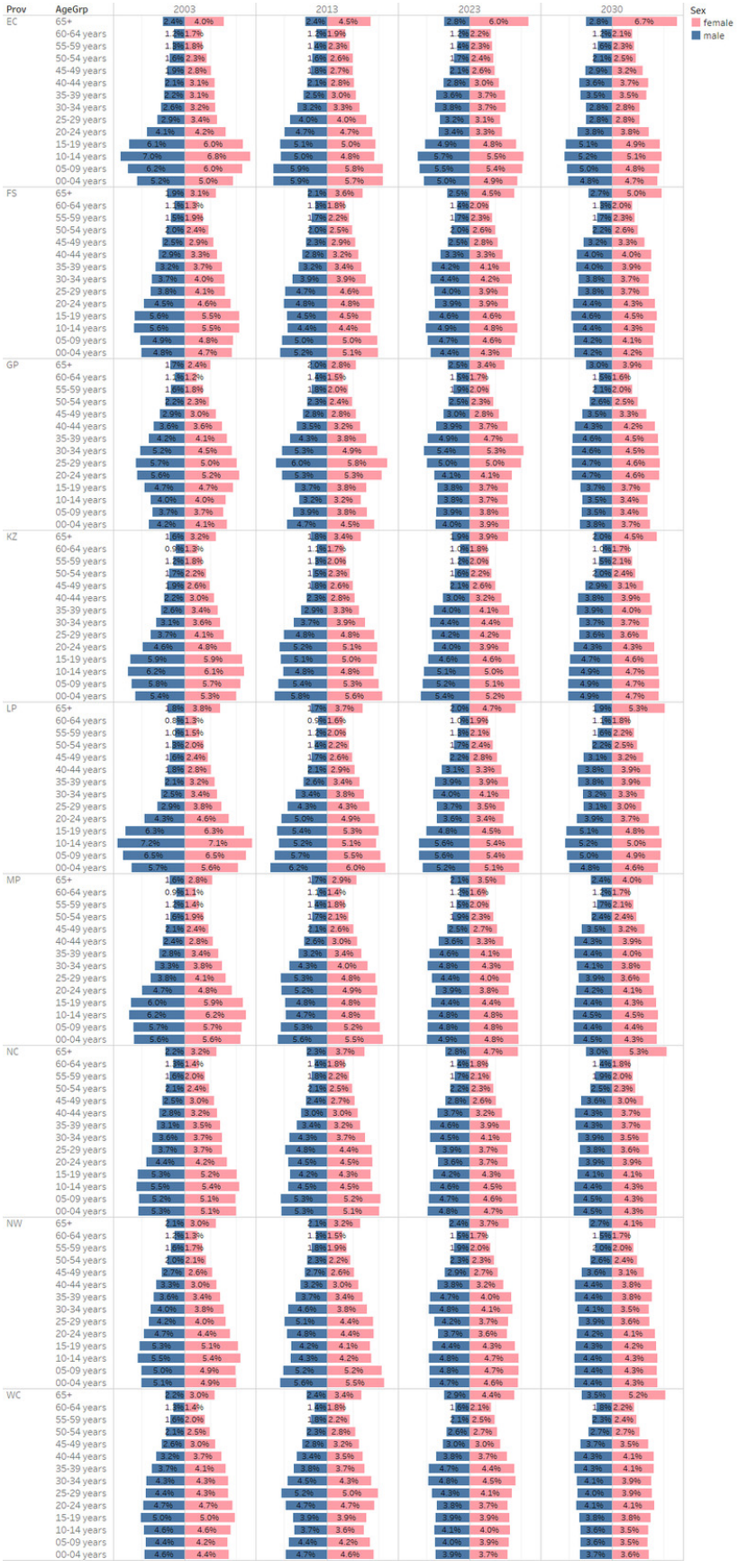
4. Nutrition

The COVID-19 pandemic had various impacts on nutrition globally, ranging from disruptions in food-supply chains and decreased food security and affordability, to increased risk of obesity, and changes in eating habits and breastfeeding of babies.[40]

COVID-19 had a significant impact on the ability of mothers to breastfeed their babies due to fears of transmission.[41] This led to a reduction in breastfeeding rates, as shown in Table 7, and an increased risk of malnutrition in infants. This reduction in breastfeeding appears to be persisting in South Africa across most provinces, except for Gauteng and the Western Cape where the rates of exclusive breastfeeding in infants remained fairly stable.

Vitamin A is vital to child health and immune function and programmes to control vitamin A deficiency contribute to a child's chances of survival, reduce severity of childhood illnesses, and lead to overall reduction in child morbidity and mortality.[42] As such, it was alarming to note the huge reduction in vitamin A doses administered in the country between 2019/20 and 2020/21, from 5.3 million to 3.9 million (Table 7). Administration of vitamin A has recovered somewhat, with the vitamin A dose coverage having increased from a low of 49.5% in 2020/21 to 60.3% 2021/22.

Figure 1. Population pyramid by province, 2003-2030



Source: webDHIS-NDoH 2000-2030 population time series[10] (received August 2020).

Figure 2. Percentage of cause-specific deaths linked to air pollution in five focus countries in Africa, 2019

Percentage of Cause-Specific Deaths							
Country	Diabetes	COPD	Stroke	Ischemic Heart Disease	Lung Cancer	Lower Respiratory Infections	Neonatal
Egypt	24 (18–30)	43 (34–53)	35 (30–39)	31 (26–34)	29 (22-36)	29 (19–40)	15 (10–20)
Ghana	24 (18–31)	48 (39–58)	35 (32–39)	31 (28–34)	31 (24-39)	36 (25–47)	17 (11–22)
Democratic Republic of the Congo	26 (18–37)	64 (51–76)	38 (34–42)	35 (32–39)	36 (26-44)	50 (38–60)	20 (13–26)
South Africa	20 (14–26)	25 (18–32)	19 (16–23)	19 (16–23)	18 (13–24)	17 (11–25)	12 (9–15)
Kenya	30 (17–30)	46 (35–58)	33 (29–36)	30 (26–33)	29 (22–37)	39 (28–50)	22 (20–24)

Source: SoGA-Africa.[23]

5. Health status indicators

5.1. Mortality

The 2022 edition of the World Health Organization's World Health Statistics included an estimate of global mortality attributable to COVID-19, as of 20 April of that year.[32] The WHO noted that although available data pointed to more than 4.7 million of the total of 6.2 million reported deaths having occurred in the Americas and European regions, mortality data in many countries were incomplete. One significant statistic, which was widely reported, was the estimate of excess mortality, which is defined as "the difference in the total number of deaths in a crisis compared to those expected under normal conditions". Between January 2020 and December 2021, the full death toll associated directly and indirectly with the COVID-19 pandemic was approximately 14.9 million, exceeding the 5.4 million COVID-19 deaths by 9.5 million. Of these, 4.5 million excess deaths were estimated to have occurred in 2020, the balance of 10.4 million in 2021. The WHO pointed out that 10 countries, in which 35% of the global population resided, accounted for almost 70% of excess deaths worldwide. More than half of the excess deaths (53%) were estimated to have occurred in lower-middle-income countries, and more than a quarter (28%) in upper-middle-income countries. An attempt to estimate excess deaths, taking into account countries with incomplete data, came to a figure of 14.83 million excess deaths globally in the same 24-month period.[43]

In South Africa, the excess death reports[44] generated by the South African Medical Research Council (SAMRC) were watched closely. Figure 4 and Table 8 show that a total of 339 146 excess deaths were estimated between May 2020 and December 2022. The close correlation between excess deaths and the first four 'waves' of COVID-19 is immediately evident, as is the more diffuse picture associated with the Omicron variant in 2022. The weekly excess-deaths reports were discontinued after December 2022. The SAMRC now reports on weekly number of deaths in South Africa on a monthly basis, the most recent being for February 2023. The revised reporting is only at national level, disaggregated by age groups and natural and unnatural causes.

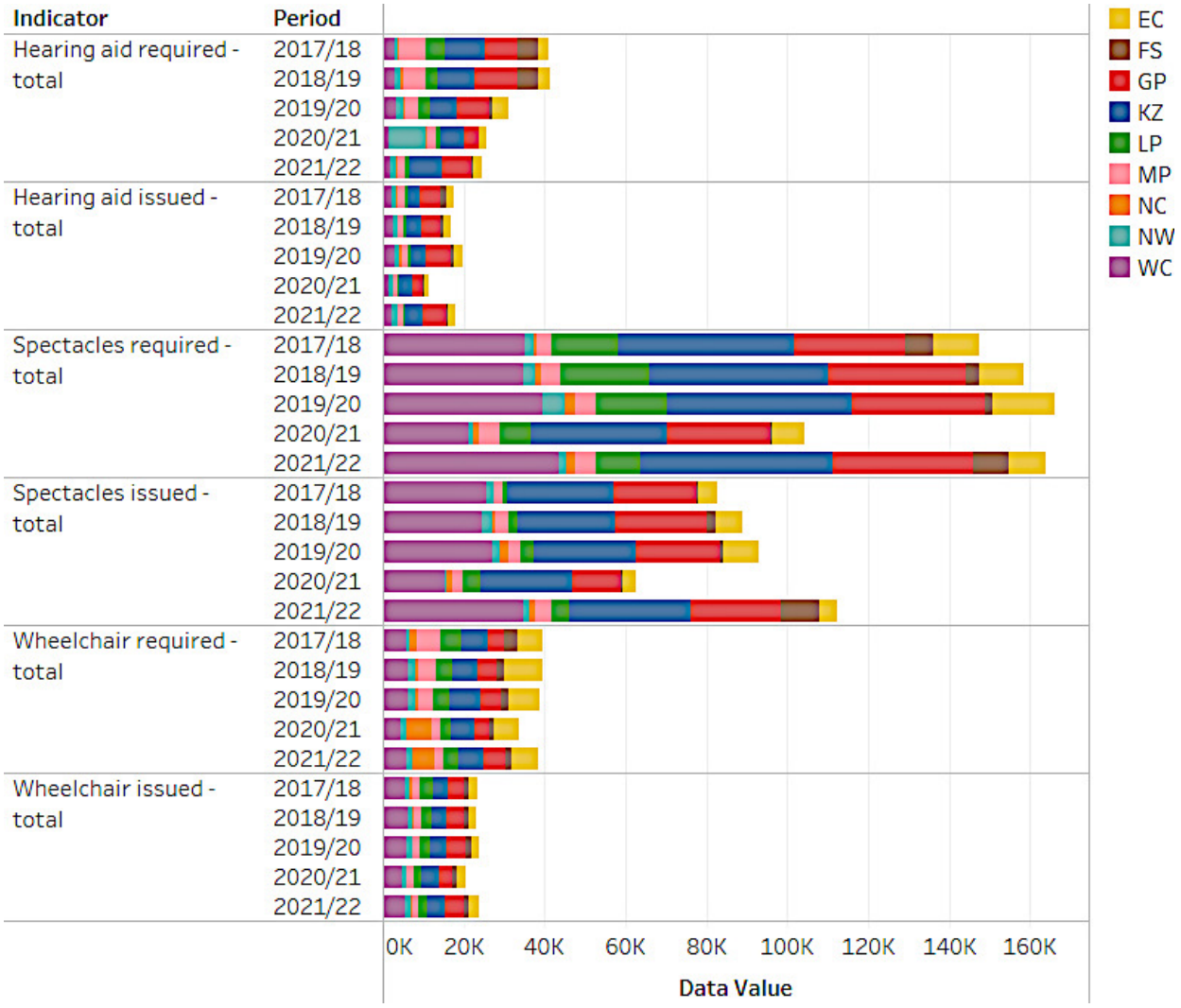
Table 9 shows the life expectancy at birth for both sexes had dropped from 65.4 years in 2020 to 62 years in South Africa at the height of the COVID-19 pandemic in 2021. However, there was a slight recovery in 2022 and it increased to 62.8 for both sexes according to the Statistics South Africa mid-year population estimates.

5.2. Infectious diseases

Despite the impact of COVID-19, the number of malaria cases and deaths remained stable across the world without any major setbacks in malaria testing, prevention, and treatment services as countries intensified their efforts in their fight against malaria.[48] Globally, the 2022 World Malaria report reported an estimated 619 000 deaths in 2021 compared to 625 000 in 2020 when the pandemic first hit, and 568 000 deaths pre-pandemic in 2019. Although the number of malaria cases continued to rise between 2020 and 2021, they rose at a slower rate than between 2019 and 2020. When looking at cases and deaths in the WHO African Region (Figure 5), which accounted for 95% of cases and 96% of deaths globally, there is an evident spike in both incidence and mortality rates in 2020, with reductions in both measures in 2021.

South Africa was one of the countries that continued to make progress towards the elimination of malaria by 2025, with a 33.7% reduction in cases in 2021 compared to 2020. However, these figures could have been con-

Figure 3. Number of assistive devices required per province, 2017/18 - 2021/22



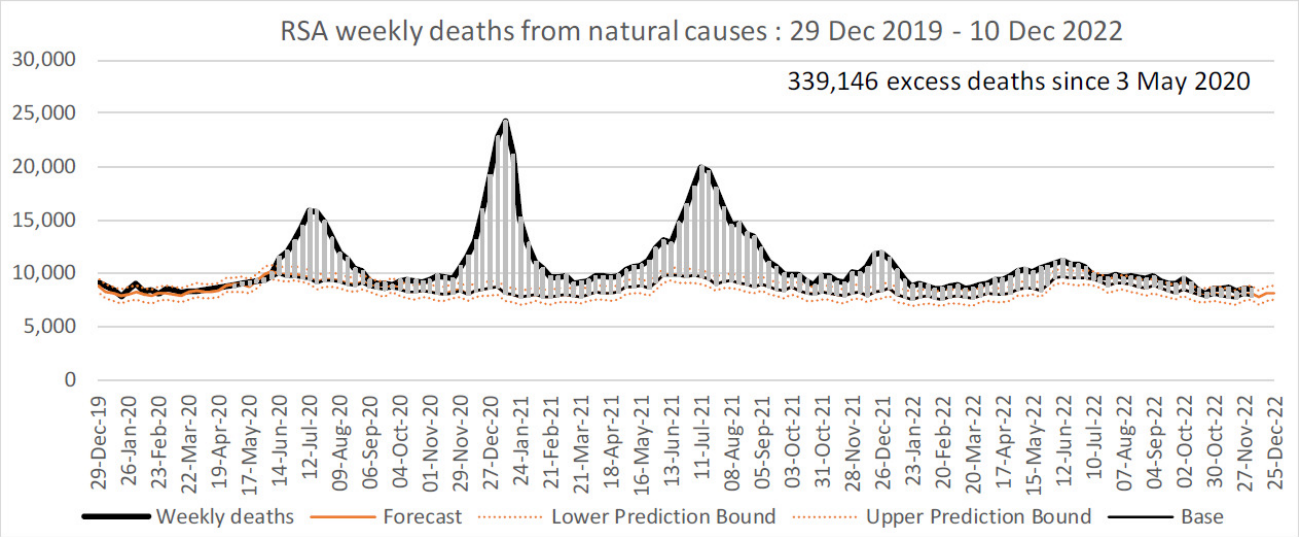
Source: webDHIS.[10]

founded by the reduction in testing due to limited movement during the lockdown periods when mobile clinics were unable to carry out testing and case investigations at community level. Furthermore, the country also recorded the highest increase in unclassified cases (one-third of total cases) over the past three years.[48] A total of 4 109 malaria cases and 34 malaria deaths (Table 10) were reported by the National Department of Health (NDoH) from January 2022 to October 2022. In South Africa, malaria is classified as a category one Notifiable Medical Condition (MNC) that must be reported within 24 hours of diagnosis via written or electronic communication.[49]

At the beginning of 2022, the WHO and United Nations International Children's Emergency Fund (UNICEF) reported an alarming increase in measles cases worldwide, with a 79% increase in the first two months of 2022 compared to the same period in the previous year. Health officials linked this surge in measles with the drop in vaccinations after the pandemic, as 23 million children missed out on all basic vaccinations in 2020. This represents the highest number of missed doses since 2009. COVID-19 disrupted childhood vaccinations as parents were apprehensive about taking their children to health facilities for fear of exposing them to COVID-19, and healthcare workers were reassigned to manage COVID-19 and moved away from doing routine vaccinations.[50]

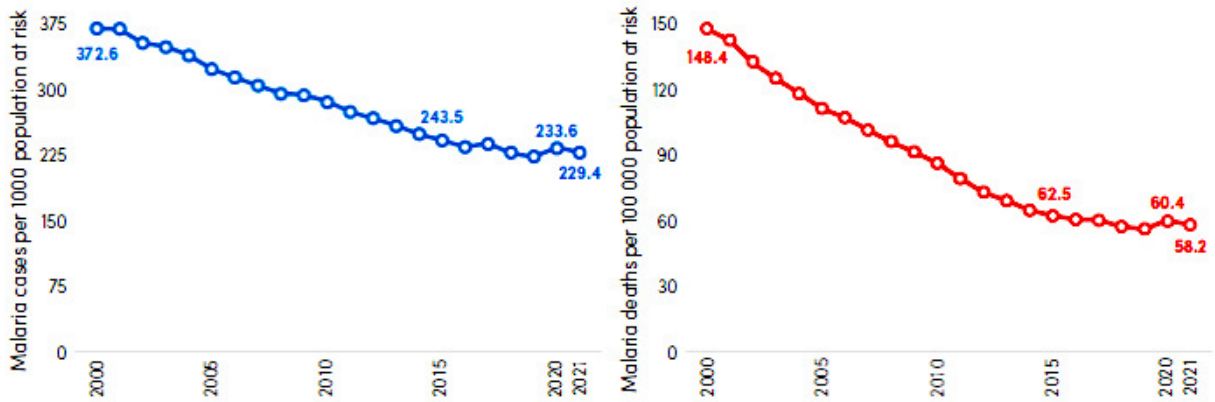
South Africa also experienced a measles outbreak in October 2022. A total of 665 laboratory-confirmed measles cases were reported between 11 October 2022 and 24 February 2023 (Table 10) by the National Institute for Communicable Diseases (NICD). Although cases were reported across the country, outbreaks were declared in all provinces except the Eastern Cape. An outbreak is only declared once there are three or more classified laboratory measles cases reported within 30 days of onset of the disease. The most affected age groups were 5-9-year-olds (41% of cases), 1-4-year-olds (25% of cases) and 10-14-year-olds (20% of cases). In response to the outbreak, the NDoH initiated a national measles vaccination campaign for children aged between 6 months and 14 years, with the aim of limiting the outbreak. Health officials have been conducting vaccinations at schools, day-

Figure 4. Weekly deaths (all causes) in South Africa, 29 December 2019 - 10 December 2022



Source: SA MRC.[44]

Figure 5. Malaria case incidence and mortality rates in the WHO African region, 2000-2021



Source: WHO estimates.[48]

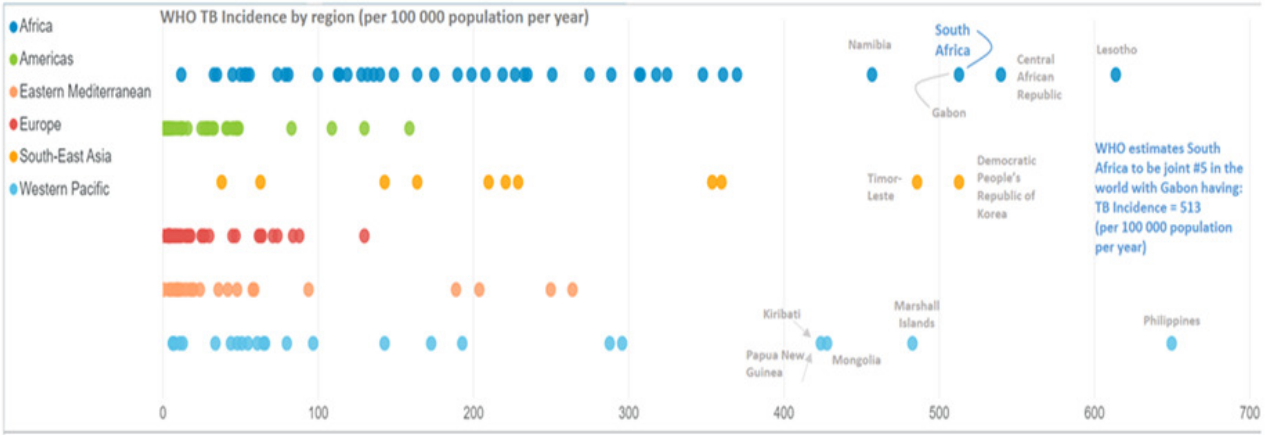
care centres and city clinics as part of the campaign to curb further spread of the outbreak.[51]

5.3. Tuberculosis

Until the COVID-19 pandemic occurred, tuberculosis (TB) was one of the leading causes of death among the infectious diseases.[53] According to the 2022 Global Tuberculosis Report, COVID-19 had a large impact on TB services globally.[54] Worldwide, progress towards reducing TB disease burden slowed drastically, halted, and in some cases reversed, due to the pandemic.[55] In South Africa, TB resources were redirected to address the demands posed by the pandemic.[56] This redirection of resources affected the screening, diagnosis and treatment of TB, and slowed the progress made in the TB programme. South Africa is still among the five countries in the world with the highest TB incidence (Figure 6), although the situation has improved from 988 cases per 100 000 population per year in 2015 to 513/100 000 in 2021. South Africa is thus well on its way to reaching one of the 2025 End TB Milestones, namely a 50% reduction in TB incidence.[57] However, the country needs to effectively implement the TB Recovery Plan, jointly developed by the National Department of Health and the TB Think Tank.[55] Key to this effort is the concept of Targeted Universal Testing for TB (TUTT). Four key aims of the Plan are to reduce the number of undiagnosed people with TB, strengthen linkages to care, improve retention in care, and improve access to TB preventive treatment.

According to WHO estimations,[57] 304 000 people in South Africa developed TB in 2021, of whom only 181 699 were diagnosed and started on treatment. TB-related

Figure 6. WHO global TB incidence by region (per 100 000 population per year), 2021



Source: WHO Global Health Observatory[28]

deaths were estimated at 55 000 in 2021, with 33 000 of those having a TB/HIV co-infection due to the high double burden of HIV and TB in South Africa, and people living with HIV being at higher risk of contracting TB. Based on local routine monitoring (Table 11), the number of newly diagnosed drug-sensitive TB patients decreased from a peak of 222 569 pre-COVID (April 2019 - March 2020) to 158 764 (April 2020 - March 2021), which represented a (-29%) decline in new TB diagnosis, reversing the progress that had been made in the TB programme. The public health facilities heeded the call to action by integrating COVID-19 services and TB services, among other evidence-based interventions, which resulted in the number of new diagnoses growing in the following financial year, to 195 640 (April 2021 - March 2022). This represents an 84% recovery towards the 2019 financial year TB diagnosis and treatment numbers.

Table 11 provides a breakdown of declines per province, showing a decline in TB diagnosis and treatment in all provinces during the 2020/21 financial year and some recovery in TB diagnosis and treatment the following financial year. However, none of the provinces have managed to reach TB diagnosis and treatment numbers to the level prior to COVID-19 (April 2019 - March 2020).

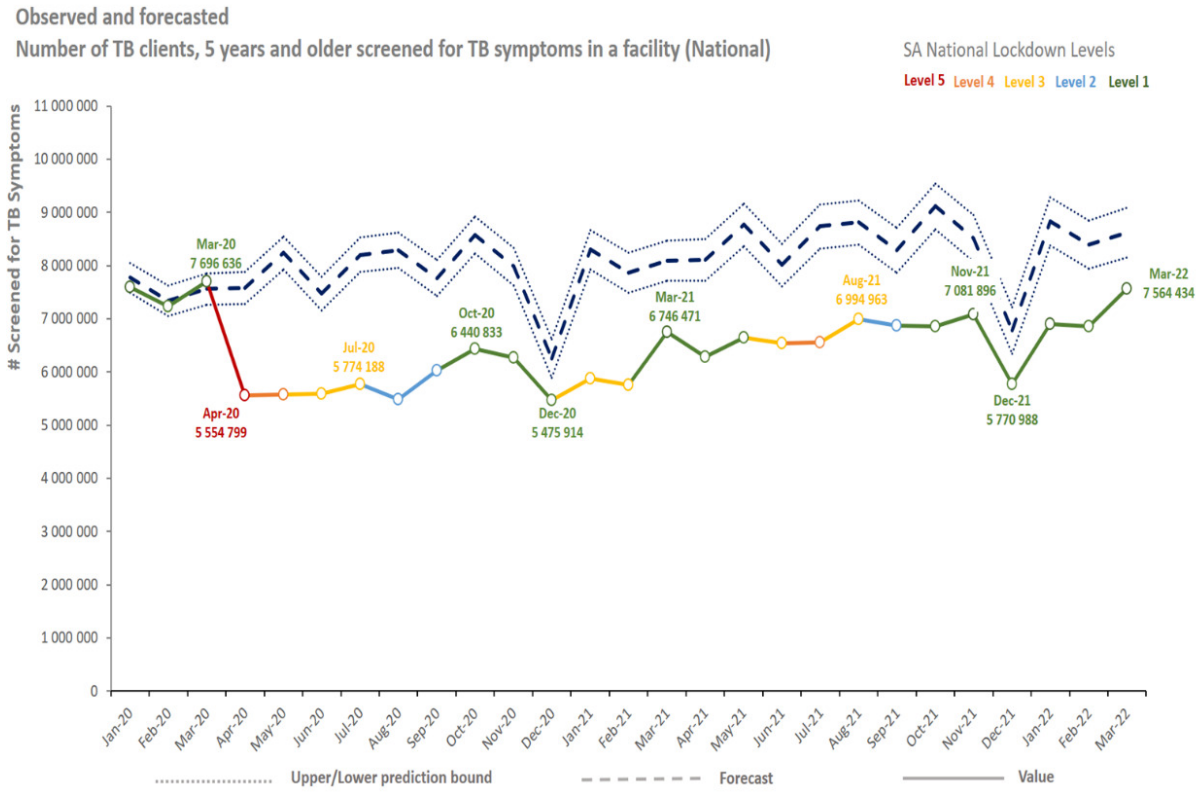
Figure 7 (national) and Figure 8 (provincial) show the impact of COVID-19 and the subsequent lockdown conditions on TB screening. Slow recovery from the initial lockdown restrictions (depicted in red) can be observed, with TB screening numbers not making a full recovery to pre-COVID TB screening figures.

The NDoH developed a National TB Recovery Plan[58] with the aim of closing the gaps created by COVID-19, and leveraging good practices born from the response to COVID-19. Phase 1 (preparatory period) of the plan took place between January 2022 and June 2022, and Phase 2 (implementation period) began in July 2022 and ended in March 2023. The Plan outlined the following:

- Finding undiagnosed people with TB through evidence-based interventions that scaled up community TB screening.[55]
- The Targeted Universal TB Testing (TUTT) approach was strengthened. This offered, among other services, TB testing to people at high risk of contracting TB regardless of symptoms, as the National TB Prevalence Survey[59] suggested that a large number of patients who develop TB present as asymptomatic.
- Use of other technologies was scaled up, with a shorter turnaround time (TAT) for results compared to GeneXpert Ultra testing kits, which have a 48-hour TAT. These TB investigation tools will not replace GeneXpert Ultra testing, but will rather work alongside it. The TB diagnostic tools include, among others, the urine Lipoarabinomannan (LAM) screening (±25-minute TAT), digital X-rays (±20-minute TAT) and mobile self-screening applications. The latter proved to be effective in increasing COVID-19 screening coverage at a time of scarce human resources.
- There was also an explicit effort to increase the focus on men, in response to the National TB Prevalence Survey[59] which showed a higher prevalence of TB in males than females.
- The recovery plan included strengthening of health systems that (i) support the TB programme, (ii) link people to TB care, and (iii) keep people in TB care through adherence counselling, hospital referrals to primary health care facilities, scale-up of shortened (6-month) multi-drug-resistant (MDR)-TB treatment regimens, 4-month paediatric treatment regimens for children, and strengthened tracer teams.

Figure 9 and Figure 10 show the impact of COVID-19 on TB diagnosis and treatment, with monthly data (24 months) displayed in relation to South African national lockdown levels from January 2020 to March 2022.

Figure 7. Number of clients 5 years and older screened for TB symptoms in a facility (national), January 2020 - March 2022



Source: webDHIS[10]

Drug-resistant (DR) TB was also negatively affected. There was a –32% decline in the number of people provided with treatment for rifampicin-resistant TB (RR-TB), while the number of people receiving MDR-TB treatment declined from 8 815 pre-COVID-19 to 6 016 in 2020/21, with a partial recovery to 7 005 (+16%) during 2021/22 (Table 12).

Figure 11 shows that preventive therapy for children under 5 years (shown in light blue) declined in performance consistently over the 2019-2022 period. This is particularly concerning as TB is very difficult to diagnose in children under 5 years, as the children are unable to articulate their symptoms, and parents find it challenging, or are sometimes unaware of, the changes to take note of in their children that would indicate the presence of TB. As such, TB in children under 5 years of age must become an explicit area of focus for TB programmes in South Africa. Gastric washout is the most commonly used procedure to diagnose TB in children under 5 years of age; however, it is a very invasive procedure that makes parents reluctant to provide consent, among other factors. A few clinical research initiatives have attempted to solve this challenge. However, data indicate that these types of research initiatives need to be prioritised and invested in so that there can be accelerated learning and calibration, and treatment can be rolled out as soon as possible to this high-TB-risk population subset.

5.4. HIV and AIDS

Figure 12 shows that by March 2022, the number of HIV tests performed nationally appeared to have recovered to pre-pandemic levels. However, the impact of the COVID-19 pandemic on HIV response should not be under-estimated as the figures for March 2022 were lower than what was forecasted. Figure 13 shows the same trend for most provinces with the exception of the Northern and Western Cape and Limpopo where HIV testing numbers had reached the estimated forecasted levels for March 2022. Figure 14 to Figure 16 graphically illustrate the impact on treatment initiations and retention in care. In a high HIV and TB burden setting, COVID-19 has been associated with high mortality among people living with HIV.[60] A divergence is noted in the antiretroviral effective coverage figures between the modelled Thembisa 4.5 estimates and the routine coverage from webDHIS (Table 13), which could be the result of the momentum lost during the COVID-19 period.

The UNAIDS summary page on South Africa[68] shows data for 2021, in the middle of the pandemic. Although new infections continued to decline, the rate at which

HIV-related deaths were declining, slowed. These statistics provide the backdrop to the recently launched National Strategic Plan (NSP) for HIV, TB and STIs 2023-2028.[69] Emphasis in the NSP 2023-2028 has been described as follows: "to provide innovative, people- and communities-centred interventions and multi-sectoral approaches to reduce the barriers and enhance access to equitable HIV, TB and STI prevention and treatment services". This intent is closely aligned with the Global AIDS Strategy 2021-2026.[70] However, policy objectives on paper do not translate easily into actionable interventions in the clinical setting. This was demonstrated in a cluster randomised controlled study conducted in 40 rural clinics in South Africa.[71] Attempts to integrate HIV and TB services, with a quality-improvement component, failed to show an impact on mortality in HIV-TB co-infected patients. Even in sub-populations that have been the target of concerted effort over many years, such as pregnant women, reaching the third of the 95-95-95 targets has proven challenging.[72] Table 19 shows the medical male circumcision (MMC) rates fluctuated between 2019/20 and 2021/22 which could have been the effect of some variations among the provinces where MMC rates went up quite drastically particularly between 2019/20 and 2020/21.

5.5. COVID-19

As the COVID-19 disease burden in South Africa and globally has reduced, so the frequency with which COVID-19 statistics are reported has dropped considerably. Although the dedicated COVID-19 website (https://sacoronavirus.co.za/) remains operative, it no longer gives daily statistics. Instead, the weekly COVID-19 reports now have to be accessed via the National Institute for Communicable Diseases (NICD) website (https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/surveillance-reports/). Most tellingly, the Daily Hospital Surveillance (DATCOV) reporting system is no longer functioning. This system had been highlighted as a prime example of collaboration between the public and private sectors, with 100% of all hospitals in each sector contributing data. The weekly DATCOV site only provides data until December 2022, and includes this note: "Please note: the DATCOV system ended at the end of December 2022 and COVID-19 hospitalisation data will be collected via the Notifiable Medical Conditions surveillance system from January 2023. These weekly COVID-19 hospitalisation reports have been discontinued from 31 December 2022." Without weekly reporting, it is uncertain whether the COVID-19 hospitalisations are being consistently reported via the notifiable medical conditions (NMC) system. How many ambulatory cases are reported as NMCs is also uncertain. The rolling total on the South African coronavirus website showed 4 055 656 COVID-19 cases on 3 April 2023 and 102 595 deaths.

The weekly testing summary also ceased, from the end of March 2023 (epidemiological week 12 of 2023). The final report showed that 12 180 Polymerase Chain Reaction (PCR) tests were conducted in the week to 25 March 2022, bringing the cumulative national total to 21 577 962 since 1 March 2020.[73] Interpreting the PCR percentage testing positive was no longer simple, as testing strategies varied between provinces. For example, settings in which all antigen-positive tests were confirmed by PCR would bias the statistic.

Although optional booster vaccinations are now accessible for all adults, uptake of COVID-19 vaccinations has slowed dramatically. Figures 18-20 show the vaccination statistics as at 20 February 2023. In March 2023, the WHO Strategic Advisory Group of Experts on Immunization (SAGE) revised its guidance.[74] Additional booster doses were not recommended for healthy adults (those under the age of 50-60 years without comorbidities) and children and adolescents with comorbidities. Booster vaccination was still recommended for those at higher risk, namely older adults, younger adults with significant comorbidities (e.g. diabetes and heart disease), people with immune-compromised conditions (e.g. people living with HIV and transplant recipients; including children aged 6 months and older), pregnant persons, and frontline health workers. Children 5-11 years old at risk of severe disease became eligible for a primary course of vaccination from the end of February 2023.[75]

5.6. Maternal and reproductive health

It has been found that during all pandemics, public focus shifts to preserving life, with less attention given to women, children, and reproductive health.[76] The number of antenatal visits declined in all provinces during level 5 of the South African lockdown in 2020-2022 as illustrated in Figure 21 and Figure 22. All the provinces showed a significant increase in number of antenatal visits as lockdown levels lowered. All provinces, except for the Free State, experienced a drop in number of visits. This drop continued into the 2021/22 year, except in the Eastern Cape, where visits improved compared with the previous year, from 68.2% in 2020/21 to 81.2% in 2021/22. All provinces noted a reduction in the number of contraceptives methods prescribed (measured by the couple year protection rate) during lockdown levels 4 and 5; however, contraceptive prescription went back to usual as lockdown levels decreased (Figure 23 and Figure 24). All provinces showed an improvement in the couple year protection rate, except Gauteng, which declined from 44.9% in 2020/21 to 37.8% in 2021/22, and the Northern Cape which declined from 50.9% in 2020/21 to 46.8% in 2021/22 as shown in Table 14.

The crisis-management approach to the pandemic, which included lockdowns, school closures, and travel restrictions, placed women and adolescent girls at risk of having their rights violated, resulting in early pregnancy, gender-based violence, and lack of access to reproductive health services. The webDHIS figures in Table 14 show that deliveries by adolescents between the ages of 10 and 19 years increased across all provinces in 2021/22 compared to 2018/19. These findings underscore the importance of policies and programmes that provide life-skills training, financial literacy, support, and safe spaces

for adolescent girls and women.[80] There was also a significant increase in the maternal mortality ratio (MMR) in 2020/21 as noted in Table 14 where the MMR ranged from 178.8 in the Free State to 80.6 in the Northern Cape. This again points to the damaging effects of COVID-19 on maternal health.

There was a huge drop in cervical screening coverage between 2019/20 and 2021/21 due to COVID-19 and its effect on the national screening coverage programme. Cervical screening coverage rates were already low nationally at 46.8% and had still not recovered in 2021/22 (36.9%) yet cervical cancer is the second leading cause of cancer death among women following breast cancer.[81]

5.7. Child health

The global under-5-year mortality rate dropped to 37 deaths per 1 000 live births in 2020, but children in the African Region continued to have the highest mortality rates worldwide.[32]

Under-5 mortality (U5MR) continues to be one of the most challenging public health issues in LMICs, mainly due to poor dwelling units, poor access to breastfeeding, and the circumstances of birth, more specifically multiple births as these children are more likely to die than singleton children[82] The leading causes of under-5 mortality are neonatal causes, diarrhoea, and pneumonia or lower respiratory tract infections, despite there being a high immunisation coverage rate and a decreasing occurrence of malnutrition.[83] COVID-19 has resulted in a setback in achieving reduced deaths from infections and maternal and child health conditions that would have been possible by the year 2035. COVID-19 disrupted childhood vaccination programmes due to lockdowns, and redirected spending towards emergencies, including the procurement of COVID-19 vaccines.[84]

The monthly webDHIS figures (Figure 25 and Figure 26) indicate that immunisation coverage has stayed stable in the country, with a slight increase across all provinces except for North West in 2021/22. This could be due to the levels of lockdown having been gradually lifted at the time. The incidence of pneumonia cases decreased during higher levels of lockdown, driven in part by reduced care-seeking behaviours and patients only presenting for severe cases (Figure 27 and Figure 28). Figure 29 and Figure 30 show that cases of diarrhoea and dehydration also declined during higher levels of lockdown and increased slightly as restrictions were eased.

5.8. Non-communicable diseases

In 2022 the NDoH published the National Strategic Plan for the Prevention and Control of Non-Communicable Diseases, 2022-2027[87] to fast-track their response towards the prevention and control of non-communicable diseases (NCDs), risk factors and mental conditions. This was also in recognition of the gaps that COVID-19 exposed in the delivery of NCD services as mortality and hospitalisation rates were much higher for those living with NCDs (both known and unknown) and among obese people in the country.[88] The NSP proposed a cascade-based strategy similar to the 90-90-90 approach for HIV and AIDS, and TB. The proposed 90-60-50 cascade states that:

- 90% of all people over 18 will know whether or not they have raised blood pressure and/or raised blood glucose.
- 60% of people with raised blood pressure or blood glucose will receive intervention.
- 50% of people receiving interventions are controlled.[87]

NCD policies require increasingly efficient implementation as the attributable burden for diabetes mellitus is growing. For example, improved surveillance of risk factors, including physical activity, is crucial to improving NCD detection and response.[89] A high mortality burden attributable to high systolic blood pressure underscores the need for improved care for hypertension and cardiovascular diseases, particularly stroke, to prevent morbidity and mortality.[90]

As mentioned before, South Africa's population is ageing and those living with HIV are living longer due to the successful uptake of antiretroviral therapy (ART), which means that the NCD burden on the country will also increase as old age is a risk factor for developing an NCD. In 2022, Percept Actuaries & Consultants quantified the burden of NCDs in South Africa using datasets that included the General Household Survey, the National Income Dynamics Study (NiDS), the South Africa Demographic and Health Survey (2016/17), cause-of-death records, Council for Medical Schemes data, underwriting from insurers, National Health Accounts, and webDHIS data. Some key findings from the briefs were:

- South African males were 1.38 times more likely than females to have diabetes. Among the medical scheme population, the odds of being male with hypertension were 1.17 times higher than the odds of being female with hypertension.
- Objective measures of diabetes showed high prevalence of undiagnosed or poorly managed diabetes. Only 30% of men and women with diabetes reported that they had previously been diagnosed with diabetes.
- Uncontrolled diabetes increased the risk of death among hospitalised COVID-19 patients; the risk of death was exacerbated in elderly males, and those who had co-morbidities such as hypertension, clotting disorders, cardiovascular disease and obesity.[91]

Data on NCDs continues to be difficult to find though, as NCDs are not notifiable medical conditions (NMC). However, there has been an improvement in this regard as cancer registries are being strengthened. Table 16 shows the cancer incidence rate in South Africa for 2020, as reported by the National Cancer Registry (NCR) by cancer type. The most prevalent cancers in the country are prostate, breast, cervical, lung and colorectal. Figure 31

Table 4. Population estimates: modelled estimates for medical schemes coverage and uninsured population national, provincial and district, 2019-2023

		Total Population (DHIS Pop Est 2000-30)					Med schemes coverage (Insight Actuaries model 2019)	Uninsured Calculated				
		2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023
Country	ZA	58979654	59797656	60604086	61402320	62197960	15,4	49896787	50588817	51271057	51946363	52619474
Province	EC	6711899	6713318	6714789	6711415	6709060	9,8	6054133	6055413	6056740	6053696	6051572
	FS	2890007	2900278	2910130	2920478	2930982	13,5	2499856	2508740	2517262	2526213	2535299
	GP	15268630	15635579	15997809	16362152	16723636	24,6	11512547	11789227	12062348	12337063	12609622
	KZ	11319610	11441785	11563182	11683165	11801471	11,2	10051814	10160305	10268106	10374651	10479706
	LP	5993527	6039032	6084467	6124442	6165877	7,2	5561993	5604222	5646385	5683482	5721934
	MP	4609880	4680103	4748543	4815060	4880047	12,5	4033645	4095090	4154975	4213178	4270041
	NC	1267621	1282813	1297034	1310808	1324275	15,1	1076210	1089108	1101182	1112876	1124309
	NW	4043350	4107283	4169094	4231279	4293016	11,9	3562191	3618516	3672972	3727757	3782147
	WC	6875130	6997465	7119038	7243521	7369596	20,1	5493229	5590975	5688111	5787573	5888307
District	BUF	799711	798388	796759	794314	791614	22,4	620576	619549	618285	616388	614292
	CPT	4510747	4598783	4686530	4776492	4867548	22,2	3509361	3577853	3646120	3716111	3786952
	DC1	455676	463390	471043	478958	487115	17,3	376844	383224	389553	396098	402844
	DC2	925999	942232	958398	974747	991117	16,4	774135	787706	801221	814888	828574
	DC3	294278	299764	305203	310662	316173	16,4	246016	250603	§§	259713	264321
	DC4	614134	618954	623516	628217	633013	16,5	512802	516827	520636	524561	528566
	DC5	74296	74342	74348	74445	74630	12,5	65009	65049	65055	65139	65301
	DC6	113937	114035	114077	114245	114367	17,5	93998	94079	94114	94252	94353
	DC7	204290	206326	208167	209912	211609	13,1	177528	179297	180897	182414	183888
	DC8	273681	278104	282362	286400	290296	15,8	230439	234164	237749	241149	244429
	DC9	410232	414190	417771	421181	424540	15,7	345826	349162	352181	355056	357887
	DC10	478448	480810	483024	484665	486523	8,8	436345	438499	440518	442014	443709
	DC12	804398	795781	787417	778884	770438	4,3	769809	761562	753558	745392	737309
	DC13	741095	731081	721434	712004	702218	4,9	704781	695258	686084	677116	667809
	DC14	344401	342580	340685	338445	336219	5,0	327181	325451	323651	321523	319408

		Total Population (DHIS Pop Est 2000-30)					Med schemes coverage (Insight Actuaries model 2019)	Uninsured Calculated				
		2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023
	DC15	1 508 997	1 524 972	1 541 080	1 555 812	1 571 532	4,2	1 445 619	1 460 923	1 476 355	1 490 468	1 505 528
	DC16	126 989	127 071	127 119	127 251	127 471	10,5	113 655	113 729	113 772	113 890	114 087
	DC18	642 629	643 043	643 503	644 397	645 123	12,0	565 514	565 878	566 283	567 069	567 708
	DC19	755 188	755 842	756 396	757 178	758 118	9,2	685 711	686 305	686 808	687 518	688 371
	DC20	504 155	505 057	505 879	506 744	507 595	13,2	437 607	438 389	439 103	439 854	440 592
	DC21	804 993	816 195	827 384	838 645	850 311	7,1	747 838	758 245	768 640	779 101	789 939
	DC22	1 123 554	1 137 023	1 150 285	1 163 352	1 177 092	11,0	999 963	1 011 950	1 023 754	1 035 383	1 047 612
	DC23	704 433	706 771	708 994	711 516	714 070	6,4	659 349	661 538	663 618	665 979	668 370
	DC24	557 752	563 568	569 454	575 760	582 409	5,4	527 633	533 135	538 703	544 669	550 959
	DC25	558 701	565 495	572 008	577 873	583 415	7,4	517 357	523 648	529 679	535 110	540 242
	DC26	858 938	863 111	867 237	872 128	877 196	5,2	814 273	818 229	822 141	826 777	831 582
	DC27	671 378	676 068	680 655	685 592	690 192	5,0	637 809	642 265	646 622	651 312	655 682
	DC28	960 065	964 828	969 742	975 004	980 188	8,7	876 539	880 888	885 374	890 179	894 912
	DC29	671 846	680 361	688 960	696 590	703 372	8,6	614 067	621 850	629 709	636 683	642 882
	DC30	1 218 483	1 240 644	1 262 612	1 283 719	1 304 284	13,1	1 058 862	1 078 120	1 097 210	1 115 552	1 133 423
	DC31	1 580 378	1 613 205	1 645 648	1 677 409	1 708 843	14,8	1 346 482	1 374 451	1 402 092	1 429 152	1 455 934
	DC32	1 811 019	1 826 254	1 840 283	1 853 932	1 866 920	10,2	1 626 295	1 639 976	1 652 574	1 664 831	1 676 494
	DC33	1 209 120	1 218 016	1 226 939	1 234 474	1 241 931	6,8	1 126 900	1 135 191	1 143 507	1 150 530	1 157 480
	DC34	1 460 085	1 474 045	1 488 161	1 501 251	1 514 770	6,6	1 363 719	1 376 758	1 389 942	1 402 168	1 414 795
	DC35	1 344 562	1 349 214	1 353 845	1 357 666	1 361 654	8,3	1 232 963	1 237 229	1 241 476	1 244 980	1 248 637
	DC36	763 309	769 853	776 172	781 264	786 231	9,1	693 848	699 796	705 540	710 169	714 684
	DC37	1 884 307	1 929 057	1 972 917	2 015 765	2 058 230	14,0	1 620 504	1 658 989	1 696 709	1 733 558	1 770 078
	DC38	901 629	906 601	910 841	916 394	922 575	9,7	814 171	818 661	822 489	827 504	833 085
	DC39	470 086	471 910	473 588	475 637	477 280	7,3	435 770	437 461	439 016	440 915	442 439
	DC40	787 328	799 715	811 748	823 483	834 931	12,8	686 550	697 351	707 844	718 077	728 060
	DC42	960 427	963 811	966 230	968 999	972 188	20,8	760 658	763 338	765 254	767 447	769 973
	DC43	503 616	506 908	510 113	513 778	517 618	5,6	475 414	478 521	481 547	485 006	488 631

		Total Population (DHIS Pop Est 2000-30)					Med schemes coverage (Insight Actuaries model 2019)	Uninsured Calculated				
		2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023
	DC44	826587	828210	830067	831112	832500	3,8	795177	796738	798524	799530	800865
	DC45	265481	270158	274657	279070	283463	13,9	228579	232606	236480	240279	244062
	DC47	1216451	1227904	1239350	1249787	1261291	5,6	1148330	1159141	1169946	1179799	1190659
	DC48	943535	956893	969545	982753	996636	24,1	716143	726282	735885	745910	756447
	EKU	3910546	3996528	4080699	4165110	4250640	23,8	2979836	3045354	3109493	3173814	3238988
	ETH	3904334	3961457	4018350	4072927	4125608	18,9	3166415	3212742	3258882	3303144	3345868
	JHB	5781281	5951077	6121322	6295072	6465812	22,2	4497837	4629938	4762389	4897566	5030402
	MAN	861046	869265	877233	884908	892675	20,0	688837	695412	701786	707926	714140
	NMA	1208262	1211496	1214323	1216179	1218016	20,4	961777	964351	966601	968078	969541
	TSH	3672841	3767270	3860013	3950218	4038360	30,6	2548952	2614485	2678849	2741451	2802622

Table 5. Socio-economic indicators by province, 2019-2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Age-standardized mortality rate attributed to household and ambient air pollution (per 100 000 population)	2019	WHO	74,9										a
		WHO COPD	5,2										a
		WHO Ischeamic heart disease	15,3										a
		WHO Lower respiratory infections	20,7										a
		WHO Stroke	10,2										a
		WHO Trachea, bronchus, lung cancers	2,9										a
		SOGA	44,6										b
Drinking Water System (Blue Drop) Performance Rating	2021	Blue Drop Low risk	48,0	51,9	37,7	82,8	48,0	35,6	58,9	46,7	12,2	85,0	c
		Blue Drop Medium risk	18,0	23,5	15,6	10,3	18,1	18,4	20,5	22,1	17,1	7,9	c
		Blue Drop High risk	11,0	11,2	19,5	3,4	7,4	21,8	8,0	11,6	17,7	3,1	c
		Blue Drop Critical risk	23,0	13,4	27,3	3,4	26,5	24,1	12,5	19,6	53,0	3,9	c
Education level: percentage of population with no schooling	2021	both sexes 20 years and older GHS	3,2	4,6	2,6	1,0	4,4	7,1	6,3	3,2	3,9	0,7	d
Human development index (high value = best)	2019	both sexes all ages HDR	0,71										e
	2020	both sexes all ages HDR	0,73										f
	2021	both sexes all ages HDR	0,7										f
Human development index rank (1= best)	2019	both sexes all ages HDR	115										e
	2020	both sexes all ages HDR	102										f
Percentage of households by type of housing	2021	both sexes GHS Formal	83,6	72,4	82,6	81,6	85,7	96,3	89,8	86,8	80,5	82,2	d
		both sexes GHS Informal	11,7	5,4	15,4	17,0	5,0	2,9	7,1	12,3	19,1	17,3	d

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		both sexes GHS Traditional	4,2	21,6	2,0	0,1	9,3	0,7	3,1	0,5	0,4	0,1	d
Percentage of households using electricity for cooking	2021	GHS	77,7	77,7	87,2	77,4	82,3	64,5	71,4	83,0	78,8	80,5	d
Percentage of households with access to improved sanitation	2019	GHS	82,1	87,6	82,3	90,0	80,9	63,4	63,7	83,9	68,8	94,5	g
	2020	GHS	83,2	92,7	85,8	90,5	81,2	58,7	64,4	86,9	78,3	93,9	d
	2021	GHS	84,1	91,7	86,3	91,8	84,5	58,5	63,2	87,4	77,8	94,8	d
Percentage of households with access to piped water	2020	GHS	89,1	72,1	93,3	98,0	86,9	71,3	87,9	91,8	87,3	98,5	d
	2021	GHS	88,7	71,0	93,6	98,4	87,0	69,4	86,2	90,9	83,4	99,4	d
Percentage of households with telephone (telephone in dwelling or cell phone)	2021	GHS	97,8	97,4	98,0	98,4	96,7	95,4	98,9	97,6	99,2	98,5	d
Percentage of population with primary reliance on clean fuels	2019	WHO	86,0										h
	2020	WHO	87,0										i
Unemployment rate (official definition)	2020 Q4	both sexes 15-64 years LFS	32,5	47,9	33,4	34,1	29,6	27,3	33,0	28,7	33,3	22,5	j
	2021 Q4	both sexes 15-64 years LFS	35,3	45,0	36,7	36,6	32,4	33,9	39,7	25,0	33,8	28,0	k
	2022 Q4	both sexes 15-64 years LFS	32,7	42,1	22,1	34,0	31,4	31,8	36,1	22,1	37,0	22,5	l
Air pollution level in cities (particulate matter [PM])	2020	AQLI PM2.5	20,3										m
Wastewater systems (Green Drop) Performance Rating	2021	Green Drop	37,0	51,0	26,0	68,0	68,0	29,0	49,0	41,0	30,0	84,0	n
		Green Drop Critical risk	39,0	39,0	67,0	15,0	14,0	78,0	43,0	76,0	69,0	11,0	n

Reference notes
a Global Health Observatory.[28]
b SOGA Africa 2021.[23]
c Blue Drop 2022.[29]
d GHS 2021.[18]
e HDR 2020.[30]
f HDR 2022.[26]
g Stats SA GHS 2019.[16]
h World Health Statistics 2021.[31]

i World Health Statistics 2022.[32]
j Labour Force Survey Q4 2020.[33]
k Labour Force Survey Q4 2021.[34]
l Labour Force Survey Q4 2022.[21]
m Air Quality Life Index 2022.[22]
n Green Drop 2022.[35]

Definitions

- Drinking Water System (Blue Drop) Performance Rating [Percentage]: Composite score measuring compliance of water suppliers with water quality management requirements. Includes microbiological, chemical and physical compliance criteria.
- Education level: percentage of population with no schooling [Percentage]: Percentage of people in a given age group who have received a particular level of education.
- Human development index (high value = best) [Number]: The HDI is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development:
- Human development index rank (1 = best) [Number]: Rank from 1 to end given to each country according to value of HDI.
- Percentage of households by type of housing [Percentage]: Percentage of households that are categorised as formal, informal, traditional or other.
- Percentage of households using electricity for cooking [Percentage]: Percentage of households using electricity as their main energy source for cooking.
- Percentage of households with access to improved sanitation [Percentage]: Percentage of households using improved sanitation facilities (including flush to piped sewer system, flush to septic tank, flush/pour flush to pit, flush/pour flush to elsewhere).
- Percentage of households with access to piped water [Percentage]: Includes households with piped water in dwelling, piped water inside yard or piped water on a community stand (<200m away or further).
- Percentage of households with telephone (telephone in dwelling or cell phone) [Percentage]: Percentage of households with a telephone in the dwelling or a cellular telephone.
- Percentage of population with primary reliance on clean fuels [Percentage]: Percentage of population with primary reliance on clean fuels.
- Unemployment rate (official definition) [Percentage]: The official definition of the unemployed is that they are those people within the economically active population (aged 15-65) who:
  (a) did not have a job or business during the 7 days prior to the interview,
  (b) want to work and are available to work within two weeks of the interview, and
  (c) have taken active steps to look for work or to start some form of self-employment in the 4 weeks prior to the interview.
- Wastewater systems (Green Drop) Performance Rating [Percentage]: Composite score measuring compliance of wastewater management requirements.

illustrates the age-standardised incidence rates among males and females for cancers with the highest incidence in the country.

According to the International Disability Alliance's report[37] on COVID-19 and diabetes, diabetes was a strong risk factor for adverse COVID-19 outcomes; individuals with diabetes were more likely to be hospitalised or die as a result of COVID-19 infections than those not living with the disease. The International Diabetes Federation (IDF) 2021 Atlas[92] estimated that South Africa has the highest number of people living with diabetes in Africa, with an estimate of 4.2 million people in 2021. Twelve years ago, in 2011, this figure was estimated at just 1.9 million. According to routine data collected in the web-DHIS between 2020/21 and 2021/22, there were noticeable drops in the number of new diabetes and hypertension treatment clients in the public sector. This was another indication of potential under-screening and under-diagnosing due to disruptions to health services caused by COVID-19 (Table 16).

COVID-19 highlighted increasing concern around mental health, both globally and locally. The second annual Mental State of the World Report[93] noted that mental wellbeing showed a greater decline in 2020 (8%) than in 2021 (3%). This correlates with the stringent COVID-19 measures taken by governments when the pandemic started, and directly correlates with the number of cases and deaths per million.[93] The report further noted that the pandemic had the greatest effect on the mental wellbeing of younger generations worldwide, with 44% of 18-24-year-olds considered in the 'Distressed' or 'Struggling' range compared with only 7% of those aged 65 years and older. The Mental Health Quotient (MHQ) assessment "captures a comprehensive spectrum of emotional, social and cognitive attributes encompassing both problems (or symptoms) across 10 different mental health disorders (as defined by the DSM-5), as well as positive mental attributes. An aggregate mental wellbeing score based on these aspects (the MHQ) positions individuals on a spectrum from Distressed to Thriving." South Africa and the UK had the lowest MHQ (a score of 46) among the 34 countries included in the assessment; according to the scale, this score was in the 'Enduring' range (Figure 32). Furthermore, South Africa stood out among all the other countries as the percentage of 'Distressed' or 'Struggling' increased by 8% from 28.55% in 2020 to 36% in 2021. Such indicators demonstrate the increasing need for comprehensive mental health action plans, and mental health programmes and services in the country.

5.9. Injuries and risk behaviours

In 2022, the Global Burden of Disease (GBD) alcohol group estimated the population-level risks of alcohol consumption by amount, geography, age, sex, and year. They recommended the development of tailored guidelines and recommendations on alcohol consumption by age and across regions due to the fact that existing low consumption thresholds were actually too high for younger populations. Additionally, the publication noted that young adult males are the highest consumers of alcohol globally, and interventions targeting them should be prioritised to minimise loss of health due to alcohol consumption.[94]

Research by the Alcohol Harms Reduction programme forecasts a marked reduction in alcohol-related health costs if legislative interventions increase the price of alcohol through minimum unit pricing, and if the availability of liquor is reduced by regulating outlet trading hours[95]

In South Africa, alcohol remains an important contributor to the overall disease burden, ranking fifth in terms of deaths and disability-adjusted life years (DALYs).[96] In 2021, most alcohol and drug treatment and rehabilitation centres re-opened following closures during the height of the COVID-19 pandemic. The most recent report from the South African Community Epidemiology Network on Drug Use (SACENDU) covered both periods in 2021 (January-June, and July-December). It reported an increased number of admissions for alcohol and other drugs (AODs) in the second half of the year, from 10 938 (across 85 centres/programmes) to 15 704 (across 78 treatment centres/programmes) as shown in Table 17. There was a higher number of people seeking treatment for alcohol in the Western Cape and Gauteng, and a decline of 21% for such admissions in KwaZulu-Natal. Cannabis was the main drug of use among admissions aged 20 years and younger (Table 17).[97]

6. Health service indicators

6.1. Health facilities

Figures 33 and 34 show the overall impact of the COVID-19 pandemic on health facility workload. Despite the direct workload associated with confirmed COVID-19 cases, the overall number of patient-day equivalents was below the predicted level until March 2022, as was in-patient bed utilisation (Figure 35 and Figure 36).

The national bed utilisation rate (BUR) during the COVID-19 period dropped from 72.4% in 2019/20 to 60.7% but the average length of stay (ALOS) remained at 4 days. The inpatient crude death rate increased from 4.6% to 5.7% indicating that although less patients were admitted during the time, more patients probably died as a result of COVID-19. By contrast, primary health care (PHC) utilisation recovered to predicted levels over the same period, as shown in Figure 37 and Figure 38.

Figure 39 to Figure 40, along with Table 18, show that the PHC utilisation rate for children under five is also on a steady recovery to pre-COVID levels in most provinces with the exception of the Northern Cape which had a PHC utilisation rate of 4.3 in 2019/20 and has only increased to 2.7 in 2021/22. Table 18 also illustrates how the total PHC headcount between 2019/20 and 2020/21 declined which resulted in less patients being seen by doctors and PHC professional nurses. This confirms the lack of essential services rendered to clients. The PHC headcount had still remained lower in the country in 2022 with only 101 393 994 people visiting PHCs com-

pared to 2019 where it was estimated at close to 120 million people.

6.2. Health personnel

The health personnel data provided in Table 19 and Table 20 only reflect those working in the public sector. The COVID-19 pandemic underscored the interrelatedness of the public and private health sectors, and enabled cross-sector service provision in one limited sense. The national COVID-19 vaccination programme was able to draw on the capacity of both sectors to deliver vaccine doses, regardless of insurance status. Changes to the reimbursement processes in early 2023 have reduced access to services in the private sector, with vaccine administration costs no longer reimbursed for uninsured persons.[103]

Lack of human resources for health remains a constant feature of many health systems, even in more well-resourced settings. A Global Burden of Disease (GBD) 2019 mapping exercise set targets of 20.7 physicians per 10 000 population, 70.6 nurses and midwives, 8.2 dentistry personnel, and 9.4 pharmaceutical personnel, in order to reach a universal health coverage index of 80 out of 100.[105] On this basis, the 2019 global health workforce was estimated to be missing 6.4 million physicians, 30.6 million nurses and midwives, 3.3 million dentistry personnel, and 2.9 million pharmaceutical personnel. Not surprisingly, the lowest health worker densities were recorded in sub-Saharan Africa, south Asia, North Africa and the Middle East. There was a noticeable increase in the medical doctors professional nurses, enrolled nurses, nursing assistants and pharmacists per 100 000 uninsured population between March 2020 and March 2021 as more professionals were appointed to work during the COVID-19 pandemic. The numbers, however, declined in March 2022 to be in line with March 2020 levels.

6.3. Health financing

As shown in Table 21, medical scheme coverage has continued to decline as a percentage of the total population. The Council for Medical Schemes' 2021 Industry Report noted a further minor consolidation in the number of medical schemes.[19] In 2021, there were 75 registered medical schemes, of which 57 were restricted and 18 open. This was almost half the number of schemes operating in the year 2000 (144 schemes, 97 restricted, 47 open). In 2021, the medical schemes disbursed a total of R205.3 billion in benefits, representing a 15.3% increase from 2020. The average amount paid per beneficiary per annum was R23 060.79. Although it is difficult to compare the expenditure patterns with those ordinarily reported for the public sector (as shown in Table 21), the following headline amounts are striking: medical schemes spent 35.7% of their overall disbursements (from risk and savings) on hospital services, 28.1% on specialists, and 16.1% on medicine dispensed outside of hospitals (by pharmacies and dispensing practitioners). Total hospital expenditure increased by 18.7% between 2020 and 2021 as illustrated in Table 22, with almost all benefits (92%) being paid to private hospitals. Year-on-year, medicines expenditure outside of hospitals increased by 9.2%. In the public sector, normalised expenditure on primary health care and district health services expenditure was distinctly higher in 2020/21 in real terms compared with the previous and following financial years; expenditure per headcount increased by almost 50% nationally in 2020/21. This was the result of the drop of the PHC headcount from almost 120 million in 2019/20 to 95 million in 2020/21 and also the drops in the BUR/OPD headcount and PDE in those periods (Figure 41 and Table 23).

7. Conclusion

While the world and South Africa are still in the early post-COVID era, there is already a global (and national) focus on learning lessons from the pandemic in order to build a more resilient health system that can be responsive to unexpected shocks. Strong health-information systems should be the foundation on which evidence-based decisions can be made in order to support strong governance and leadership, where human resources for health are also supported and healthcare funding is prioritised. However, there is also an understandable tendency to revert to the status quo ante to recover lost ground and reinstate systems that were compromised. This is particularly true in a setting of extreme fiscal constraint, where health systems in the public sector are being asked to accept real declines in funding and the private sector continues to face unaffordable increases in medical scheme subscription costs for a stagnant and aging risk pool. Where health-information systems that bridged the divide between the public and private sectors lose funding, the previous fragmentation is re-imposed. Lessons learned risk being lost, despite the lip-service paid to post-pandemic preparedness and response frameworks.

Table 11. TB diagnosis, year-on-year breakdown (provincial and national), 2019 - 2022

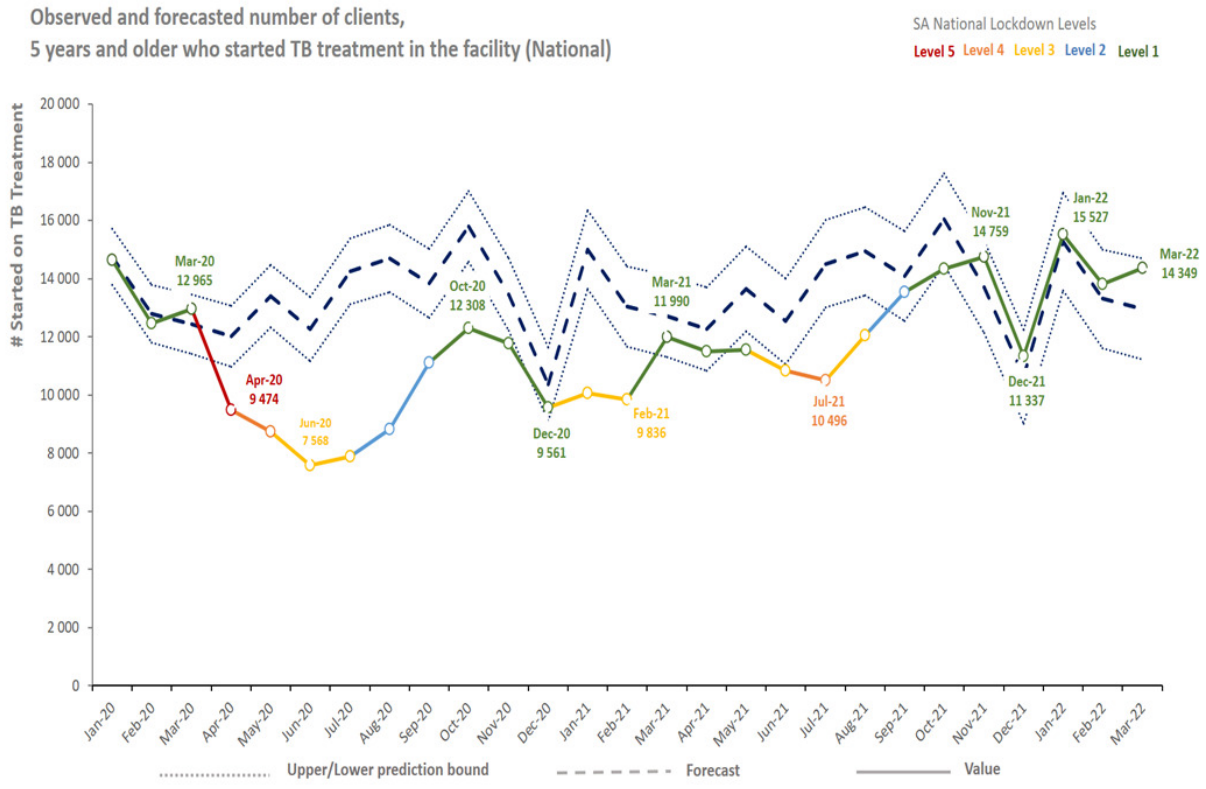
TB Diagnosis Year-on-Year Breakdown

Financial Year

FY19 (Pre-COVID) Apr 2019- Mar 2020		FY20 Apr 2020- Mar 2021		FY21 Apr 2021- Mar 2022		Net Effect		% Recovery towards FY19	
Observed Number (% Change)		Observed Number (% Change)		Observed Number (% Change)		FY20 vs FY 21 (% Change)		Below 80% 80% - 89% Above 90%	
EC	41 985	EC	30 930 (-26%)	EC	39 669 (28%)	EC	(+02%)	EC	39 669/41 985 (94%)
FS	11 011	FS	7 265 (-34%)	FS	8 464 (17%)	FS	(-17%)	FS	8 464/11 011 (77%)
GP	31 304	GP	21 933 (-30%)	GP	26 278 (20%)	GP	(-10%)	GP	26 278/31 304 (84%)
KZ	52 558	KZ	37 876 (-28%)	KZ	45 653 (21%)	KZ	(-07%)	KZ	45 653/42 558 (87%)
LP	11 785	LP	8 169 (-31%)	LP	9 638 (18%)	LP	(-13%)	LP	9 638/11 785 (82%)
MP	12 135	MP	8 507 (-30%)	MP	10 861 (28%)	MP	(-02%)	MP	10 861/12 135 (90%)
NC	6 776	NC	4 903 (-28%)	NC	5 971 (22%)	NC	(-06%)	NC	5 971/6 776 (88%)
NW	13 928	NW	8 988 (-35%)	NW	10 550 (17%)	NW	(-18%)	NW	10 550/13 928 (76%)
WC	41 087	WC	30 193 (-27%)	WC	38 556 (28%)	WC	(+01%)	WC	38 556/41 087 (94%)
ZA	222 569	ZA	158 764 (-29%)	ZA	195 640 (23%)	ZA	(-06%)	ZA	195 640/222 569 (88%)

Source: webDHIS.[10]

Figure 9. TB clients 5 years and older who started treatment in facility (national), January 2020 - March 2022



Source: webDHIS[10]

Table 6. Disability indicators by province, 2019/20 - 2021/22

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Cataract surgery - total	2019/20	both sexes all ages DHIS	58808	2971	7592	12454	19781	3483	1730	776	2440	7581	a
	2020/21	both sexes all ages DHIS	19108	362	313	4339	9660	1427		601	166	2240	a
	2021/22	both sexes all ages DHIS	38388	1552	1880	8385	16767	3063		463	1155	5123	a
Cataract surgery rate	2019/20	both sexes DHIS	1022,0	404,9	2628,0	879,1	1754,0	586,5	380,9	630,8	606,4	1133,0	a
	2020/21	both sexes DHIS	262,9	48,9	106,0	296,3	819,1	232,8	0,0	488,3	41,1	333,4	a
	2021/22	both sexes DHIS	633,4	231,1	646,0	524,1	1450,0	503,4		357,0	277,0	719,6	a
Hearing aid issued - total	2019/20	both sexes all ages DHIS	19890	2223	680	6418	3663	641	1630	430	1314	2891	a
	2020/21	both sexes all ages DHIS	11489	1281	270	2794	3102	373	1041	164	916	1548	a
	2021/22	both sexes all ages DHIS	17794	1576	437	5924	4374	467	1288	218	1187	2323	a
Hearing aid issued adult 19 years and older	2020/21	both sexes DHIS	9531	1093	160	2463	2433	293	941	118	722	1308	a
	2021/22	both sexes DHIS	14481	1222	251	5130	3249	376	1107	155	1042	1949	a
Hearing aid issued adult 19 years and older rate	2020/21	both sexes DHIS	41,9	72,2	124,0	80,9	47,6	36,9	42,6	52,0	8,6	99,2	a
	2021/22	both sexes DHIS	71,2	71,4	137,2	78,5	53,5	31,4	68,1	54,0	103,4	113,8	a
Hearing aid issued child 0-18 years	2020/21	both sexes DHIS	1958	188	110	331	669	80	100	46	194	240	a
	2021/22	both sexes DHIS	3313	354	186	794	1125	91	181	63	145	374	a
Hearing aid issued child 0-18 years rate	2020/21	both sexes DHIS	66,8	53,6	323,5	73,9	76,7	58,8	45,7	107,0	37,0	79,2	a
	2021/22	both sexes DHIS	77,6	64,8	357,7	79,3	63,1	51,7	88,7	76,8	109,8	127,6	a
Hearing aid required - total	2019/20	both sexes all ages DHIS	30943	3754	730	7988	6827	2884	3301	432	1715	3312	a
	2020/21	both sexes DHIS	25672	1864	163	3493	5985	931	2429	270	8915	1622	a
	2021/22	both sexes all ages DHIS	24606	2258	235	7538	7860	1372	1829	369	1140	2005	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Hearing aid required adult 19 years and older	2020/21	both sexes DHIS	22 741	1 513	129	3 045	5 113	795	2 210	227	8 390	1 319	a
	2021/22	both sexes DHIS	20 338	1 712	183	6 537	6 078	1 196	1 625	287	1 008	1 712	a
Hearing aid required child 0-18 years	2020/21	both sexes DHIS	2 931	351	34	448	872	136	219	43	525	303	a
	2021/22	both sexes DHIS	4 268	546	52	1 001	1 782	176	204	82	132	293	a
Hearing aids issued rate	2019/20	both sexes all ages DHIS	64,3	59,2	93,2	80,3	53,7	22,2	49,4	99,5	76,6	87,3	a
	2020/21	both sexes DHIS	44,8	68,7	165,6	80,0	51,8	40,1	42,9	60,7	10,3	95,4	a
	2021/22	both sexes DHIS	72,3	69,8	186,0	78,6	55,6	34,0	70,4	59,1	104,1	115,9	a
Prevalence of disability	2021	both sexes 5+ years GHS	4,5	4,8	4,9	3,1	5,5	5,2	3,8	7,1	4,6	4,9	b
		female 5+ years GHS	4,9										b
		male 5+ years GHS	4,1										b
Spectacles issued - total	2019/20	both sexes all ages DHIS	93 086	8 964	727	20 818	25 229	3 179	3 247	1 852	2 077	26 993	a
	2020/21	both sexes all ages DHIS	62 739	3 500	394	11 845	23 026	4 363	2 547	1 201	395	15 468	a
	2021/22	both sexes all ages DHIS	112 249	4 206	9 573	22 339	29 958	4 462	3 970	1 413	1 710	34 618	a
Spectacles issued rate	2019/20	both sexes all ages DHIS	56,0	57,3	44,3	63,0	55,4	18,2	63,7	65,6	38,6	68,3	a
	2020/21	both sexes all ages DHIS	60,2	44,5	61,8	46,3	68,7	55,4	52,7	73,3	46,1	72,3	a
	2021/22	both sexes all ages DHIS	68,5	46,8	109,1	64,3	62,7	40,7	77,3	67,9	98,2	79,2	a
Spectacles issued to an adult - total	2020/21	both sexes DHIS	56 913	3 340	361	10 561	19 652	4 034	2 334	1 173	374	15 084	a
	2021/22	both sexes DHIS	98 553	3 844	9 172	18 934	25 338	3 968	3 311	1 357	1 522	31 107	a
Spectacles issued to an adult rate	2020/21	both sexes DHIS	61,5	56,3	71,8	44,7	70,7	56,9	50,9	74,0	49,1	73,0	a
	2021/22	both sexes DHIS	69,9	49,3	134,8	65,6	63,1	41,5	78,8	67,6	98,0	77,7	a
Spectacles issued to child - total	2020/21	both sexes DHIS	5 826	160	33	1 284	3 374	329	213	28	21	384	a
	2021/22	both sexes DHIS	13 696	362	401	3 405	4 620	494	659	56	188	3 511	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Spectacles issued to child rate	2020/21	both sexes DHIS	49,7	8,3	24,4	64,6	58,8	41,4	84,2	52,8	22,1	51,8	a
	2021/22	both sexes DHIS	59,6	30,4	20,3	57,8	60,4	35,1	70,6	76,7	99,5	95,9	a
Spectacles required - total	2019/20	both sexes all ages DHIS	166220	15637	1641	33068	45567	17467	5101	2823	5379	39537	a
	2020/21	both sexes all ages DHIS	104250	7869	638	25611	33518	7882	4837	1638	857	21400	a
	2021/22	both sexes all ages DHIS	163908	8980	8778	34741	47778	10965	5137	2080	1742	43707	a
Spectacles required by an adult - total	2020/21	both sexes DHIS	92518	5932	503	23622	27784	7088	4584	1585	762	20658	a
	2021/22	both sexes DHIS	140935	7790	6806	28845	40128	9557	4203	2007	1553	40046	a
Spectacles required by child - total	2020/21	both sexes DHIS	11732	1937	135	1989	5734	794	253	53	95	742	a
	2021/22	both sexes DHIS	22973	1190	1972	5896	7650	1408	934	73	189	3661	a
Wheelchair issued - total	2019/20	both sexes all ages DHIS	23611	1792	1271	4643	4155	2614	1720	241	1183	5992	a
	2020/21	both sexes all ages DHIS	20646	2351	1123	3149	4346	2041	1776	56	1066	4738	a
	2021/22	both sexes all ages DHIS	23653	2298	1242	4706	4537	2076	1651	309	1176	5658	a
Wheelchair issued adult 19 years and older	2020/21	both sexes DHIS	18035	2031	905	2758	3710	1826	1543	45	953	4264	a
	2021/22	both sexes DHIS	19956	1719	1029	4066	3676	1872	1374	246	1025	4949	a
Wheelchair issued adult 19 years and older rate	2020/21	both sexes DHIS	62,10	39,10	87,40	91,50	76,90	81,30	94,40	0,81	65,60	104,00	a
	2021/22	both sexes DHIS	61,50	31,30	88,60	86,80	73,00	62,10	78,90	5,00	72,90	99,90	a
Wheelchair issued child 0-18 years	2020/21	both sexes DHIS	2611	320	218	391	636	215	233	11	113	474	a
	2021/22	both sexes DHIS	3697	579	213	640	861	204	277	63	151	709	a
Wheelchair issued child 0-18 years rate	2020/21	both sexes DHIS	58,9	41,9	137,1	74,5	52,2	86,0	54,8	1,8	87,6	136,2	a
	2021/22	both sexes DHIS	62,5	62,1	61,7	70,0	67,2	54,3	66,0	11,6	101,3	74,6	a
Wheelchair required - total	2019/20	both sexes all ages DHIS	38898	7725	1763	5288	7777	3945	3590	626	1855	6329	a
	2020/21	both sexes DHIS	33485	5957	1195	3539	6043	2496	2060	6167	1581	4447	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021/22	both sexes all ages DHIS	38 366	6 433	1 506	5 599	6 318	3 389	2 162	5 502	1 555	5 902	a
Wheelchair required adult 19 years and older	2020/21	both sexes DHIS	29 052	5 193	1 036	3 014	4 825	2 246	1 635	5 552	1 452	4 099	a
	2021/22	both sexes DHIS	32 452	5 500	1 161	4 685	5 036	3 013	1 742	4 957	1 406	4 952	a
Wheelchair required child 0-18 years	2020/21	both sexes DHIS	4 433	764	159	525	1 218	250	425	615	129	348	a
	2021/22	both sexes DHIS	5 914	933	345	914	1 282	376	420	545	149	950	a
Wheelchairs issued rate	2019/20	both sexes all ages DHIS	60,7	23,2	72,1	87,8	53,4	66,3	47,9	38,5	63,8	94,7	a
	2020/21	both sexes DHIS	61,7	39,5	94,0	89,0	71,9	81,8	86,2	0,9	67,4	106,5	a
	2021/22	both sexes DHIS	61,7	35,7	82,5	84,1	71,8	61,3	76,4	5,6	75,6	95,9	a

Reference notes

a webDHIS.[10]

b GHS 2021.[18]

Definitions

- Cataract surgery - total [Number]: Number of eyes on which cataract surgery was performed.
- Hearing aid issued - total [Number]: All hearing aids issued to patients.
- Hearing aid issued adult 19 years and older [Number]: All hearing aids issued to adults 19 years and older.
- Hearing aid issued child 0-18 years [Number]: All hearing aids issued to children 0 to 18 years.
- Hearing aid required - total [Number]: All hearing aids required.
- Hearing aid required adult 19 years and older [Number]: All hearing aids required by adults 19 years and older.
- Hearing aid required child 0-18 years [Number]: All hearing aids required by children 0-18 years.
- Spectacles issued - total [Number]: Number of spectacles issued to patients.
- Spectacles issued to an adult - total [Number]: Number of spectacles issued to clients aged 19 years and older.
- Spectacles issued to child - total [Number]: Number of spectacles issued to clients aged 7-18 years of age.
- Spectacles required - total [Number]: Number of new spectacles (ordered) required for clients.
- Spectacles required by an adult - total [Number]: Spectacles (ordered) required for clients aged 19 years and above.
- Spectacles required by child - total [Number]: Spectacles (ordered) required for clients aged 7-18 years of age.
- Wheelchairs issued - total [Number]: All wheelchairs issued to a client in need of a wheelchair.
- Wheelchair issued adult 19 years and older [Number]: All wheelchairs issued to adults 19 years and older
- Wheelchair issued child 0-18 years [Number]: All wheelchairs issued to children 0-18 years.
- Wheelchair required - total [Number]: All wheelchair requests received at the facility.
- Wheelchair required adult 19 years and older [Number]: All wheelchair requests received at the facility for adults 19 years and older.
- Wheelchair required child 0-18 years [Number]: All wheelchair requests received at the facility for children 0-18 years.
- Cataract surgery rate [per 1 million]: Clients who had cataract surgery per 1 million uninsured population.
- Hearing aid issued adult 19 years and older rate [Percentage]: Hearing aids issued as a proportion of the applications for hearing aids received for adults 19 years and older.
- Hearing aid issued child 0-18 years rate [Percentage]: Hearing aids issued as a proportion of the applications for hearing aids received for children 0-18 years.
- Hearing aids issued rate [Percentage]: Hearing aids issued as a proportion of the applications for hearing aids received.
- Prevalence of disability [Percentage]: Percentage of people reporting moderate to severe disability in a survey where disability is defined as a limitation in one or more activities of daily living (seeing, hearing, communication, moving, getting around, daily life activities, learning, intellectual and emotional).
- Spectacles issued rate [Percentage]: Spectacles issued as a % of the applications received.

- Spectacles issued to an adult rate [Percentage]: Spectacles issued to adults aged 19 years and above as a proportion of the applications received in adults aged 19 years and above (required).
- Spectacles issued to child rate [Percentage]: Spectacles issued to children age 7-18 years as a proportion of the applications received in children 7-18 years of age (required).
- Wheelchair issued adult 19 years and older rate [Percentage]: Wheelchairs issued as a proportion of the applications for wheelchairs received for adults 19 years and older.
- Wheelchair issued child 0-18 years rate [Percentage]: Wheelchairs issued as a proportion of the applications for wheelchairs received for children 0-18 years.
- Wheelchairs issued rate [Percentage]: Wheelchairs issued as a proportion of the applications for wheelchairs received.

Table 7. Nutrition indicators by province, 2019-2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Infant exclusively breastfed at DTaP-IPV-Hib-HBV 3rd dose rate	2019/20	both sexes DHIS	48,8	48,2	53,6	45,7	56,5	40,3	51,9	55,9	59,7	39,7	a
	2020/21	both sexes DHIS	45,9	45,2	46,4	45,2	56,7	38,1	43,0	52,7	41,6	37,6	a
	2021/22	both sexes DHIS	44,4	43,2	43,8	46,7	56,3	32,7	38,8	49,0	33,2	40,3	a
Overweight	2020	both sexes Under 5 years WHO	12,9										b
Stunting	2020	both sexes WHO	23,2										b
Vitamin A dose 12-59 months	2019/20	both sexes DHIS	5 302 353	772 904	226 520	1 067 632	1 455 506	496 909	466 125	80 536	265 752	470 469	a
	2020/21	both sexes DHIS	3 898 515	540 386	198 276	850 985	898 699	409 577	345 116	69 451	209 734	376 291	a
	2021/22	both sexes DHIS	4 428 184	577 730	203 706	982 671	1 030 246	439 413	400 232	73 845	271 654	448 687	a
Vitamin A dose 12-59 months coverage	2019/20	both sexes DHIS	56,6	58,1	52,1	52,7	68,2	46,5	65,6	48,4	41,6	53,9	a
	2020/21	both sexes DHIS	49,5	49,1	48,1	47,4	60,6	43,6	51,1	47,6	37,9	44,0	a
	2021/22	both sexes DHIS	60,3	63,7	55,7	57,1	78,2	49,5	57,9	42,5	50,9	51,4	a

Reference notes

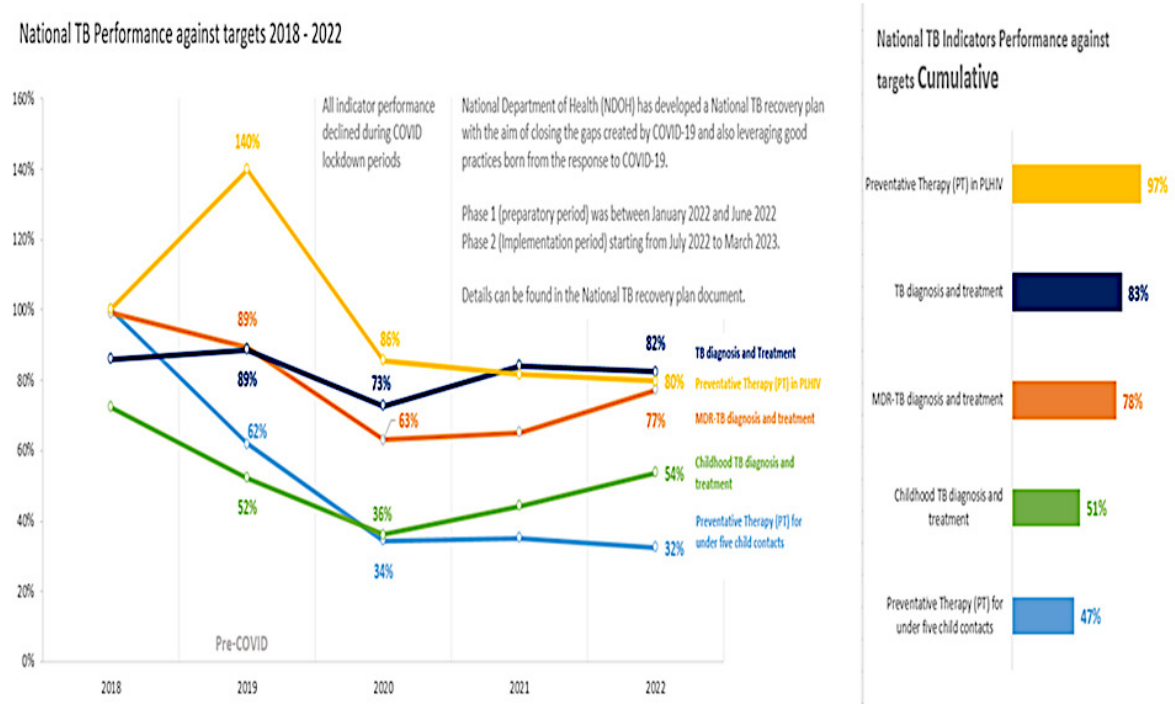
a webDHIS.[10]

b World Health Statistics 2022.[32]

Definitions

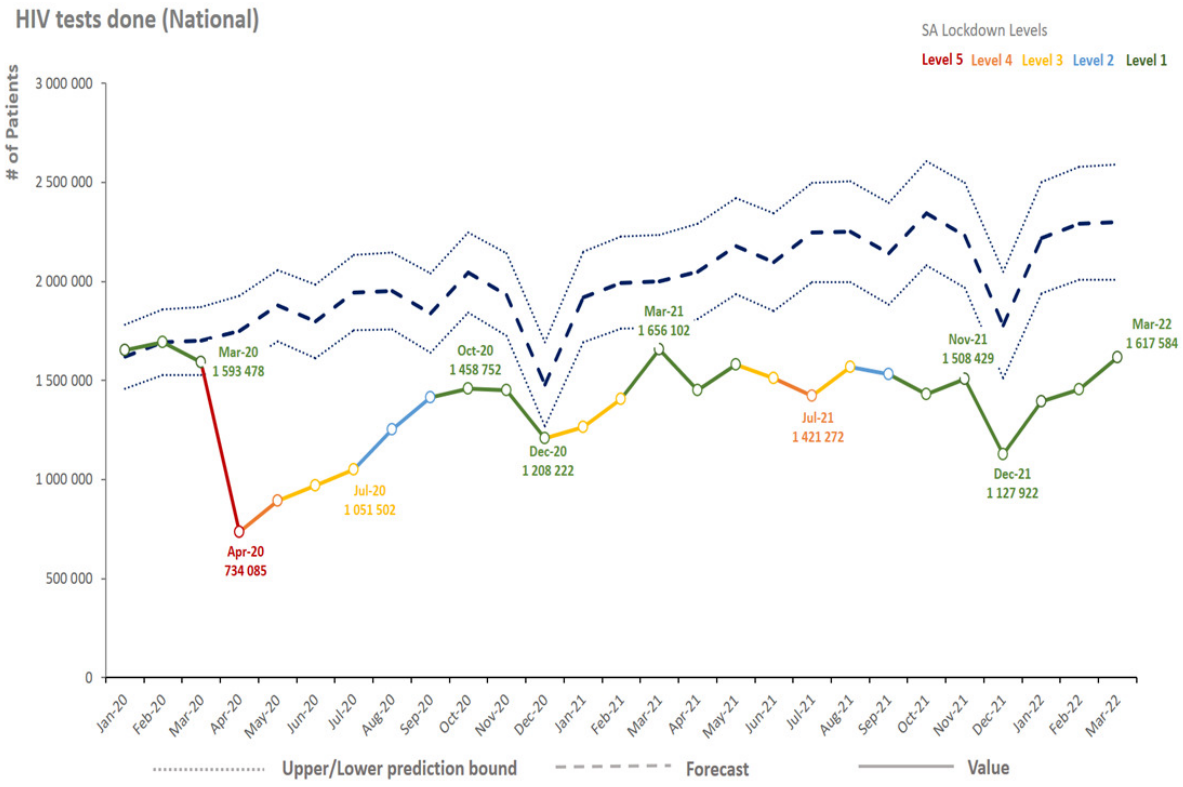
- Vitamin A dose 12-59 months [Number]: Vitamin A dose given to a child, preferably every six months from 12 to 59 months.
- Infant exclusively breastfed at DTaP-IPV-Hib-HBV 3rd dose rate [Percentage]: Infants exclusively breastfed at 14 weeks as a proportion of the DTaP-IPV-Hib-HBV 3rd dose vaccination. Take note that DTaP-IPV-Hib-HBV 3rd dose (Hexavalent) was implemented in 2015 to include the HepB dose.
- Obesity [Percentage]: Percentage of people with a body mass index (BMI) (body mass in kg divided by the square of the height in m) equal to or more than 30kg/m^2.
- Overweight [Percentage]: Children: Proportion of children with weight for height over 2 standard deviations from the norm (reference population median). Adults: Percentage of people with body mass index (BMI) of 25-29.9 kg/m^2. BMI is weight in kg divided by the square of height in m.
- Stunting [Percentage]: Proportion of children with height for age under 2 standard deviations from the norm (reference population median).
- Vitamin A dose 12-59 months coverage [Percentage]: Proportion of children 12-59 months who received vitamin A 200 000 units, preferably every six months. The denominator is therefore the target population 1-4 years multiplied by 2.

Figure 11. National TB performance against targets, 2018-2022



Source: webDHIS[10]

Figure 12. HIV tests done (national), January 2020 - March 2022



Source: webDHIS[10]

Table 9. Mortality indicators by province, 2018 - 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Adult mortality (45q15 - probability of dying between 15-60 years of age)	2018	both sexes RMS	31,0										a
		female RMS	25,0										a
		male RMS	37,0										a
	2019	both sexes RMS	29,0										b
		female RMS	24,0										b
		male RMS	35,0										b
	2020	both sexes RMS	31,0										b
		female RMS	26,0										b
		male RMS	36,0										b
Healthy life expectancy (HALE)	2019	both sexes WHO	56,2										c
			56,2										d
		female WHO	57,7										c
			57,7										d
		male WHO	54,6										c
			54,6										d
Life expectancy at birth	2020	both sexes mid-year	65,4										e
		both sexes RMS	64,7										b
		female mid-year	68,5										f
		female mid-year without HIV/AIDS	71,3										f
		female RMS	67,2										b
		female UNICEF	68,0										g
		male mid-year	62,5										f
		male mid-year without HIV/AIDS	64,6										f
		male RMS	62,2										b
	2021	HDR	62,3										h

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		both sexes mid-year	62,0										i
		female mid-year	64,6										i
		male mid-year	59,3										i
	2022	both sexes mid-year	62,8										e
		female mid-year	65,6										e
		male mid-year	60,0										e

Reference notes

a RMS 2018.[45]
b RMS 2019 & 2021.[46]
c World Health Statistics 2021.[31]
d World Health Statistics 2022.[32]
e Stats SA MYE 2022.[11]
f Stats SA MYE 2020.[13]
g SWChildren 2021.[47]
h HDR 2022.[26]
i Stats SA MYE 2021.[12]

Definitions

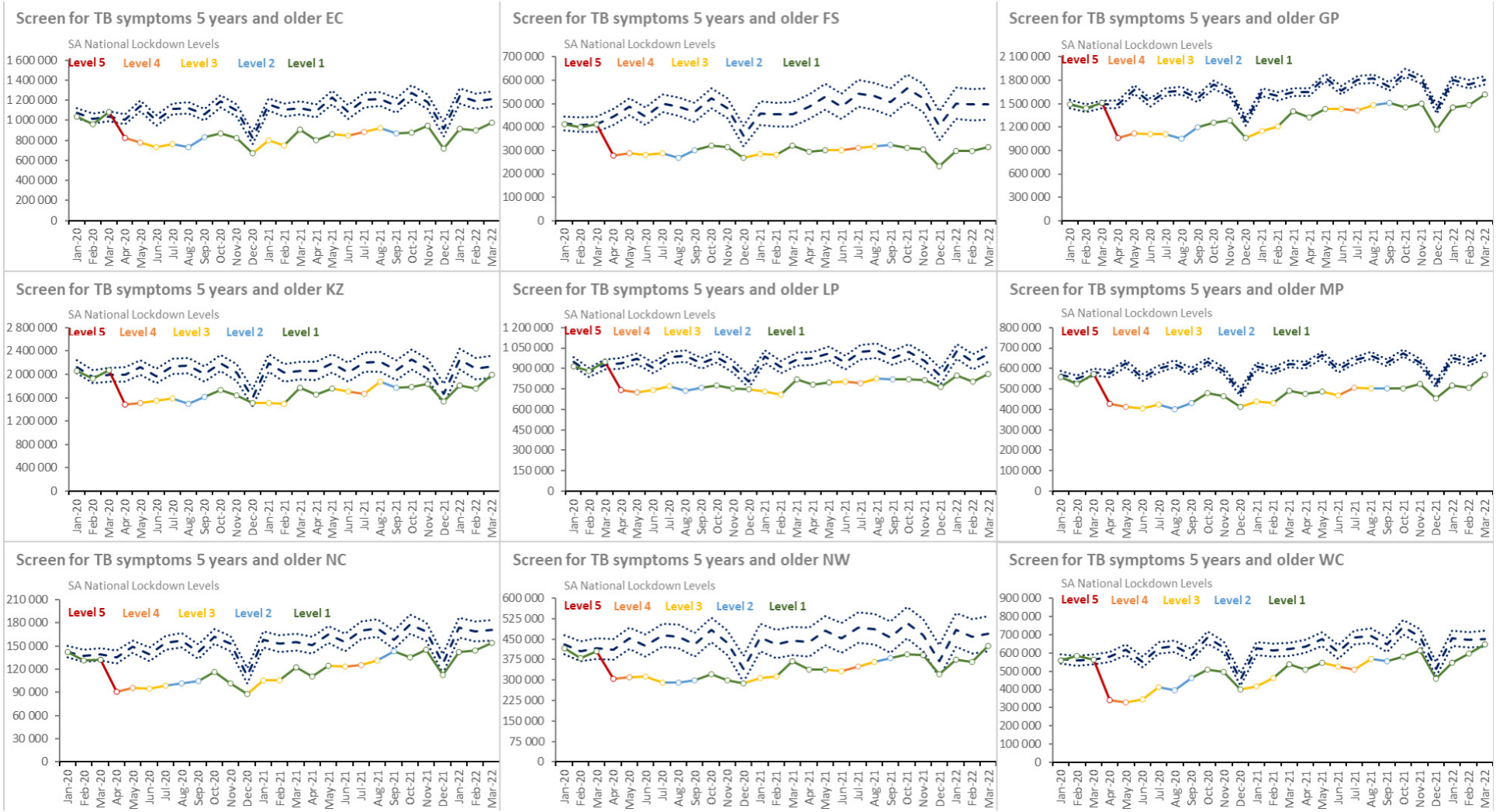
- Adult mortality (45q15 - probability of dying between 15-60 years of age) [Percentage]: The probability of dying between 15 and 60 years of age (percentage of 15-year-olds who die before their 60th birthday).
- Healthy life expectancy (HALE) [Years]: Healthy life expectancy or health-adjusted life expectancy is based on life expectancy at birth but includes an adjustment for time spent in poor health. It is most easily understood as the equivalent number of years in full health that a newborn can expect to live based on current rates of ill-health and mortality.
- Life expectancy at birth [Years]: The average number of additional years a person could expect to live if current mortality trends were to continue for the rest of that person's life.

Table 10. Infectious disease indicators by province, 2018 - 2023

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Reported cases of malaria	2020	both sexes all ages WHO	4463										a
	2021	both sexes all ages DOH surveillance	4300										b
		both sexes all ages WHO	2958										a
	2022	both sexes all ages DOH surveillance	4109										b
Reported cases of measles	2018	WHO	52,0										c
	2022/23	NICD lab diagnosed	665	4	24	90	15	232	100	5	185	10	d
Reported deaths from malaria	2020	both sexes all ages WHO	38										a
	2021	both sexes all ages DOH surveillance	49										b
		both sexes all ages WHO	56										a
	2022	both sexes all ages DOH surveillance	34										b

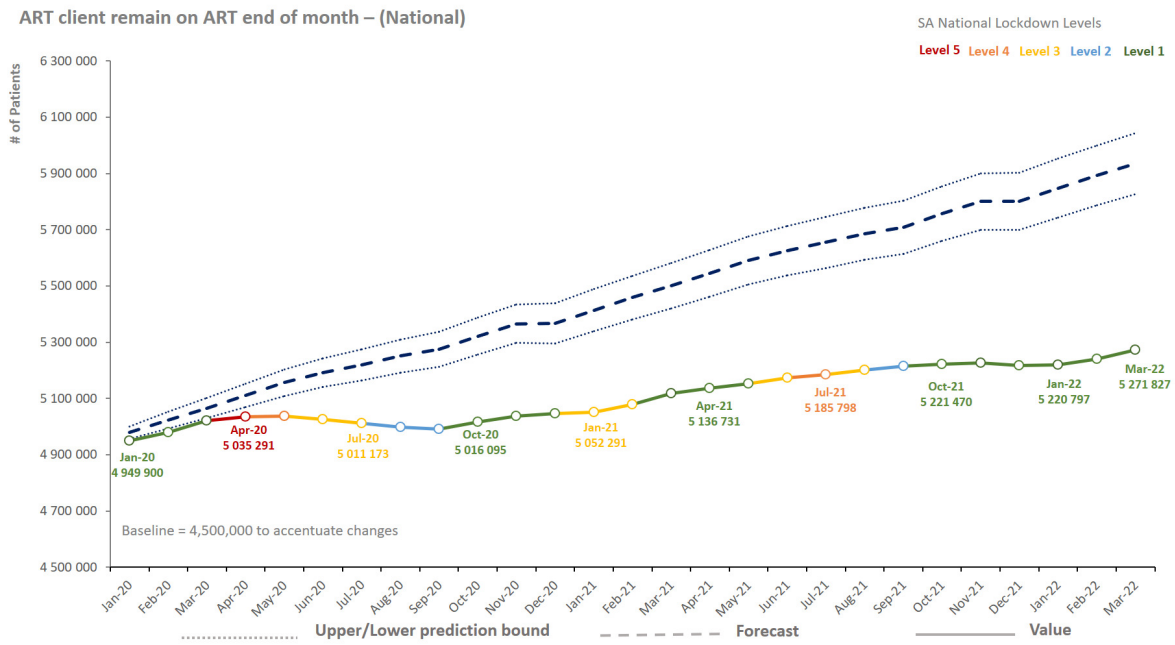
Reference notes
a World Malaria 2022.[48]
b NICD Communique Dec 2022.[49]
c WHO Measles.[28]
d NICD Outbreak report 2023.[52]

Figure 8. Number of clients 5 years and older screened for TB in a facility by province, January 2020 - March 2022



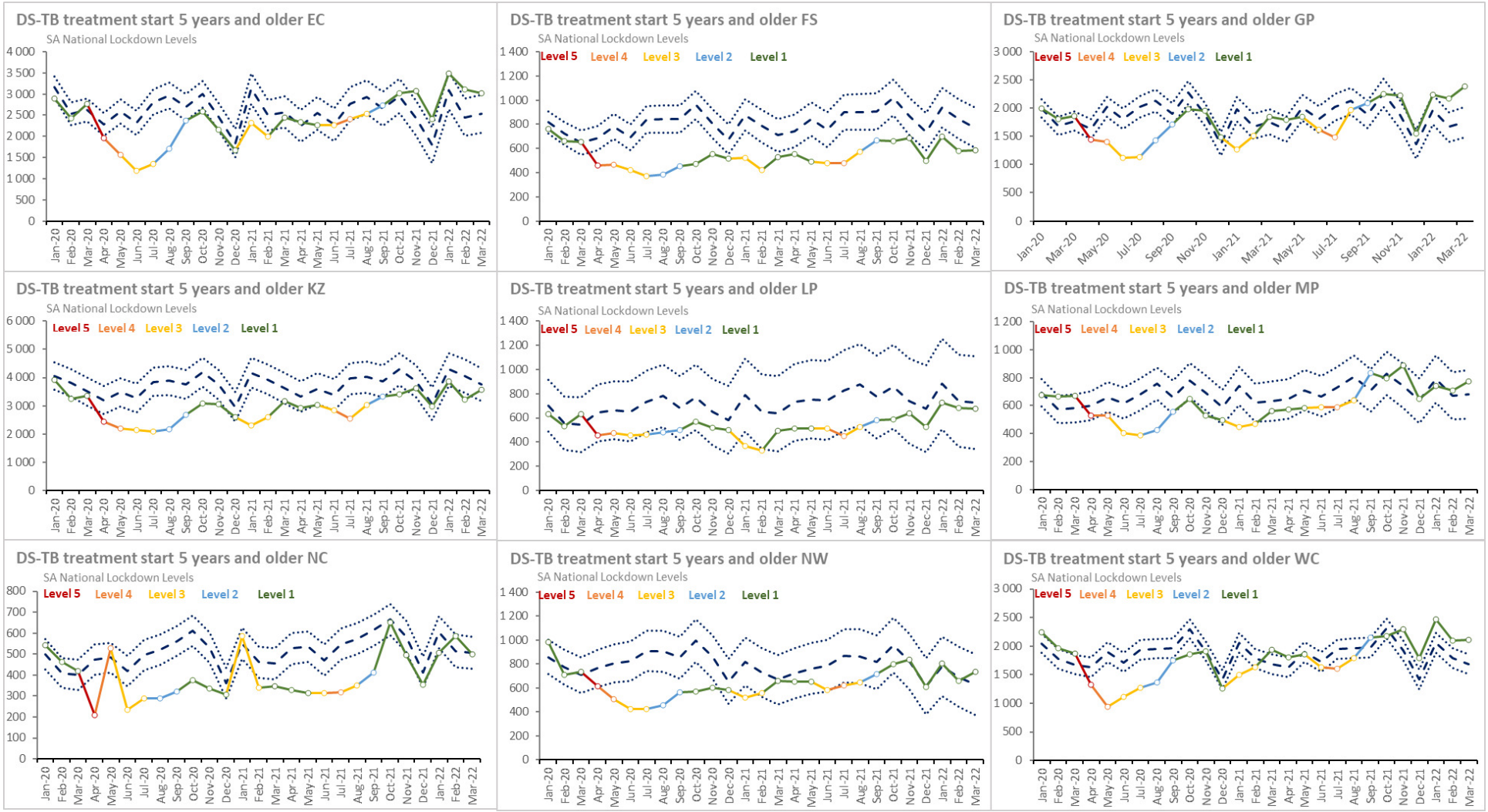
Source: webDHIS[10]

Figure 14. ART client start ART during month (national), January 2020 - March 2022



Source: webDHIS[10]

Figure 10. Drug-sensitive TB treatment started by persons 5 years and older, by province, January 2020 - March 2022



Source: webDHIS[10]

Table 12. TB indicators by province, 2019 - 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
All DS TB patients in cohort	2019	both sexes DHIS	220171	42453	10994	31394	51296	10601	12146	7215	13153	40919	a
	2020	both sexes DHIS	165624	32873	7803	22310	37584	8204	8979	5616	9748	32507	a
	2021	both sexes DHIS	121883	25561	5569	15658	27188	5190	6007	4119	6945	25646	a
Case detection rate (all forms)	2020	both sexes Global TB	58										b
	2021	both sexes Global TB	57										b
DS TB patients who completed treatment or were cured	2018	both sexes all ages DHIS	174583	30909	8633	27955	41577	9221	10479	3720	7553	34536	a
	2019	both sexes DHIS	176032	33474	8520	26340	42449	8289	9823	5409	10334	31394	a
	2020	both sexes DHIS	130598	25697	5824	18387	31184	6377	7233	3844	7708	24344	a
Incidence of TB (all types) (per 100000)	2019	both sexes WHO	615										c
	2020	both sexes WHO	554										d
		both sexes Global TB	562										b
	2021	both sexes Global TB	513										b
Screen for TB symptoms 5 years and older	2019/20	both sexes DHIS	88341637	11911051	4997501	17309676	23697914	10873851	6544049	1569752	4881165	6556678	a
	2020/21	both sexes DHIS	70565171	9493199	3546481	14079732	19132526	9023591	5270205	1236609	3752773	5030055	a
	2021/22	both sexes DHIS	80942655	10532623	3607012	17268185	21143838	9727357	6018633	1593266	4385597	6666144	a
Screen for TB symptoms under 5 years	2019/20	both sexes DHIS	17647545	2154997	926337	3204481	4514276	2584786	1547206	291499	938084	1485879	a
	2020/21	both sexes DHIS	13189701	1715142	650304	2468495	3384940	1876971	1137773	219538	657298	1079240	a
	2021/22	both sexes DHIS	15632660	1977308	716311	3010670	3776483	2231014	1386491	286590	834127	1413666	a
TB child under 5 years start on treatment rate	2019/20	DHIS	11,3	9,6	4,5	15,0	11,1	7,6	3,5	11,6	10,1	40,7	a
	2020/21	DHIS	93,2	99,5	103,7	80,0	92,4	62,9	122,3	70,1	108,7	99,2	a
	2021/22	DHIS	94,8	79,6	65,6	98,7	101,8	105,7	87,6	114,4	108,9	96,5	a
TB client 5 years and older start on treatment rate	2019/20	DHIS	97,0	98,3	97,6	95,5	99,0	98,8	101,1	99,5	99,9	90,0	a
	2020/21	DHIS	94,8	93,0	93,2	93,4	96,4	96,2	96,0	99,8	95,3	90,3	a
	2021/22	DHIS	93,4	92,7	90,6	94,8	94,8	97,2	93,4	87,9	95,3	91,4	a
TB DS client lost to follow up rate	2019	both sexes DHIS	12,6	13,8	10,8	8,5	10,0	9,6	10,5	18,8	12,4	18,6	a
	2020	both sexes DHIS	12,0	13,3	11,6	7,9	8,4	7,7	8,4	22,1	10,0	18,8	a
	2021	both sexes DHIS	13,0	14,5	14,3	7,5	9,1	7,1	7,0	25,2	7,8	20,7	a
TB DS death rate	2019	both sexes DHIS	7,4	7,5	10,6	7,4	7,5	12,5	9,0	7,3	9,5	3,9	a
	2020	both sexes DHIS	8,3	7,7	12,5	9,2	8,0	13,7	10,4	8,4	10,3	5,2	a
	2021	both sexes DHIS	8,3	8,0	13,4	9,5	8,1	13,3	9,6	8,6	9,1	5,2	a
TB DS treatment success rate	2019	both sexes DHIS	79,3	77,9	77,3	83,6	81,9	77,2	80,0	72,6	77,6	76,5	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2020	both sexes DHIS	78,9	78,2	74,6	82,4	83,0	77,7	80,6	68,4	79,1	74,9	a
	2021	both sexes DHIS	77,9	76,6	71,3	82,5	82,1	78,9	82,8	64,9	82,1	73,0	a
TB MDR client death rate	2019	both sexes DHIS	16,6	18,6	26,7	18,4	13,4	24,3	20,9	13,7	16,8	13,3	a
	2020	both sexes DHIS	17,5	19,2	26,6	19,1	16,0	17,8	20,0	20,1	16,6	13,6	a
TB MDR client loss to follow up rate	2019	both sexes DHIS	15,2	16,5	10,7	15,3	13,2	8,1	6,6	21,5	10,7	22,8	a
	2020	both sexes DHIS	16,5	16,8	11,2	16,9	13,9	11,7	9,4	16,0	9,4	25,5	a
TB MDR treatment success rate	2019	both sexes EDRWeb	60,7	60,4	59,1	58,7	66,0	55,8	66,3	60,3	65,4	51,6	a
	2020	both sexes DHIS	60,8	60,1	56,1	60,5	66,1	64,3	68,5	61,2	65,8	51,3	a
TB symptom 5 years and older screened in facility rate	2019/20	both sexes DHIS	88,6	85,7	110,1	98,1	99,7	95,3	87,1	68,9	76,6	53,4	a
	2020/21	both sexes DHIS	87,6	85,7	85,9	98,9	98,3	88,9	86,1	65,2	70,9	61,9	a
	2021/22	both sexes DHIS	95,8	90,6	89,3	111,4	104,9	95,2	95,7	80,1	80,0	72,5	a
TB symptom child under 5 years screened in facility rate	2019/20	both sexes DHIS	87,6	85,4	109,5	87,3	98,2	88,0	90,5	64,8	70,3	71,5	a
	2020/21	both sexes DHIS	88,9	91,8	95,8	90,7	101,4	83,9	94,7	69,1	65,4	73,9	a
	2021/22	both sexes DHIS	92,6	95,5	97,7	95,8	100,9	88,2	96,1	83,3	74,3	80,6	a
TB XDR client death rate	2019	both sexes DHIS	19,1	19,7	35,7	27,6	10,4	50,0	31,3	14,3	0,0	17,7	a
	2020	both sexes DHIS	16,5	19,2	0,0	17,4	13,7	0,0	16,7	21,4		5,9	a
TB XDR client loss to follow up rate	2019	both sexes DHIS	12,1	10,9	7,1	6,9	11,7	0,0	12,5	28,6	0,0	16,1	a
	2020	both sexes DHIS	17,8	19,2	25,0	8,7	15,7	0,0	33,3	28,6		11,8	a
TB XDR started on treatment	2019	both sexes DHIS	461	239	14	29	77	2	16	21	1	62	a
	2020	both sexes DHIS	315	182	4	23	51	1	6	14	0	34	a
TB XDR successfully complete treatment	2019	both sexes DHIS	284	152	7	18	58	1	7	10	1	30	a
	2020	both sexes DHIS	169	94	0	14	28	0	3	6	0	24	a
TB XDR treatment success rate	2019	both sexes EDRWeb	49,9	52,1	46,2	51,7	55,8	50,0	25,0	47,6	0,0	41,9	a
	2020	both sexes DHIS	53,7	51,6	0,0	60,9	54,9	0,0	50,0	42,9		70,6	a

Reference notes

a webDHIS.[10]

b Global TB Report 2022.[54]

c World Health Statistics 2021.[31]

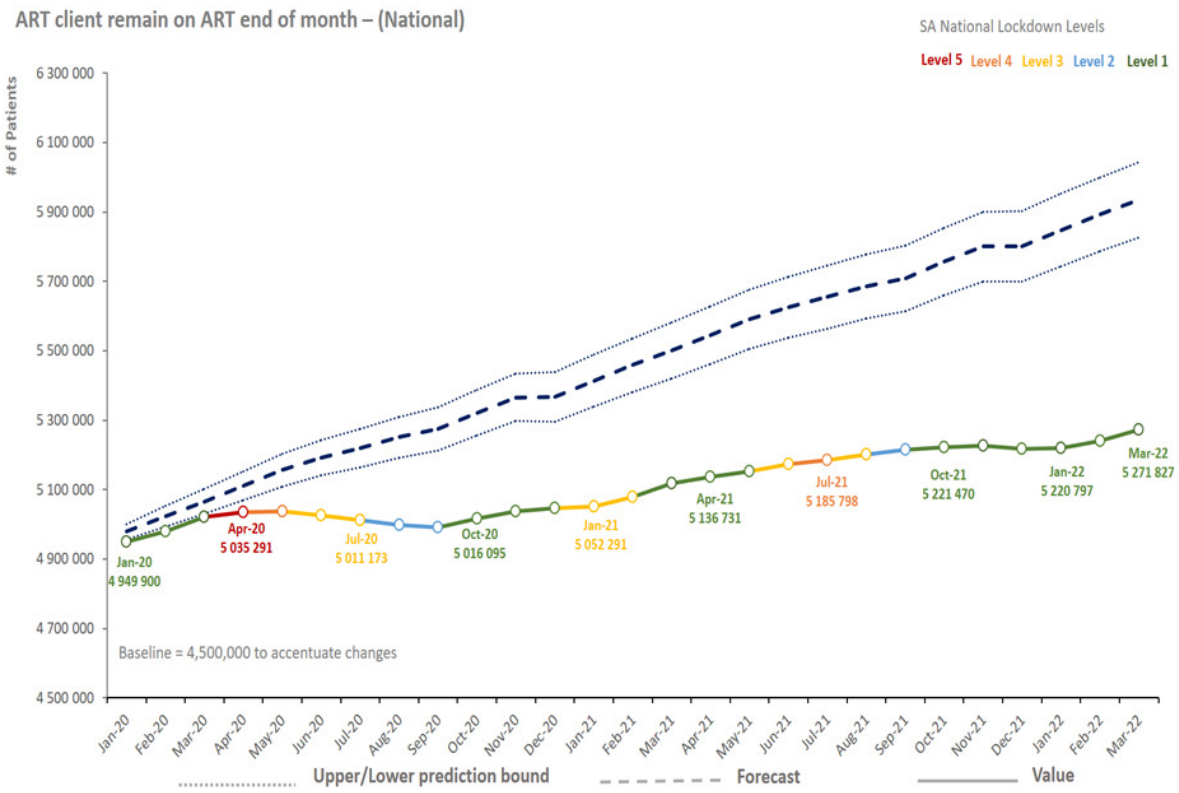
d World Health Statistics 2022.[32]

Definitions

- All DS TB patients in cohort [Number].
- DS TB patients who completed treatment or were cured [Number].
- Screen for TB symptoms 5 years and older [Number]: Clients 5 years and older who were screened in health facilities for TB symptoms using the standard TB screening tool as per National TB Guideline.
- Screen for TB symptoms under 5 years [Number]: Children under 5 years who were screened in health facilities for TB symptoms using the standard TB screening tool as per National TB Guideline.
- TB XDR started on treatment [Number]: Number of XDR-TB patients who started treatment.
- TB XDR successfully complete treatment [Number]: Extensive Drug Resistant TB (XDR-TB) clients successfully treated at the end of the treatment.

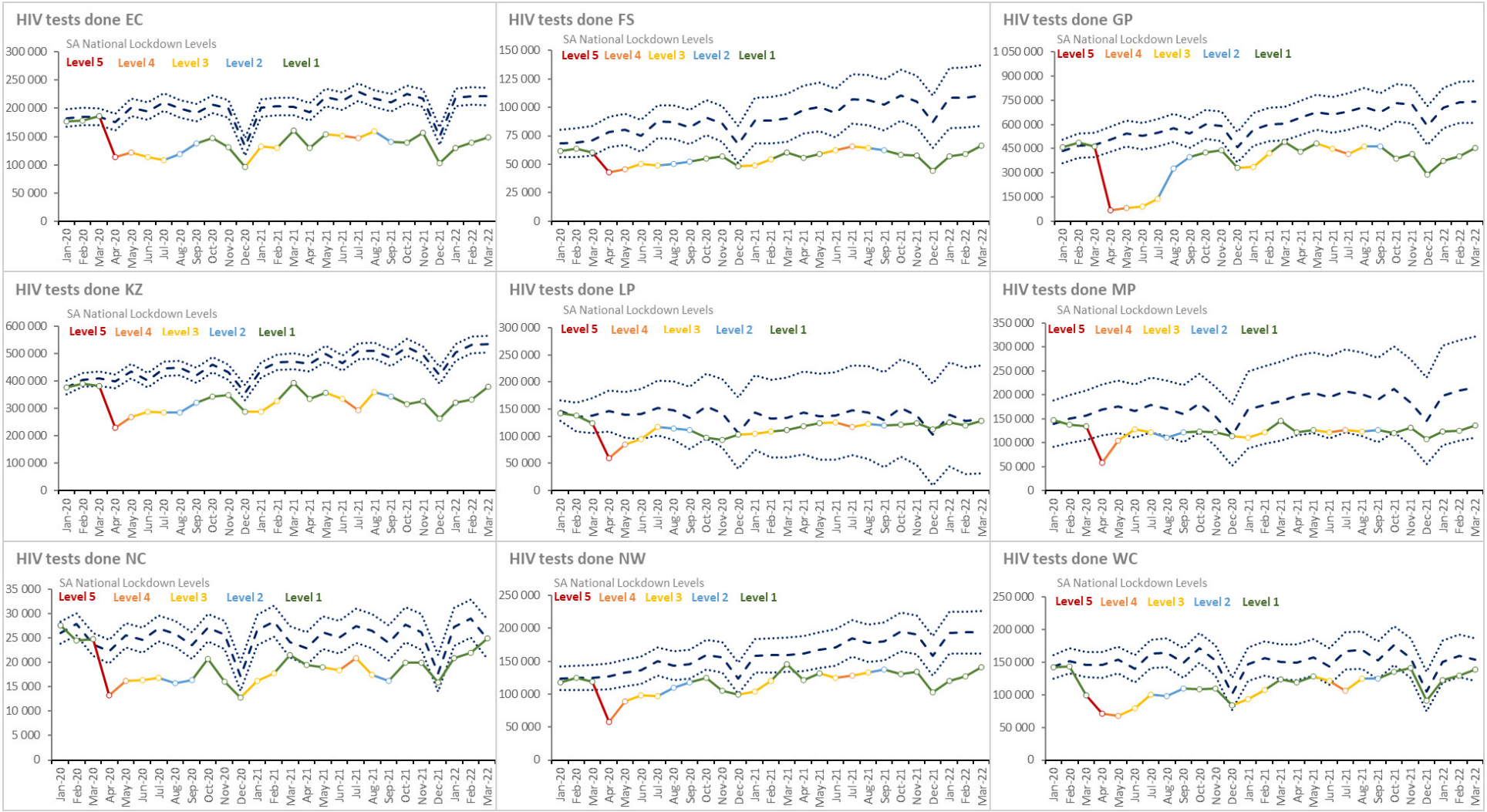
- TB child under 5 years start on treatment rate [Percentage]: TB client under 5 years started on treatment as a proportion of ALL symptomatic children under 5 years.
- TB client 5 years and older start on treatment rate [Percentage]: TB client 5 years and older start on treatment as a proportion of TB symptomatic client 5 years and older test positive.
- TB DS client lost to follow-up rate [Percentage]: The percentage of TB clients (all types of TB) who defaulted treatment.
- TB DS death rate [Percentage]: The percentage of TB clients (all types of TB registered in ETR.net) who died.
- TB DS treatment success rate [Percentage]: The percentage of TB clients (all types registered in ETR.net) cured plus those who completed treatment.
- TB MDR client death rate [Percentage]: The percentage of TB clients (MDR TB) who died.
- TB MDR client loss to follow-up rate [Percentage]: The percentage of TB clients (MDR TB) who are lost to follow-up.
- TB MDR treatment success rate [Percentage]: The percentage of TB clients (MDR TB) cured plus those who completed treatment.
- TB symptom child under 5 years screened in facility rate [Percentage]: Children under 5 years screened for TB symptoms as a proportion of PHC headcount under 5 years.
- TB XDR client death rate [Percentage]: The percentage of TB clients (XDR TB) who died.
- TB XDR client loss to follow-up rate [Percentage]: The percentage of TB clients (XDR TB) who are lost to follow-up.
- TB XDR treatment success rate [Percentage]: TB XDR clients successfully complete treatment as a proportion of TB XDR clients started on treatment.

Figure 16. ART client remain on ART (national), January 2020 - March 2022



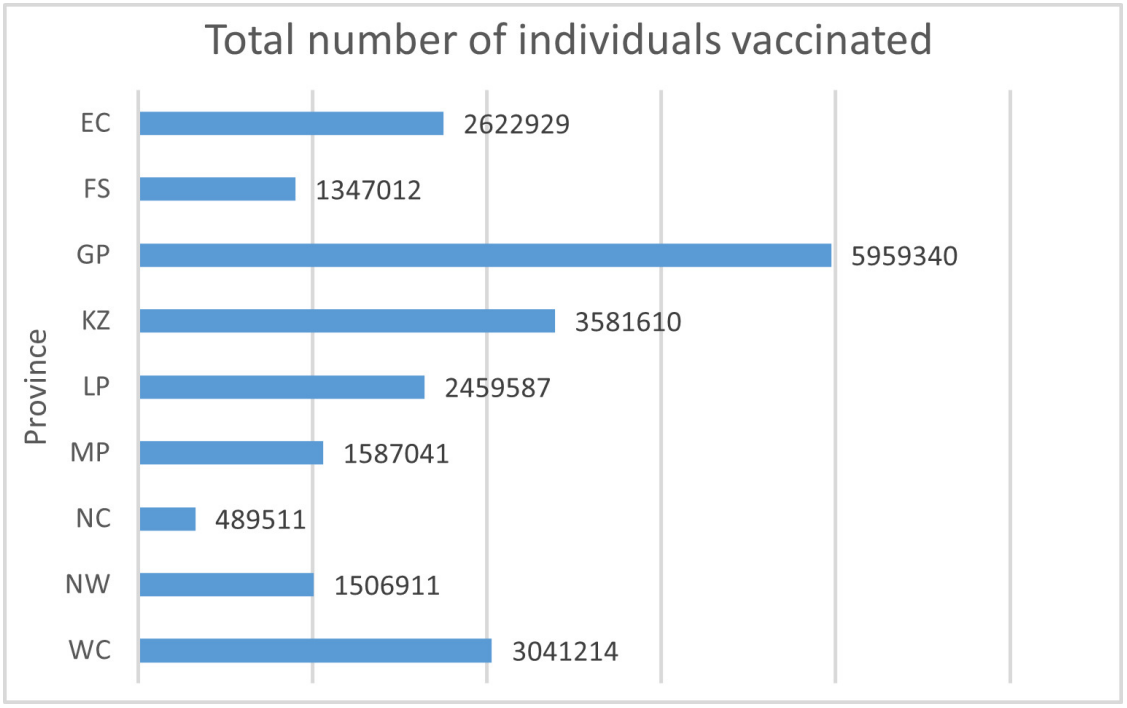
Source: webDHIS[10]

Figure 13. HIV tests per province, January 2020 - March 2022



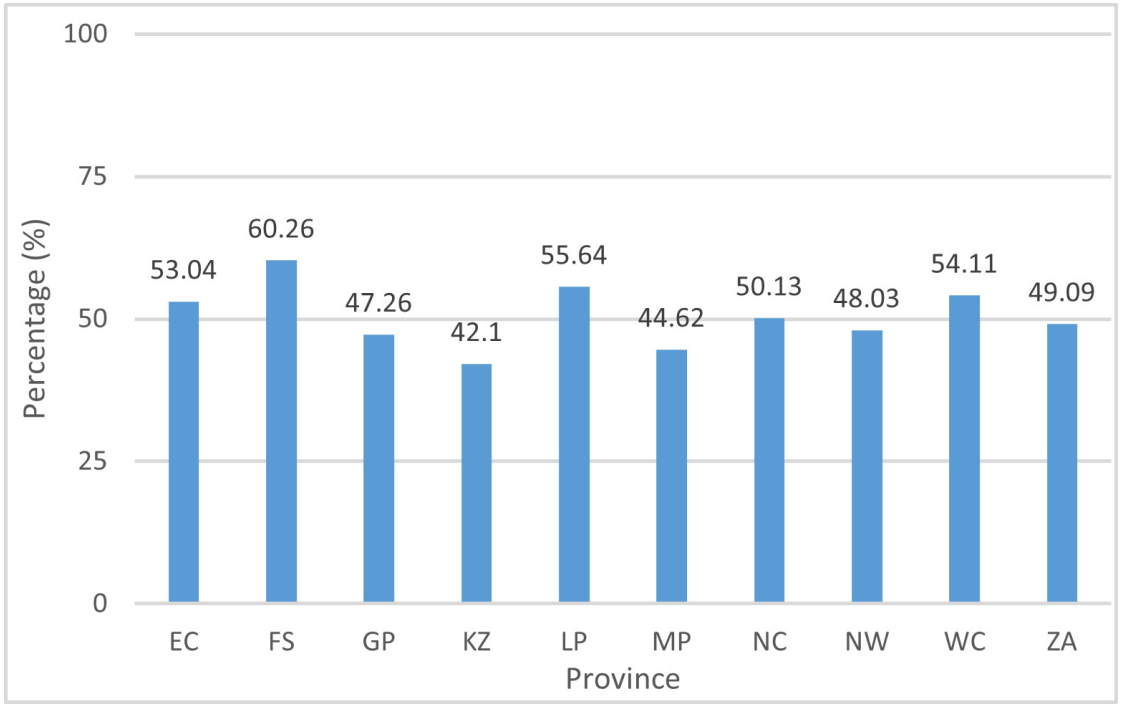
Source: webDHIS[10]

Figure 18. Total number of individuals vaccinated, by province, 20 February 2023



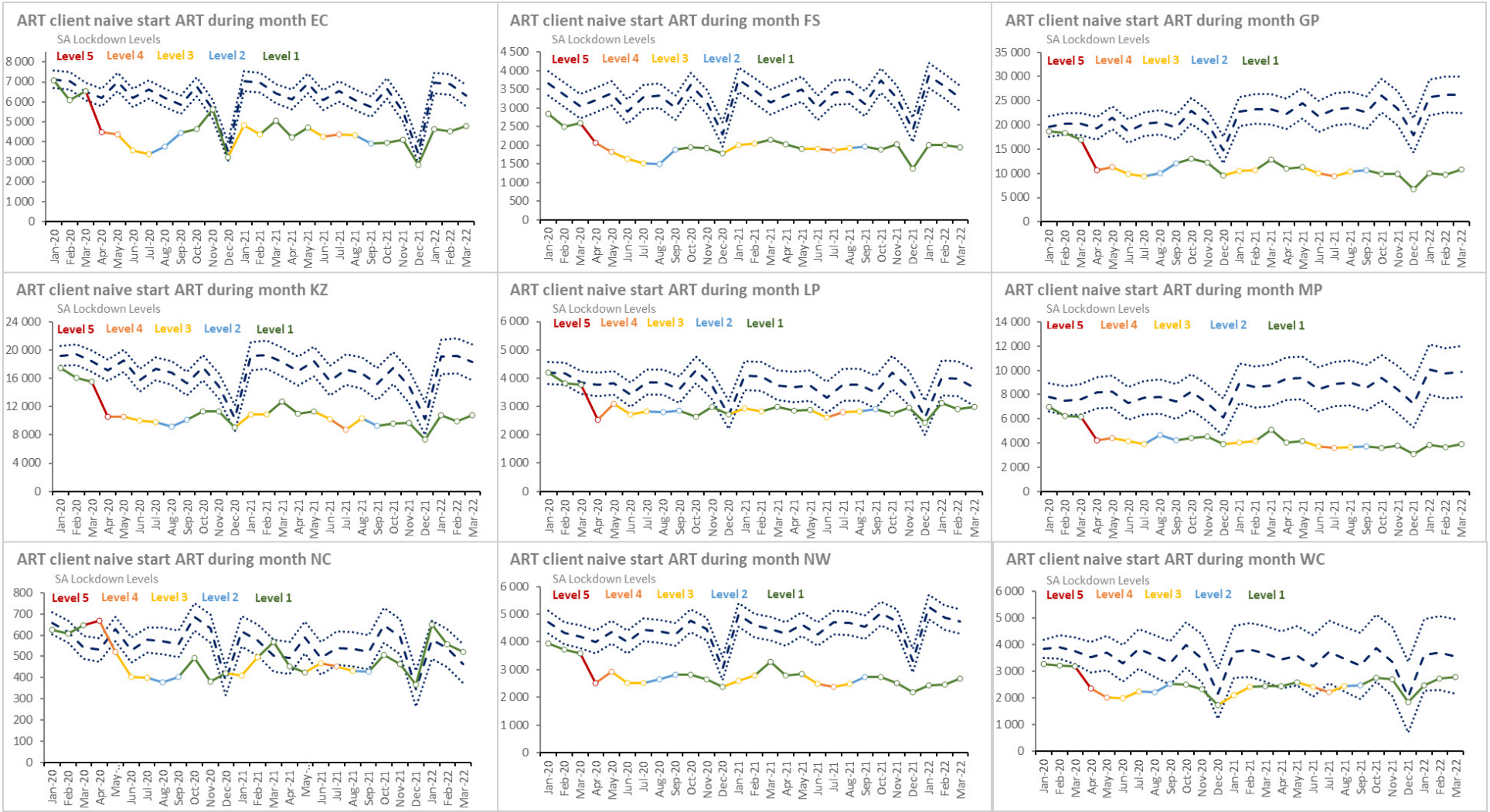
Source: https://sacoronavirus.co.za

Figure 19. Individuals vaccinated as % of the population, 20 February 2023



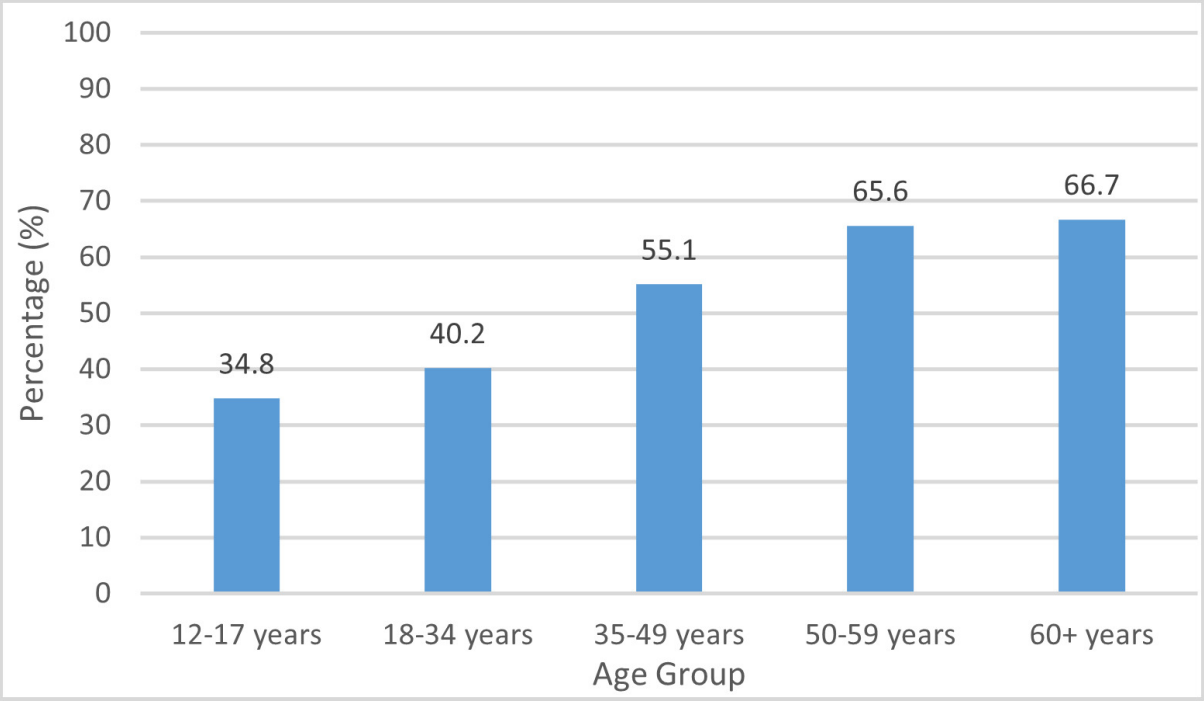
Source: https://sacoronavirus.co.za

Figure 15. ART client start ART during month by province, January 2020 - March 2022



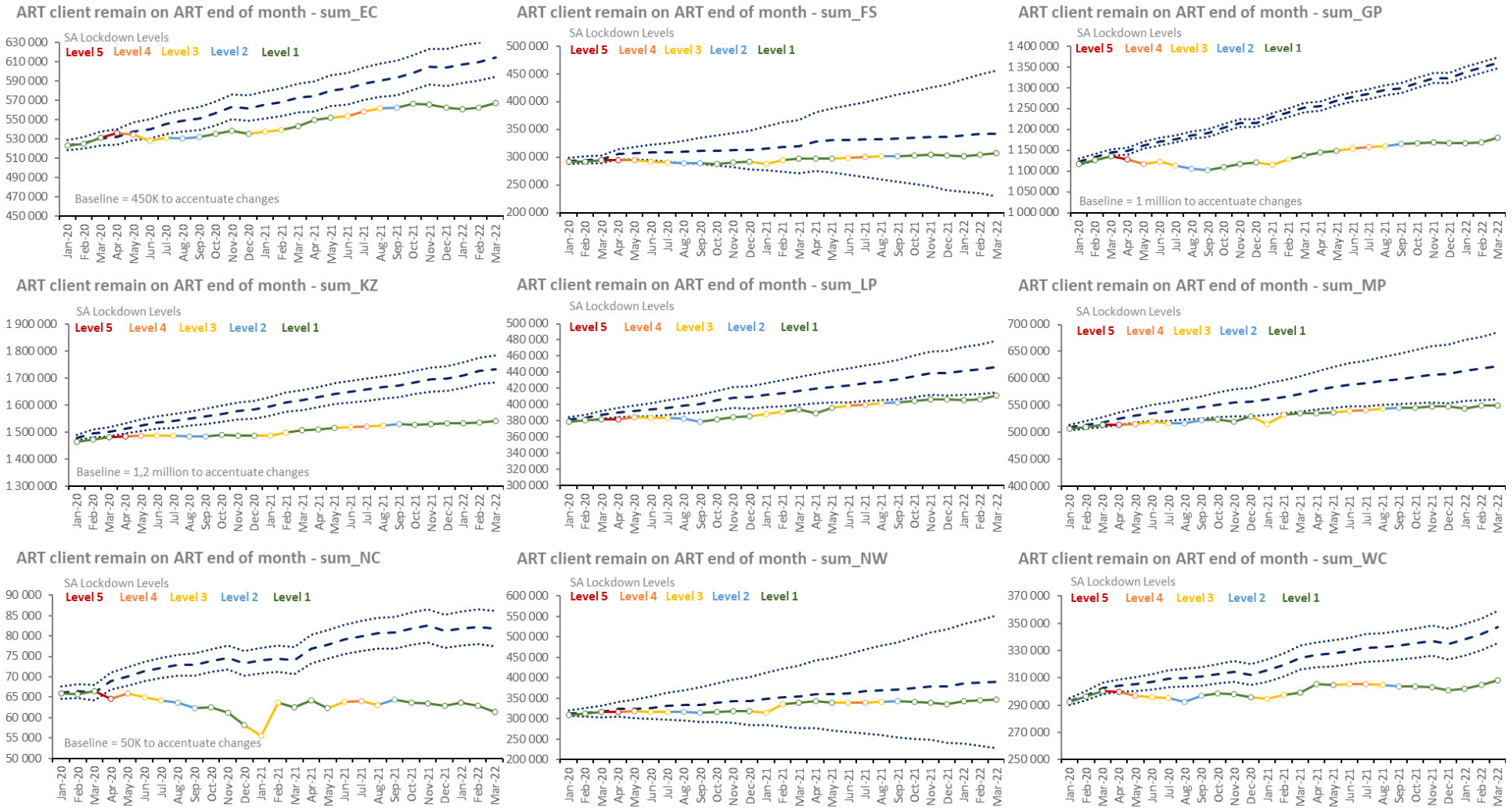
Source: webDHIS[10]

Figure 20. Individuals vaccinated as % of the population by age group, 20 February 2023



Source: https://sacoronavirus.co.za.

Figure 17. ART client remain on ART by province, January 2020 - March 2022



Source: webDHIS[10]

Table 13. HIV and AIDS indicators by province, 2018- 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Adult living with HIV	2020 Q1	both sexes 15+ years NDoH-Thembisa	7174336	808940	403021	1866419	1950240	461625	668118	79737	501315	434921	a
	2021 Q1	both sexes 15+ years NDoH-Thembisa	7157513	820796	396195	1752754	1854967	567873	683117	101051	498164	482596	a
	2022 Q1	both sexes 15+ years NDoH-Thembisa	7518945	833869	389880	1836580	1911616	664333	717174	103808	514813	546872	a
Child living with HIV	2020 Q1	both sexes 0-14 years NDoH-Thembisa	326567	42576	19529	58700	100371	27699	35720	4862	23536	13574	a
	2021 Q1	both sexes 0-14 years NDoH-Thembisa	268935	36519	17079	48685	73354	27081	26420	5854	18756	15187	a
	2022 Q1	both sexes 0-14 years NDoH-Thembisa	270599	32056	14767	49277	75076	30986	31336	4428	18645	14028	a
Total living with HIV	2020 Q1	both sexes all ages NDoH-Thembisa	7500903	851516	422550	1925119	2050611	489324	703838	84599	524851	448495	a
	2021 Q1	both sexes all ages NDoH-Thembisa	7426448	857315	413274	1801439	1928321	594954	709537	106905	516920	497783	a
	2022 Q1	both sexes all ages NDoH-Thembisa	7789544	865925	404647	1885857	1986692	695319	748510	108236	533458	560900	a
People living with HIV (PLHIV)	2020	both sexes 0-14 years Global Report	310000										b
		both sexes all ages Global Report	7800000										b
		both sexes all ages mid-year	7800000										c
		both sexes all ages Thembisa 4.4	7892070	863517	404619	1878400	1985710	692685	746915	107814	532097	556517	d
		both sexes ILO in labour force	4887632										e
		female 15 + years Global Report	4800000										b
		female ILO in labour force	2607391										e
		male 15+ years Global Report	2700000										b

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		male ILO in labour force	2 280 241										e
	2021	both sexes all ages Thembisa 4.4	8 008 080	874 329	405 266	1 910 980	1 992 300	704 108	754 254	109 608	538 115	574 861	d
	2022	both sexes all ages Thembisa 4.5	7 975 940	900 332	415 029	1 849 650	2 034 810	706 564	752 696	112 561	544 074	586 425	f
Percentage of people living with HIV (PLHIV) who know their status (1st 90)	2019	both sexes all ages Global Report	92,0										g
		female 15+ years Global Report	94,0										g
		male 15+ years Global Report	91,0										g
	2020	both sexes 0-14 years Global Report	75,0										b
		both sexes all ages Global Report	92,0										b
		female 15+ years Global Report	94,0										b
		male 15 years Global Report	91,0										b
HIV prevalence (age 15-49)	2020	both sexes 15-49 years mid-year	18,7										c
		female 15-49 years mid-year	23,0										c
	2021	both sexes mid-year	19,5										h
	2022	both sexes mid-year	19,6										i
HIV prevalence (total population)	2020	both sexes all ages mid-year	13,0										c
		both sexes all ages Thembisa 4.3	13,2	13,7	15,0	12,4	17,9	10,8	15,9	9,9	13,8	7,6	j
		both sexes all ages Thembisa 4.4	13,4	13,3	14,0	12,0	17,6	11,9	15,6	9,6	13,3	8,1	d
		both sexes ILO in labour force	23,9										e
		female ILO in labour	30,2										e

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		force											
		male ILO in labour force	19,3										e
	2021	both sexes all ages Thembisa 4.4	13,4	13,4	14,0	12,0	17,5	12,0	15,5	9,7	13,2	8,2	d
		both sexes mid-year	13,7										h
	2022	both sexes all ages Thembisa 4.5	13,5	14,1	14,7	11,8	18,1	12,0	15,8	10,1	13,6	8,4	f
		both sexes mid-year	13,9										i
Adult ART Total	2020 Q1	both sexes 15+ years DHIS	4866047	511867	282727	1109761	1436613	366875	498211	61567	305498	292928	a
	2021 Q1	both sexes 15+ years DHIS	4981934	526288	288816	1115574	1467110	381963	520366	58798	331156	291863	a
	2022 Q1	both sexes 15+ years DHIS	5148692	551615	298996	1160906	1506479	399243	534821	57815	338111	300706	a
Child ART Total	2020 Q1	both sexes 0-14 years DHIS	148396	18849	10151	23425	44482	13755	16394	4015	9295	8030	a
	2021 Q1	both sexes 0-14 years DHIS	135459	17284	8204	21088	41226	12372	15602	3673	8516	7494	a
	2022 Q1	both sexes 0-14 years DHIS	123135	16224	7401	19191	35473	11638	14726	3511	7669	7302	a
Number of patients receiving ART	2020	both sexes all ages Thembisa 4.3	5286810	559312	297082	1181960	1465490	404000	493116	72224	315454	334966	j
		both sexes all ages Thembisa 4.4	4976670	565489	299766	1175690	1522030	405754	539588	69361	334696	315474	d
	2020 Q1	both sexes all ages DHIS	5014443	530716	292878	1133186	1481095	380630	514605	65582	314793	300958	a
	2021	both sexes all ages Thembisa 4.4	5240800	590495	306668	1219410	1557130	426306	562597	72965	349713	334444	d
	2021 Q1	both sexes all ages DHIS	5111503	542488	295260	1136123	1508568	394362	533347	62383	339532	299440	a
	2022	both sexes all ages Thembisa 4.5	5631460	592901	315868	1249670	1583250	437523	562923	70949	359946	336590	f
	2022 Q1	both sexes all ages DHIS	5271827	567839	306397	1180097	1541952	410881	549547	61326	345780	308008	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Total Clients remaining on ART at the end of the month	Mar 2020	both sexes all ages DHIS	5 020 308	531 135	294 215	1 134 719	1 481 679	381 733	514 347	66 439	315 571	300 470	a
	Mar 2021	both sexes all ages DHIS	5 117 541	543 572	296 971	1 136 662	1 508 336	394 335	536 165	62 471	339 672	299 357	a
	Mar 2022	both sexes 15+ years DHIS	5 271 827	567 839	306 397	1 180 097	1 541 952	410 881	549 547	61 326	345 780	308 008	a
Antiretroviral coverage (2nd 90)	2020	both sexes 0-14 years Global Report	47,0										b
		both sexes all ages GBD	72,8										k
		both sexes all ages Global Report	72,0										b
		both sexes all ages Thembisa 4.3	68,4	61,7	67,4	61,8	71,4	64,5	65,3	64,0	57,7	64,4	j
		both sexes all ages Thembisa 4.4	71,9	71,4	80,2	68,1	81,3	64,8	78,3	70,5	68,7	62,3	d
		female 15+ years Global Report	78,0										b
		male 15 years Global Report	63,0										b
	2021	both sexes all ages Thembisa 4.4	73,7	73,3	81,5	69,6	82,5	66,6	80,4	72,8	70,7	64,0	d
	2022	both sexes all ages Thembisa 4.5	75,0	71,3	80,9	72,2	81,1	67,9	79,2	69,1	70,9	62,4	f
Clients remaining on ART rate	Mar 2020	both sexes all ages DHIS	66,9	62,4	69,4	58,9	72,2	77,8	73,1	77,5	59,9	67,1	a
	Mar 2021	both sexes all ages DHIS	68,9	63,4	71,9	63,1	78,2	66,3	75,6	58,4	65,7	60,1	a
	Mar 2022	both sexes all ages DHIS	67,7	65,6	75,7	62,6	77,6	59,1	73,4	56,7	64,8	54,9	a
Antiretroviral effective coverage	2020	both sexes all ages Thembisa 4.3	63,3	56,0	63,5	55,3	67,6	57,6	60,2	58,4	52,9	60,6	j
		both sexes all ages Thembisa 4.4	66,4	65,5	74,1	62,6	76,7	58,6	72,2	64,4	62,9	56,7	d
	2020	both sexes 0-14 years	18,7	19,1	17,4	18,8	21,2	19,1	20,2	13,9	17,5		a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	Q1	DHIS-Tier											
		both sexes 15+ years DHIS-Tier	41,8	37,8	39,9	41,6	49,0	53,6	52,5	17,8	37,7		a
		both sexes all ages DHIS-Tier	40,8	36,8	38,8	40,9	47,6	51,6	50,8	17,6	36,8		a
	2021	both sexes all ages Thembisa 4.4	68,3	67,6	75,7	63,8	78,2	60,6	74,6	66,6	65,0	58,2	d
	2021 Q1	both sexes all ages DHIS-Tier	45,5	39,9	43,9	45,0	52,6	44,2	50,3	22,5	43,5	32,6	a
	2022	both sexes all ages Thembisa 4.5	70,6	65,9	76,1	67,6	77,8	61,9	74,8	63,1	66,2	57,4	f
	2022 Q1	both sexes all ages DHIS-Tier	45,1	40,0	49,9	45,3	56,0	36,5	50,6	21,5	43,8	20,0	a
Adult with viral load suppressed rate 12 months	2020 Q1	both sexes 15+ years DHIS	88,1	86,8	89,7	87,6	90,6	86,5	86,2	83,6	85,5		a
	2021 Q1	both sexes 15+ years DHIS	88,6	88,6	89,3	88,7	89,1	88,3	88,3	83,3	86,5	90,3	a
	2022 Q1	both sexes 15+ years DHIS	88,9	86,7	92,8	91,3	90,5	79,9	87,7	85,0	84,3	91,6	a
Child with viral load suppressed rate 12 months	2020 Q1	both sexes 0-14 years DHIS	63,9	62,9	64,3	64,3	68,8	51,5	60,9	75,2	65,3		a
	2021 Q1	both sexes 0-14 years DHIS	65,3	62,3	72,5	65,2	53,1	68,4	64,0	69,8	68,0	64,5	a
	2022 Q1	both sexes 0-14 years DHIS	60,7	63,2	61,4	63,2	55,8	62,3	53,1		59,4	69,3	a
ART client viral load suppressed rate (VLS)	2020 Q1	both sexes all ages DHIS-Tier	87,5	85,9	89,0	87,1	89,9	85,3	85,5	83,2	84,9		a
	2021 Q1	both sexes all ages DHIS	88,0	87,8	89,1	88,3	88,5	87,3	87,7	81,5	86,1	88,6	a
	2022 Q1	both sexes all ages DHIS	88,0	86,0	92,0	91,0	90,0	79,0	87,0	84,0	84,0	91,0	a
HIV viral load suppression (3rd 90)	2020	both sexes 0-14 years Global Report	33,0										b
		both sexes all ages Global Report	66,0										b

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		both sexes all ages Thembisa 4.3	92,5	90,6	94,1	89,4	94,6	89,3	92,3	91,2	91,7	94,2	j
		both sexes all ages Thembisa 4.4	59,6	57,1	68,8	55,4	71,0	51,0	64,3	57,7	56,2	52,7	d
		female 15+ years Global Report	72,0										b
		male 15 years Global Report	58,0										b
	2021	both sexes all ages Thembisa 4.4	62,8	60,8	71,5	58,2	73,7	54,4	68,2	61,2	59,7	55,1	d
	2022	both sexes all ages Thembisa 4.5	64,0	57,4	70,6	60,7	72,2	53,9	67,6	55,8	60,0	53,6	f
Infant PCR test positive around 10 weeks rate	2018/19	both sexes DHIS	0,7	1,0	0,7	0,7	0,6	0,7	0,9	1,4	0,9	0,3	a
	2019/20	both sexes DHIS	0,7	0,9	0,5	0,7	0,5	0,7	0,9	1,3	0,9	0,3	a
	2020/21	both sexes DHIS	0,6	0,7	0,5	0,7	0,4	0,7	0,6	1,0	0,7	0,3	a
Adult living with HIV viral load done 12m	2020 Q1	both sexes 15+ years DHIS-Tier	3403846	352021	179121	886716	1055123	286134	406715	16964	221052		a
	2021 Q1	both sexes 15+ years DHIS	3734509	377554	198456	898715	1111108	292891	396112	27698	255405	176570	a
	2022 Q1	both sexes 15+ years DHIS	3899389	391707	214659	924923	1210061	312055	425359	27427	273492	119706	a
Adult living with HIV viral load suppressed (VLS) 12m	2020 Q1	both sexes 15+ years DHIS	2999406	305530	160656	776624	955434	247396	350673	14188	188905		a
	2021 Q1	both sexes 15+ years DHIS	3317696	334432	178051	799532	992743	258942	350454	23238	220859	159445	a
	2022 Q1	both sexes 15+ years DHIS	3464855	339499	199254	844446	1095505	249401	373072	23306	230668	109704	a
Adult remaining on ART at end of the month - total	Mar 2020	both sexes 15+ years DHIS	4872515	512268	284952	1111128	1437205	367756	497964	62524	306262	292456	a
	Mar 2021	both sexes 15+ years DHIS	4980854	526288	288767	1115574	1467110	381963	519335	58798	331156	291863	a
	Mar	both sexes 15+ years	5148692	551615	298996	1160906	1506479	399243	534821	57815	338111	300706	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2022	DHIS											
Antenatal client initiated on ART rate	2019/20	female DHIS	96,2	95,3	98,4	97,2	98,4	95,2	98,8	93,4	98,1	80,2	a
	2020/21	female DHIS	94,9	91,8	98,1	98,6	98,9	96,8	96,6	88,6	93,2	67,9	a
	2021/22	female DHIS	95,0	90,4	97,7	99,3	98,9	98,0	97,6	90,4	90,3	68,5	a
Antenatal client start on ART	2019/20	female DHIS	94440	10536	4126	25746	21207	9871	10526	1563	6020	4845	a
	2020/21	female DHIS	82021	8893	3451	22662	18524	8853	9450	1389	4993	3806	a
	2021/22	female DHIS	68045	7827	3173	17969	16121	7358	7041	1210	4090	3256	a
Child living with HIV viral load done 12m	2020 Q1	both sexes 0-14 years DHIS-Tier	95581	12927	5290	17137	30907	10262	11865	898	6295		a
	2021 Q1	both sexes 0-14 years DHIS	93422	11737	4852	16731	31182	7988	9986	1186	5526	4234	a
	2022 Q1	both sexes 0-14 years DHIS	84890	10748	4293	14590	27318	8134	10702	180	5445	3480	a
Child living with HIV viral load suppressed (VLS) 12m	2020 Q1	both sexes 0-14 years DHIS	61099	8127	3400	11021	21255	5284	7227	675	4110		a
	2021 Q1	both sexes 0-14 years DHIS	61022	7309	3520	10916	21329	4243	6387	828	3760	2730	a
	2022 Q1	both sexes 0-14 years DHIS	51530	6790	2634	9224	17022	4535	5679		3235	2411	a
Child under 15 years remaining on ART at end of the month - total	2021 Q1	both sexes 0-14 years DHIS	136687	17284	8204	21088	41226	12372	16830	3673	8516	7494	a
	Mar 2020	both sexes 0-14 years DHIS	147793	18867	9263	23591	44474	13977	16383	3915	9309	8014	a
	Mar 2022	both sexes 0-14 years DHIS	123135	16224	7401	19191	35473	11638	14726	3511	7669	7302	a
HIV testing coverage	2020	both sexes 15+ years Thembisa 4.3	77,7	74,0	73,1	75,9	79,0	75,1	74,6	75,1	76,7	76,2	j
		both sexes 15+ years Thembisa 4.4	77,7	75,7	75,4	79,0	80,9	76,4	77,0	76,5	79,2	78,1	d

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021	both sexes 15+ years Thembisa 4.4	78,2	76,5	75,8	79,2	81,7	77,1	77,6	77,0	79,7	78,6	d
	2022	both sexes 15+ years Thembisa 4.5	82,9	79,9	75,5	83,8	86,2	78,4	77,8	77,7	82,5	82,4	f
Infant 1st PCR test positive at birth rate	2019/20	both sexes DHIS	0,6	0,5	0,4	0,5	0,3	0,6	1,0	0,4	1,3	0,8	a
	2020/21	both sexes DHIS	0,5	0,5	0,3	0,6	0,4	0,5	0,8	0,6	0,6	0,8	a
	2021/22	both sexes DHIS	0,4	0,4	0,1	0,5	0,3	0,5	0,3	0,8	0,5	0,8	a
Medical male circumcision 15 years and older rate	2019/20	DHIS	46,4	59,5	32,2	38,3	47,6	24,4	52,5	51,6	61,1	71,2	a
	2020/21	DHIS	59,1	88,6	73,5	38,9	79,2	85,9	67,4	59,8	94,5	91,2	a
	2021/22	DHIS	55,8	79,3	50,3	38,5	60,1	78,7	68,6	40,5	84,3	92,5	a
Percentage of deaths due to AIDS	2020	both sexes all ages mid-year	15,4										c
	2021	both sexes all ages mid-year	12,2										h
Total living with HIV viral load done 12m	2020 Q1	both sexes all ages DHIS-Tier	3 499 427	364 948	184 411	903 853	1 086 030	296 396	418 580	17 862	227 347		a
	2021 Q1	both sexes all ages DHIS-Tier	3 448 279	363 218	178 204	842 785	1 045 472	282 163	360 744	21 816	243 727	110 150	a
	2022 Q1	both sexes all ages DHIS	3 984 279	402 455	218 952	939 513	1 237 379	320 189	436 061	27 607	278 937	123 186	a
Total living with HIV viral load suppressed 12m	2020 Q1	both sexes all ages DHIS	3 060 505	313 657	164 056	787 645	976 689	252 680	357 900	14 863	193 015		a
	2021 Q1	both sexes all ages DHIS	3 035 283	318 804	158 778	744 538	925 390	246 225	316 453	17 781	209 772	97 542	a
	2022 Q1	both sexes all ages DHIS	3 516 385	346 289	201 888	853 670	1 112 527	253 936	378 751	23 306	233 903	112 115	a

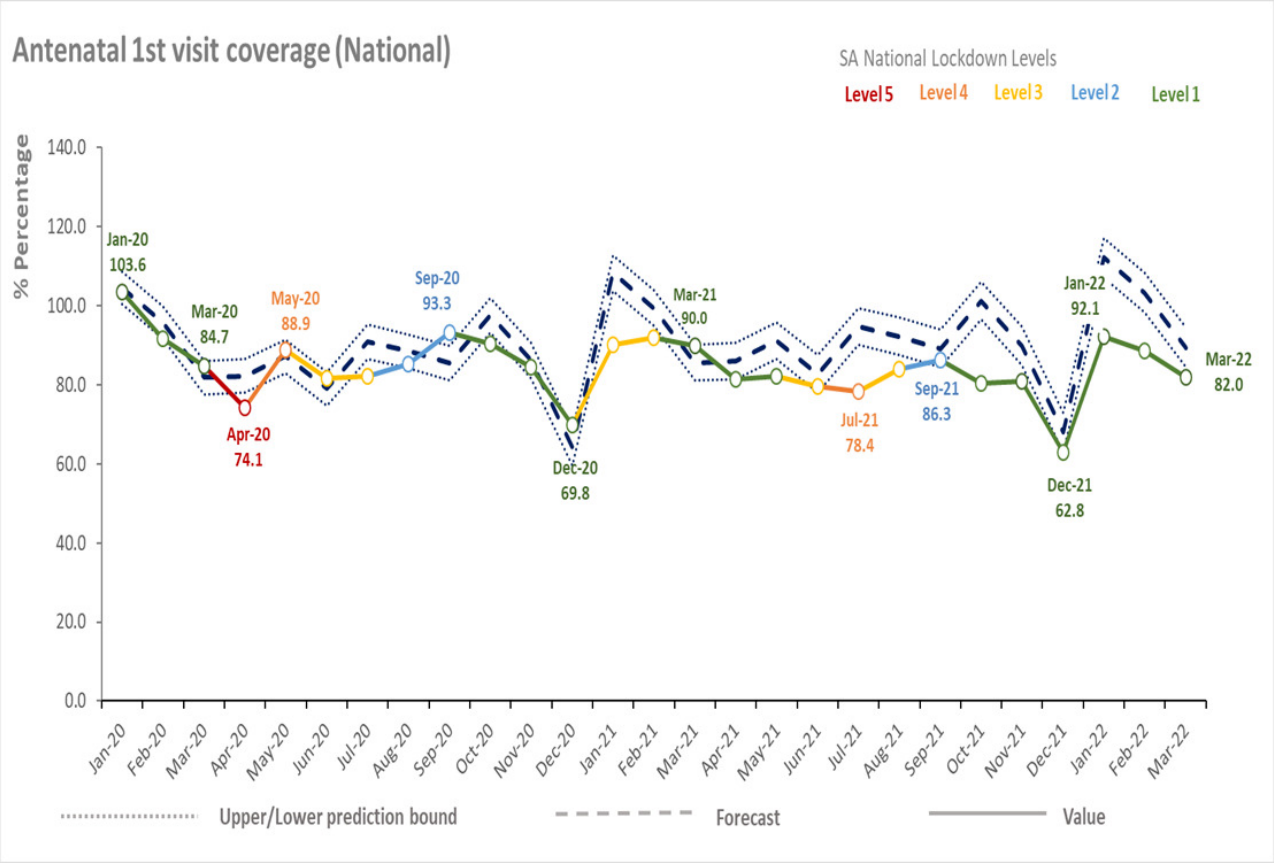
Reference notes
a webDHIS.[10]
b UNAIDS 2021.[61]
c Stats SA MYE 2020.[13]
d Thembisa v4.4.[62]

e HIV and work 2018[63]
f Thembisa v4.5.[64]
g UNAIDS Data 2020.[65]
h Stats SA MYE 2021.[12]
i Stats SA MYE 2022.[11]
j .Thembisa v4.3.[66]
k GBD 2017 HIV.[67]

Definitions

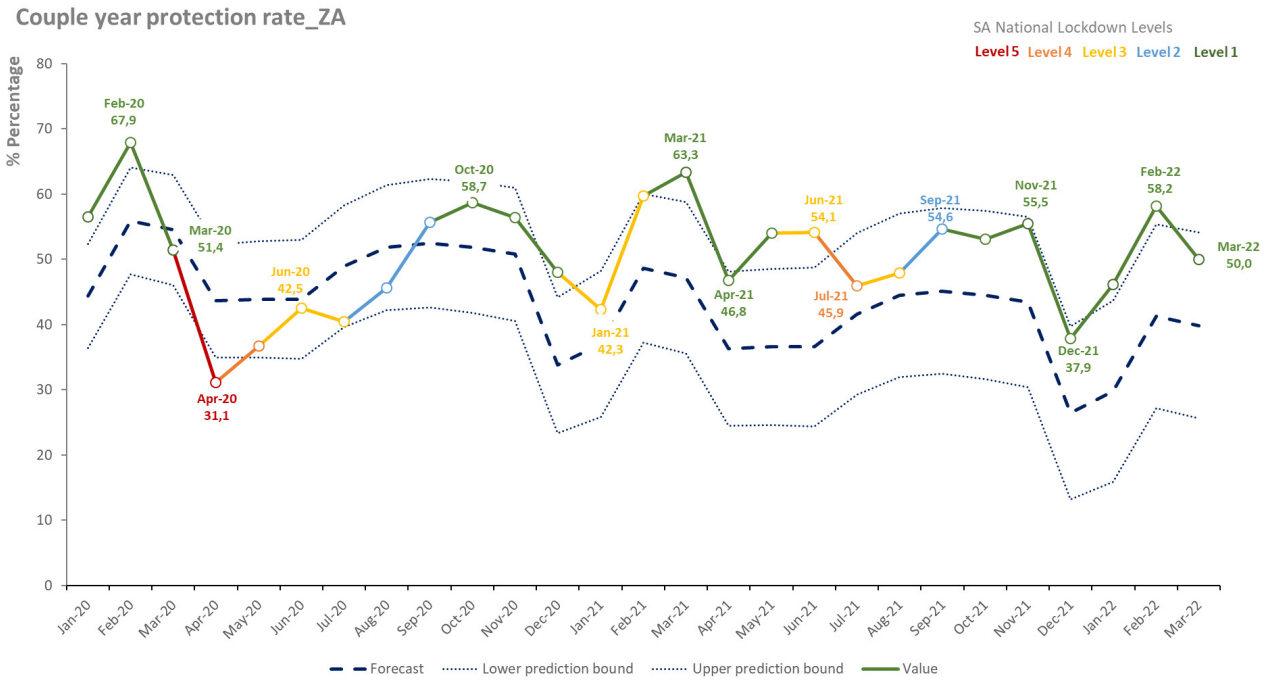
- Adult ART Total [Number].:
- Adult living with HIV [Number]: Estimated number of adults (15+ years) living with HIV.
- Adult living with HIV viral load done 12m [Number].
- Adult living with HIV viral load suppressed (VLS) 12m [Number]: ART client with suppressed viral load (VLS) of under 400 copies per millilitre (cps/mL).
- Adult remaining on ART at end of the month - total [Number].
- ART Adult client viral load done (VLD) [Number].
- ART Child client viral load done (VLD) [Number].
- Child ART Total [Number].
- Child living with HIV [Number]: Estimated number of children (0-14 years) living with HIV.
- Child living with HIV viral load done 12m [Number].
- Child living with HIV viral load suppressed (VLS) 12m [Number]: ART client with suppressed viral load (VLS) of under 400 copies per millilitre (cps/mL).
- Number of patients receiving ART [Number]: Number of patients receiving ART.
- People living with HIV (PLHIV) [Number]: The number of people who are HIV-positive.
- Total clients remaining on ART at the end of the month [Number].
- Total living with HIV [Number]: The estimated number of people who are HIV-positive.
- Total living with HIV viral load done 12m [Number].
- Total living with HIV viral load suppressed 12m [Number]: ART client with suppressed viral load (VLS) of under 400 copies per millilitre (cps/mL) at 12 months.
- Adult with viral load suppressed rate 12 months [Percentage]: Proportion of ART clients with viral load suppressed at different time intervals. This indicates the population level immunological impact of clients on ART.
- Antenatal client initiated on ART rate [Percentage]: Antenatal clients on ART as a proportion of the total number of antenatal clients who are HIV positive and not previously on ART.
- Antiretroviral coverage (2nd 90) [Percentage]: The number of patients receiving ART, divided by the number needing treatment. The denominator has changed over time, due to changes in treatment guidelines affecting the criteria for treatment eligibility. The latest definition is that all HIV-infected patients should be on ART. This indicator is also one of the 90-90-90 global targets for AIDS (UNAIDS).
- Antiretroviral effective coverage [Percentage]: Proportion of HIV-positive people on ART and virally suppressed. Any implausible values (>100) capped at 100, zero or missing values set to 1.
- ART client viral load suppressed rate (VLS) [Percentage]: ART viral load suppressed - total as a proportion of ART viral load done
- Child with viral load suppressed rate 12 months [Percentage]: Proportion of ART clients with viral load suppressed at different time intervals. This indicates the population level immunological impact of clients on ART.
- Clients remaining on ART rate [Percentage]: Percentage of estimated people living with HIV who remain on ART. (Routine data equivalent for antiretroviral coverage).
- HIV prevalence (age 15-49) [Percentage]: Percentage of population (age 15-49) estimated to be HIV-positive.
- HIV prevalence (total population) [Percentage]: Percentage of population estimated to be HIV-positive.
- HIV testing coverage [Percentage]: Percentage of target population who have been tested for HIV.
- HIV viral load suppression (3rd 90) [Percentage]: Percentage of people on ART who are virologically suppressed (VL level ≤1 000 copies/mL). This indicator is also one of the 90-90-90 global targets for AIDS (UNAIDS).
- Infant 1st PCR test positive at birth rate [Percentage]: Infants tested PCR positive for the first time at birth as proportion of infants PCR tested at birth.
- Medical male circumcision 15 years and older rate [Percentage]: Medical male circumcisions performed 15 years and older as a proportion of total medical male circumcisions performed.
- Percentage of deaths due to AIDS [Percentage]: Percentage of total deaths attributed to AIDS related causes.
- Percentage of people living with HIV (PLHIV) who know their status (1st 90) [Percentage]: Percentage of people living with HIV who know their HIV status. This indicator is also one of the 90-90-90 global targets for AIDS (UNAIDS).

Figure 21. Antenatal 1st visit coverage (national), January 2020 - March 2022



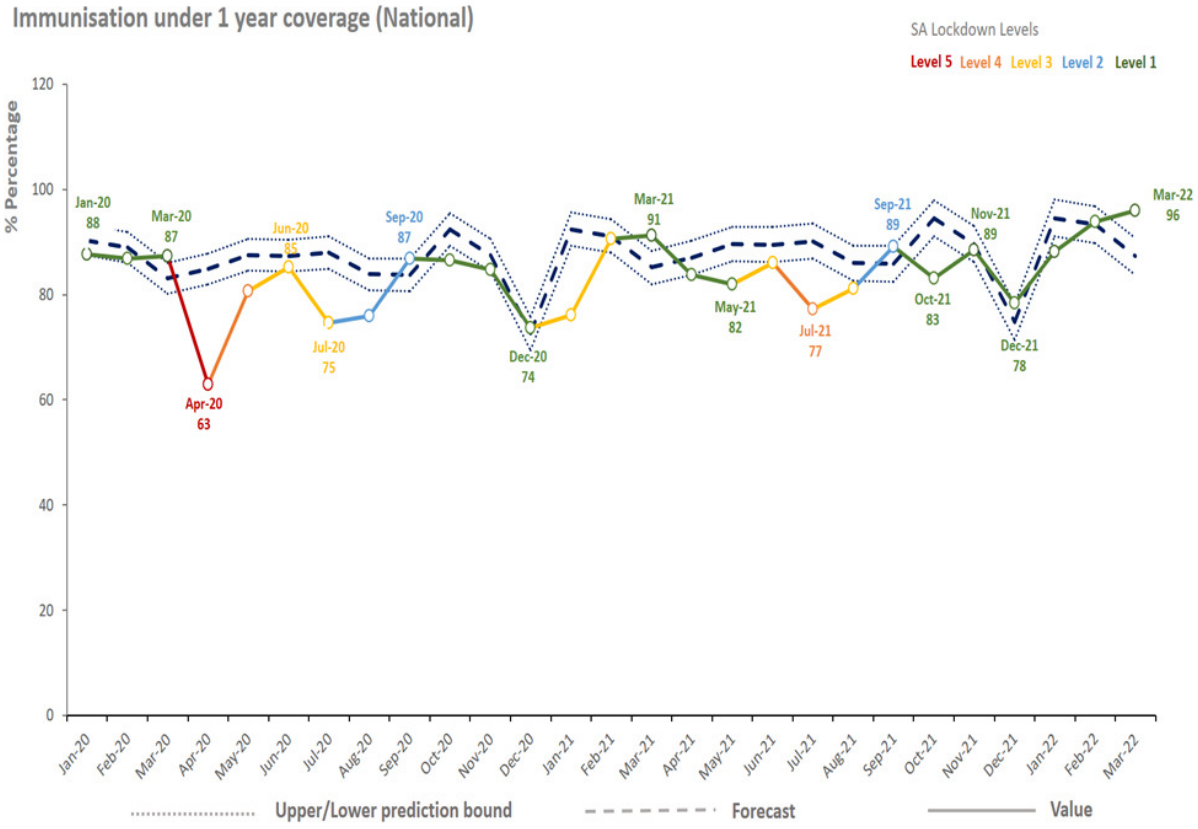
Source: webDHIS[10]

Figure 23. Couple year protection rate (national), January 2020 - March 2022



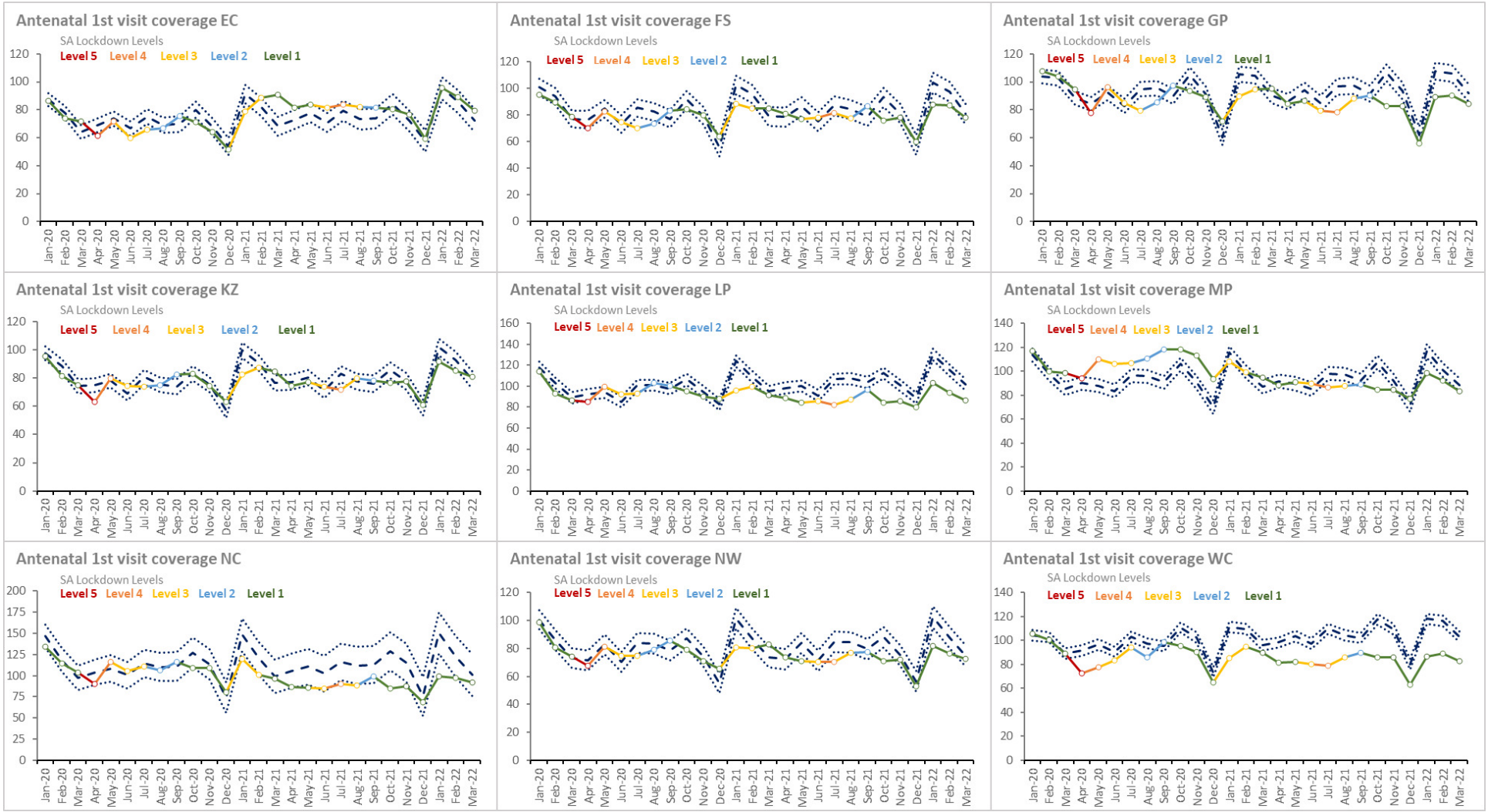
Source: webDHIS[10]

Figure 25. Immunisation under 1 year coverage (national), January 2020 - March 2023



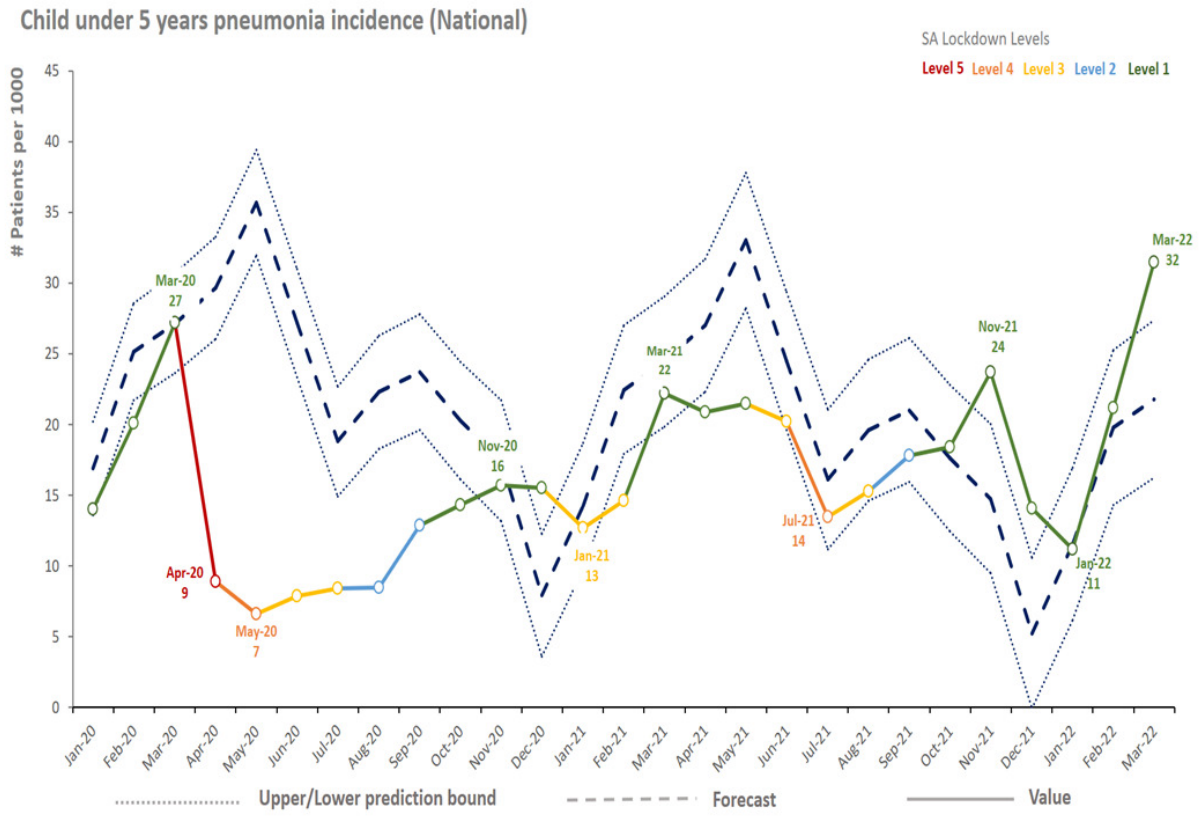
Source: webDHIS[10]

Figure 22. Antenatal 1st visit coverage per province, January 2020 – March 2022



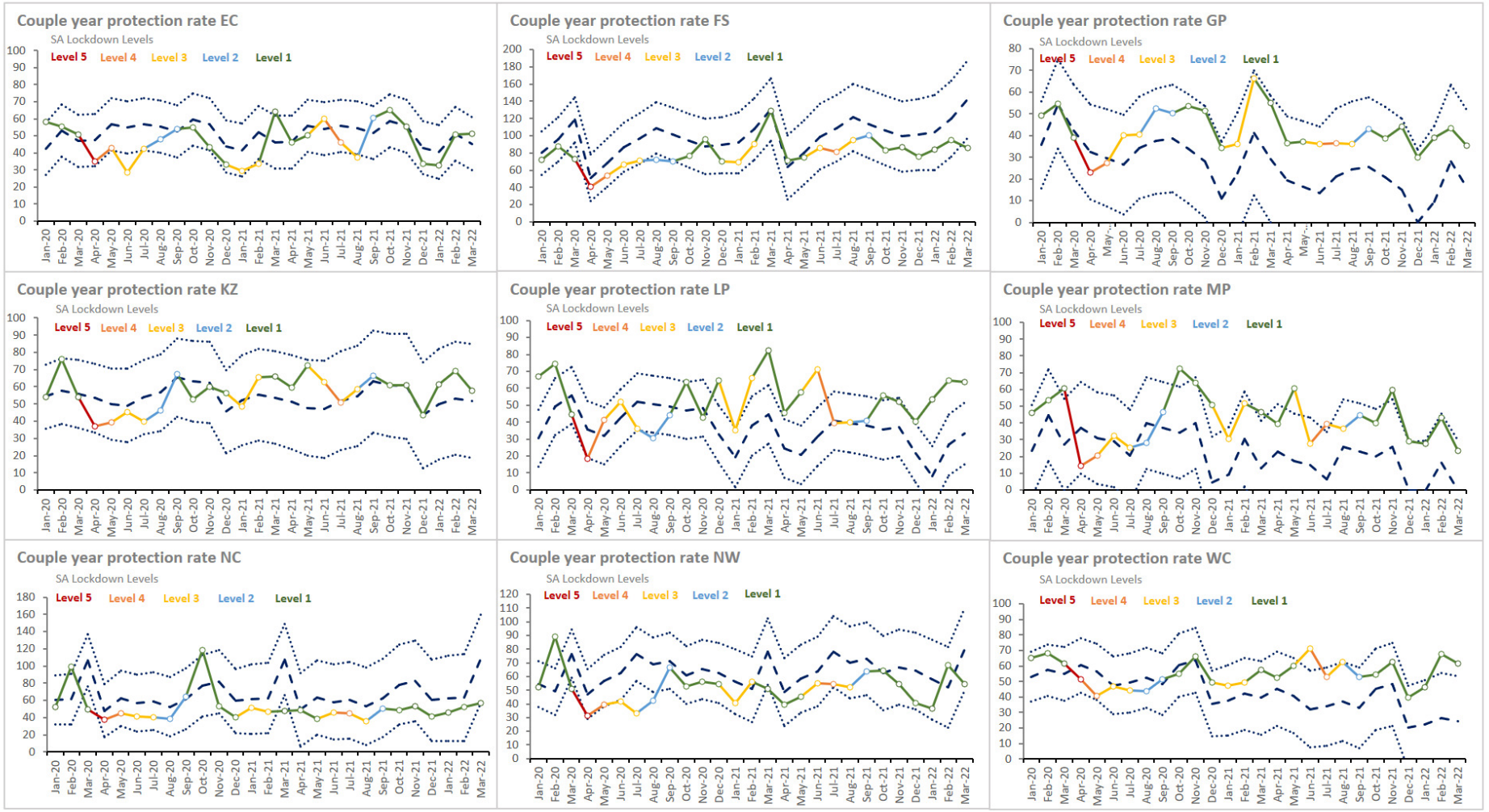
Source: webDHIS[10]

Figure 27. Child under 5 years pneumonia incidence (national), January 2020 - March 2022



Source: webDHIS[10]

Figure 24. Couple year protection rate per province, January 2020 – March 2022



Source: webDHIS[10]

Table 14. Maternal health indicators by province, 2018- 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Antenatal 1st visit before 20 weeks rate	2019/20	female DHIS	69,7	62,5	66,6	66,5	74,5	69,0	77,4	65,0	70,9	71,9	a
	2020/21	female DHIS	67,9	62,5	61,3	63,3	74,6	66,8	74,9	58,6	68,0	70,6	a
	2021/22	female DHIS	68,9	63,0	60,5	66,8	74,2	66,7	74,3	56,3	70,1	72,6	a
Antenatal 1st visit coverage	2019/20	female DHIS	83,1	68,7	79,3	90,2	75,0	90,7	92,7	105,6	77,7	91,1	a
	2020/21	female DHIS	83,9	68,2	78,5	88,3	76,3	93,9	107,4	109,9	76,4	86,7	a
	2021/22	female DHIS	81,5	81,2	78,9	82,5	77,3	88,0	87,6	88,6	72,1	82,6	a
Cervical cancer screening coverage	2019/20	female DHIS	46,8	50,0	46,0	42,2	55,9	33,3	57,9	32,0	55,9	41,8	a
	2020/21	female DHIS	27,8	31,5	29,5	17,8	40,5	21,5	41,3	13,9	25,7	28,0	a
	2021/22	female DHIS	36,9	32,9	35,2	31,4	56,8	25,1	42,7	15,3	22,8	40,0	a
Couple year protection rate	2019/20	DHIS	54,5	55,2	78,9	43,7	56,5	55,3	48,2	56,6	62,4	64,5	a
	2020/21	DHIS	49,8	41,0	74,9	44,9	51,5	46,9	39,8	50,9	48,0	50,5	a
	2021/22	DHIS	50,3	49,0	84,7	37,8	60,3	51,9	39,2	46,8	52,3	56,9	a
Delivery 10-14 years in facility	2019/20	female DHIS	3870	671	192	631	704	447	618	134	149	324	a
	2021/22	female 10-14 years DHIS	3963	627	147	549	993	518	419	101	216	393	a
Delivery 10-19 years in facility	2018/19	DHIS	124628	17167	5779	14920	35471	16587	11819	4041	7857	10987	a
	2021/22	female 10-19 years DHIS	139361	18960	6647	20877	35820	18070	14425	3976	9424	11162	a
Delivery 15-19 years in facility	2019/20	female DHIS	127028	17211	6054	15251	35467	18363	11786	3870	7922	11104	a
	2021/22	female 15-19 years DHIS	135398	18333	6500	20328	34827	17552	14006	3875	9208	10769	a
Delivery by Caesarean section rate	2019	female med schemes	77,5										b
	2019/20	female DHIS	29,0	30,9	31,8	31,2	33,7	21,4	22,4	21,5	25,0	29,9	a
	2020/21	female DHIS	27,8	31,7	30,4	30,3	35,3	23,1	21,0	23,9	24,1	30,0	a
	2021/22	female DHIS	29,6	32,3	32,3	30,6	36,4	23,2	20,3	22,2	23,4	30,9	a
Delivery by Caesarean section rate (district hospitals)	2019/20	female DHIS District Hospital	24,7	25,4	14,9	27,5	28,2	22,5	21,2	15,5	29,8	27,2	a
	2020/21	female DHIS District Hospital	24,4	25,5	13,9	30,7	29,1	24,8	20,2	19,9	28,9	27,0	a
	2021/22	female DHIS District Hospital	25,9	25,9	14,0	33,2	29,3	24,4	20,4	15,7	28,6	28,5	a
Delivery in 10 to 19 years in facility rate	2019/20	female DHIS	13,2	16,7	12,7	7,5	16,3	14,1	14,9	18,4	13,1	11,1	a
	2020/21	female DHIS	14,3	17,1	13,1	8,9	16,5	13,8	15,5	19,3	14,0	10,8	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021/22	female DHIS	13,7	17,4	13,3	9,1	16,6	13,5	15,8	17,6	15,0	11,2	a
Delivery in facility rate	2019/20	female DHIS	79,3	61,4	87,5	75,2	78,4	94,9	88,1	98,4	72,9	89,5	a
	2020/21	female DHIS	82,1	62,4	85,9	82,7	76,0	100,6	97,8	92,1	74,6	90,6	a
	2021/22	female DHIS	83,3	77,8	92,7	81,5	79,0	100,2	88,2	82,0	72,6	84,6	a
Early neonatal death in facility rate	2019/20	both sexes DHIS	9,6	10,0	11,9	9,3	8,7	12,5	9,6	13,1	9,5	6,5	a
	2020/21	both sexes DHIS	9,7	10,4	11,9	9,6	9,4	10,6	10,3	11,5	10,8	6,5	a
	2021/22	both sexes 0 DHIS	10,0	10,3	12,6	10,5	9,8	10,7	10,5	10,3	11,1	6,1	a
Female condoms distributed	2018/19	DHIS	17 658 915	2 579 661	1 218 303	3 760 346	3 397 759	1 737 808	1 951 650	333 100	782 888	1 897 400	a
	2019/20	DHIS	16 562 153	1 775 000	1 397 300	4 867 267	2 804 576	1 982 950	1 231 300	248 950	773 910	1 480 900	a
	2021/22	DHIS	17 487 705	2 089 400	1 421 800	5 228 585	3 813 200	738 500	1 997 762	113 700	931 858	1 152 900	a
Live birth under 2500g in facility rate	2019/20	both sexes DHIS	12,9	14,1	14,2	13,9	11,7	10,6	11,6	18,9	13,6	13,9	a
	2020/21	both sexes DHIS	13,2	13,6	14,4	13,0	11,8	10,7	11,5	16,7	13,3	13,6	a
	2021/22	both sexes 0 DHIS	13,2	14,3	14,8	14,0	12,3	10,6	12,0	18,2	14,0	14,4	a
Male condom distribution coverage	2019/20	DHIS	32,1	34,7	52,3	25,1	30,1	35,5	32,8	28,9	38,7	33,2	a
	2020/21	DHIS	26,5	22,3	50,9	26,3	26,6	27,5	23,9	23,8	27,4	21,4	a
	2021/22	DHIS	26,1	22,4	56,1	21,1	29,0	28,3	19,1	20,9	28,1	27,3	a
Male condoms distributed	2019/20	DHIS	646 587 444	78 817 157	53 246 000	135 857 486	108 503 920	67 818 200	51 749 400	12 959 400	55 579 921	82 055 960	a
	2020/21	DHIS	542 144 989	51 122 509	52 248 000	146 303 254	96 529 200	53 325 900	38 316 000	10 825 929	39 841 971	53 632 226	a
	2021/22	DHIS	545 372 354	45 839 588	55 352 800	129 075 303	106 967 000	52 862 900	31 364 066	9 518 000	42 361 097	72 031 600	a
Maternal mortality in facility ratio	2019/20	female DHIS	88,0	108,2	116,2	102,9	76,9	97,8	67,1	109,9	88,0	43,6	a
	2020/21	female DHIS	120,9	146,2	178,8	118,7	123,9	120,1	108,3	80,6	124,6	83,9	a
	2021/22	female DHIS	119,1	114,6	156,5	129,3	100,6	134,6	130,0	157,5	129,9	75,1	a
Mother postnatal visit within 6 days rate	2019/20	female DHIS	80,1	69,0	80,5	85,5	76,1	104,2	70,9	68,6	93,2	60,1	a
	2020/21	female DHIS	76,6	71,2	79,9	75,0	76,2	94,7	73,9	66,8	94,9	53,7	a
	2021/22	female DHIS	78,6	78,6	76,6	74,7	79,3	95,2	74,2	61,1	102,6	57,1	a
Neonatal death in facility rate	2019/20	both sexes DHIS	11,9	12,3	15,6	12,4	10,9	14,3	11,2	15,5	11,5	8,2	a
	2020/21	both sexes DHIS	12,6	13,1	16,0	13,2	12,1	12,7	12,7	13,8	13,9	8,3	a
	2021/22	both sexes DHIS	13,1	13,2	15,9	14,3	13,0	13,2	12,9	12,9	14,6	7,7	a
Neonatal mortality rate (NMR) (deaths <28 days old per 1 000 live births)	2018	both sexes WHO	11,0										c
		both sexes RMS	11,0										d
	2019	both sexes WHO	11,0										e
		both sexes GBD	20,7										f

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2020	both sexes WHO	11,0										g
		RMS	12,0										h
Perinatal death in facility rate	2019/20	both sexes DHIS	29,1	29,0	35,4	27,9	29,7	31,7	28,2	36,8	31,0	22,9	a
	2020/21	both sexes DHIS	29,8	31,3	38,7	29,1	32,7	30,9	13,3	33,9	33,9	24,6	a
	2021/22	both sexes DHIS	30,8	30,3	38,6	29,5	32,3	29,5	31,1	43,6	33,2	24,1	a
Perinatal mortality rate (stillbirths plus deaths <8 days old per 1 000 total births)	2018/19	both sexes DHIS	30,1	28,3	39,9	28,6	30,8	31,7	30,2	34,3	30,6	25,6	a
	2019/20	both sexes DHIS	25,0	18,8	32,7	24,3	24,5	32,0	26,5	37,9	23,9	21,7	a
	2021/22	both sexes DHIS	27,2	25,4	38,1	25,4	27,3	31,1	29,0	38,0	24,8	21,6	a
Stillbirth in facility rate	2019/20	both sexes DHIS	19,7	19,2	23,8	18,8	21,2	19,5	18,8	24,0	21,7	16,5	a
	2020/21	both sexes DHIS	19,9	21,1	27,1	19,7	23,6	20,5	3,0	22,6	23,4	18,3	a
	2021/22	both sexes DHIS	21,0	20,1	26,3	19,2	22,8	19,0	20,8	33,6	22,4	18,1	a
Teenage pregnancy	2021	female 14-19 years GHS	2,7										i
ToPs (Terminations of Pregnancy)	2019/20	DHIS	124 446	12 597	7 776	23 048	27 441	14 960	8 127	1 497	9 806	19 194	a
	2020/21	DHIS	103 350	9 696	6 888	22 832	21 754	13 660	2 494	1 454	8 367	16 205	a
	2021/22	DHIS	120 144	13 107	7 837	26 427	24 204	14 408	6 706	1 816	9 222	16 417	a

References

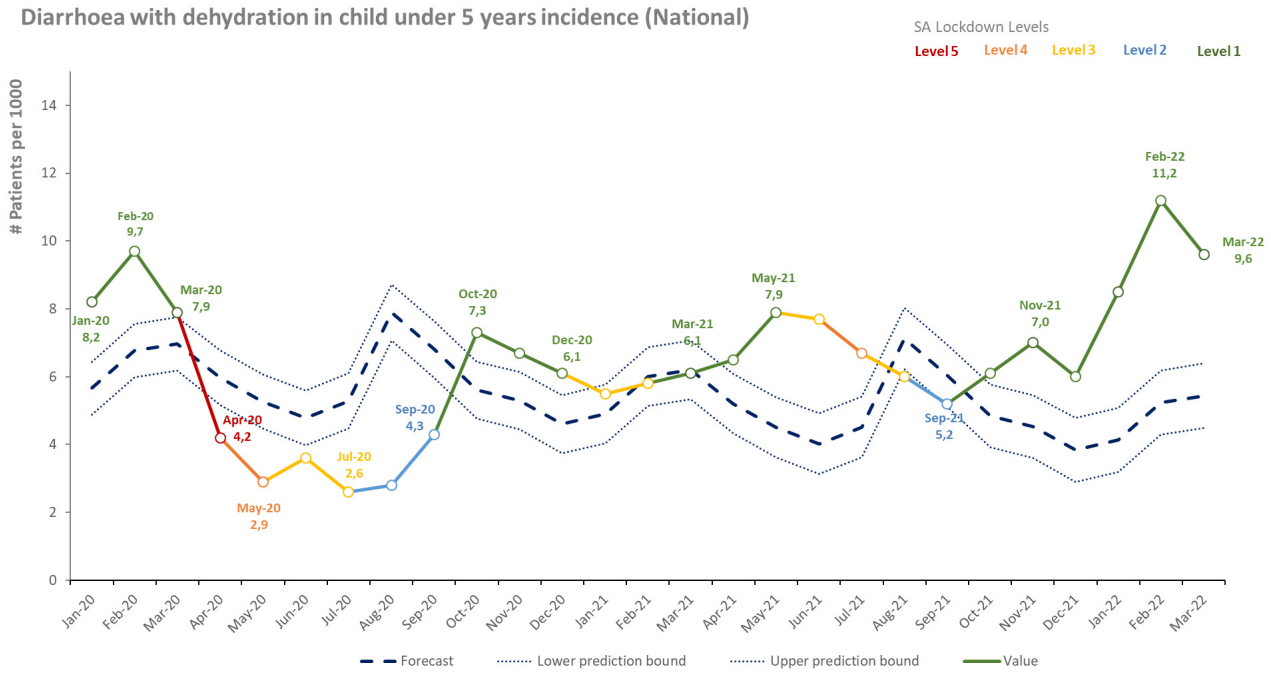
a webDHIS.[10]
b Medical Schemes 2019-20.[77]
c World Health Statistics 2020.[78]
d RMS 2018.[45]
e World Health Statistics 2021.[31]
f GBD 2021 Child Health.[79]
g World Health Statistics 2022.[32]
h RMS 2019 & 2021.[46]
i GHS 2021.[18]

Definitions

- Delivery 10-14 years in facility [Number]: Delivery where the mother is 10-14 years old. These deliveries are done in facilities under the supervision of trained medical/nursing staff.
- Delivery 10-19 years in facility [Number]: Delivery where the mother is 10-19 years old. These deliveries are done in facilities under the supervision of trained medical/nursing staff.
- Delivery 15-19 years in facility [Number]: Delivery where the mother is 15-19 years old. These deliveries are done in facilities under the supervision of trained medical/nursing staff.
- Female condoms distributed [Number]: Female condoms distributed from a primary distribution site to health facilities or points in the community (e.g. campaigns, non-traditional outlets, etc.).
- Male condoms distributed [Number]: Male condoms distributed from a primary distribution site to health facilities or points in the community (e.g. campaigns, non-traditional outlets, etc.).
- Maternal death in facility [Number]: Maternal death is death occurring during pregnancy, childbirth and puerperium within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy and the cause of death (obstetric and non-obstetric).
- Still birth in facility [Number]: Still born infants delivered in a health facility.
- ToPs (Terminations of Pregnancy) [Number]: The number of terminations of pregnancy.
- Antenatal 1st visit before 20 weeks rate [Percentage]: Women who have a booking visit (first visit) before they are 20 weeks (about half way) into their pregnancy as a proportion of all antenatal 1st visits.
- Antenatal 1st visit coverage [Percentage]: The proportion of pregnant women coming for at least one antenatal visit.
- Cervical cancer screening coverage [Percentage of target women]: Cervical smears in women 30 years and older as a proportion of the female population 30 years and older. 80% of these women should be screened for cervical cancer every 10 years and 20% must be screened every 3 years, which should be included in the denominator because it is estimated that 20% of women 30 years and older are HIV-positive.

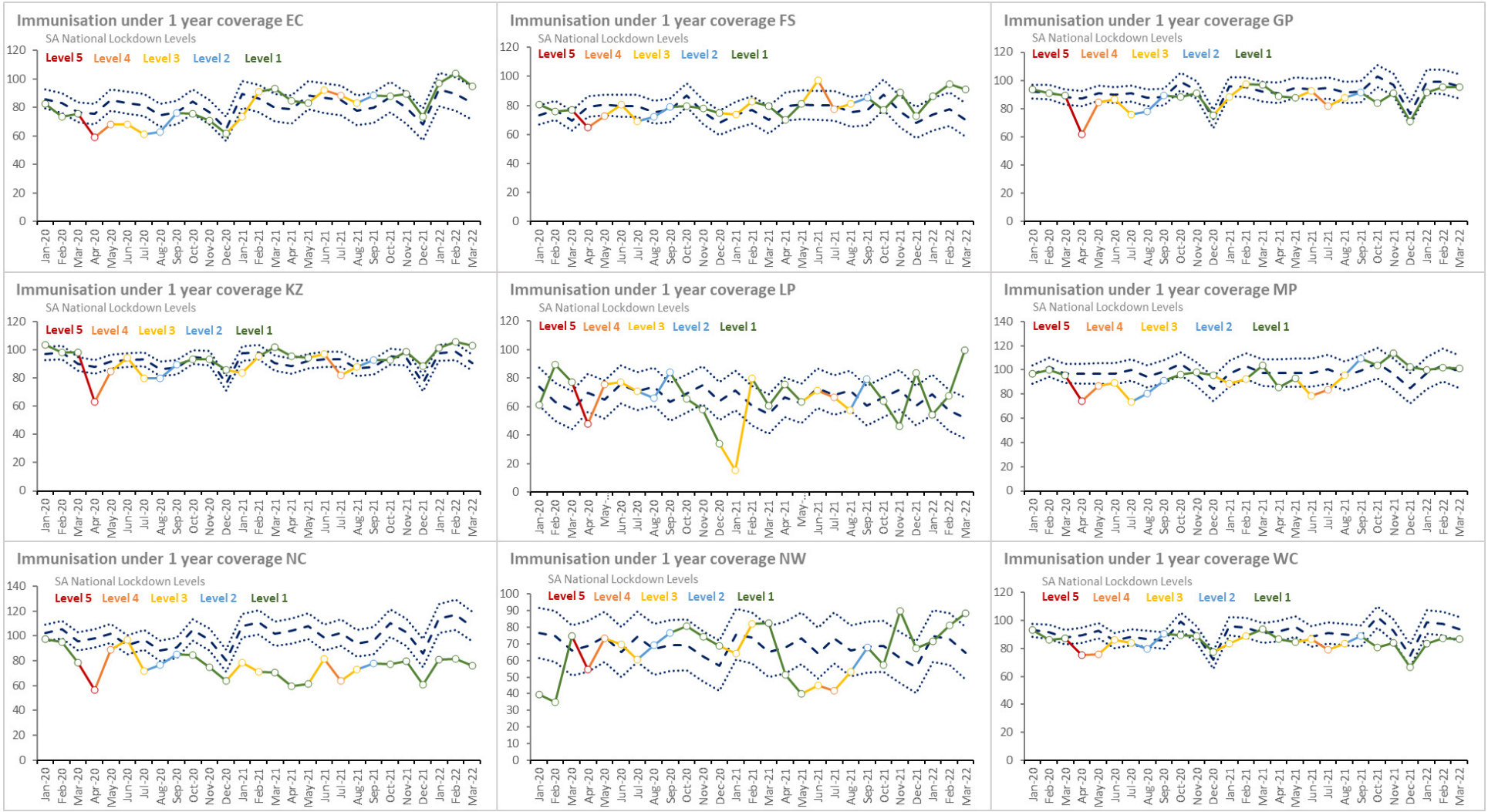
- Couple year protection rate [Percentage]: Women protected against pregnancy by using modern contraceptive methods, including sterilisations, as proportion of female population 15-49 years.
- Delivery by Caesarean section rate (district hospitals) [Percentage]: Caesarean section deliveries, expressed as the proportion of total deliveries in facility
- Delivery in 10 to 19 years in facility rate [Percentage]: Deliveries to women under the age of 20 years as proportion of total deliveries in health facilities.
- Delivery in facility rate [Percentage]: Deliveries in health facilities as proportion of expected deliveries in the population.
- Early neonatal death in facility rate [per 1 000 live births]: Early neonatal deaths per 1 000 infants who were born alive in health facilities.
- Live birth under 2 500g in facility rate [Percentage]: Percentage of live births under 2 500g.
- Male condom distribution coverage [Condoms per male 15+]: Male condoms distributed from a primary distribution site to health facilities or points in the community (e.g. campaigns, non-traditional outlets, etc.).
- Maternal mortality in facility ratio [per 100 000 live births]: Women who die as a result of childbearing, during pregnancy or within 42 days of delivery or termination of pregnancy, per 100 000 live births, and where the death occurs in a health facility.
- Mother postnatal visit within 6 days rate [Percentage]: Mothers who received postnatal care within 6 days after delivery as proportion of deliveries in health facilities.
- Neonatal death in facility rate [per 1 000 live births]: Infants 0-28 days who died during their stay in the facility per 1000 live births in facility.
- Neonatal mortality in facility rate [per 1 000 live births]: Inpatient deaths within the first 28 days of life per 1 000 estimated live births. Estimated live births in population is calculated by multiplying estimated population under 1 year by 1.03 to compensate for infant mortality.
- Neonatal mortality rate (NMR) (deaths <28 days old per 1 000 live births) [per 1 000 live births]: Number of deaths within the first 28 days of life, in a year, per 1 000 live births during that year. Also called Neonatal Death Rate (NDR).
- Perinatal death in facility rate [per 1 000 total births]: Still births and deaths in facility under 7 days of life (Early Neonatal Death) per 1 000 births
- Perinatal mortality rate (stillbirths plus deaths <8 days old per 1 000 total births) [per 1 000 total births]: The number of perinatal deaths per 1 000 births. The perinatal period starts at the beginning of foetal viability (28 weeks' gestation or 1 000g) and ends at the end of the 7th day after delivery. Perinatal deaths are the sum of stillbirths plus early neonatal deaths. These are divided by total births (live births plus stillbirths).
- Stillbirth in facility rate [per 1 000 births]: Stillbirths in facility per 1 000 total births in a facility.
- Teenage pregnancy [Percentage]: Percentage of women aged 15-19 who are mothers or who have ever been pregnant.

Figure 29. Diarrhoea with dehydration in child under 5 years incidence (national), January 2020 - March 2022



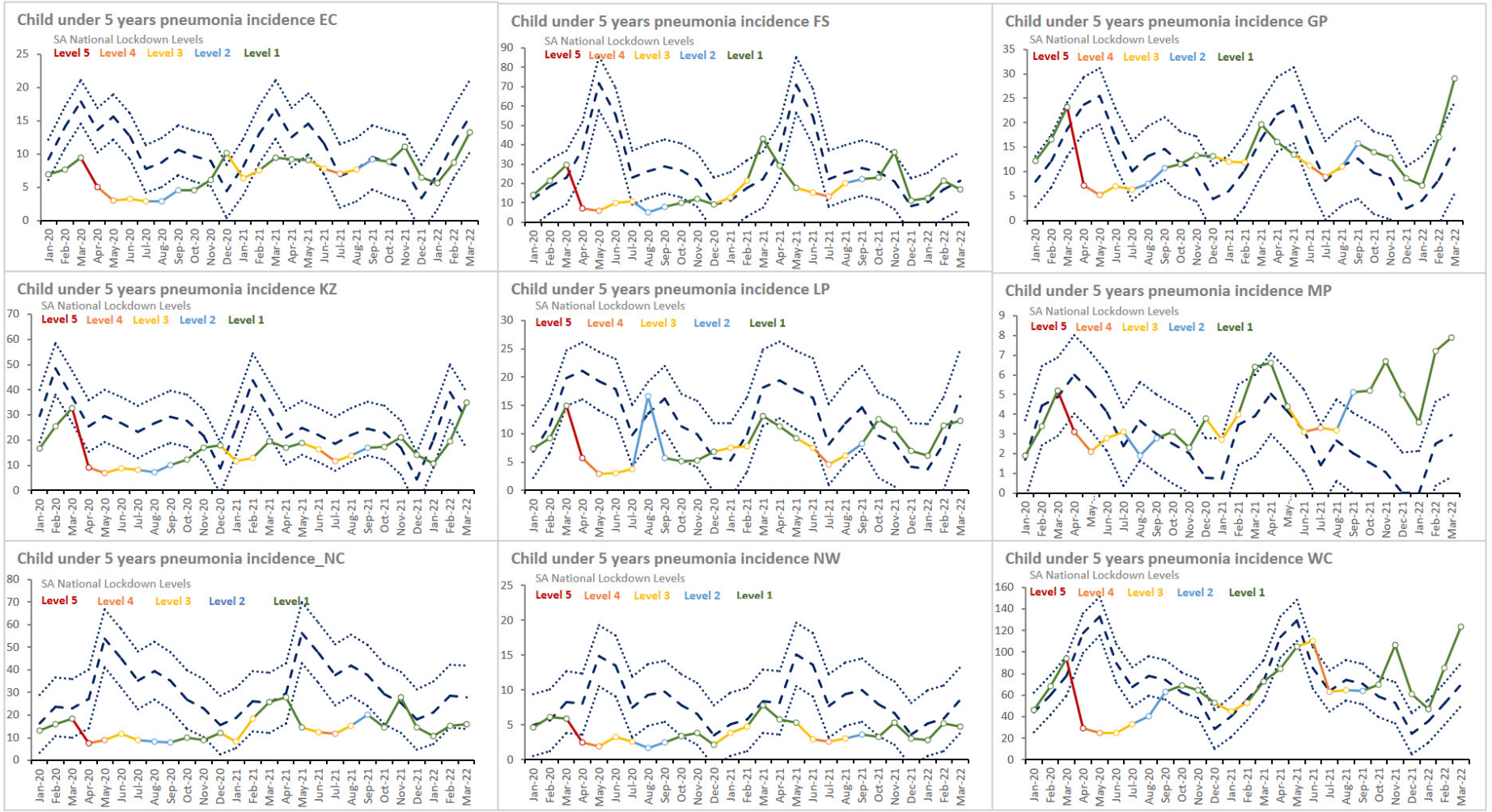
Source: webDHIS[10]

Figure 26. Immunisation under 1 year coverage by province, January 2020 - March 2022



Source: webDHIS[10]

Figure 28. Child under 5 years pneumonia incidence per province, January 2020 - March 2022

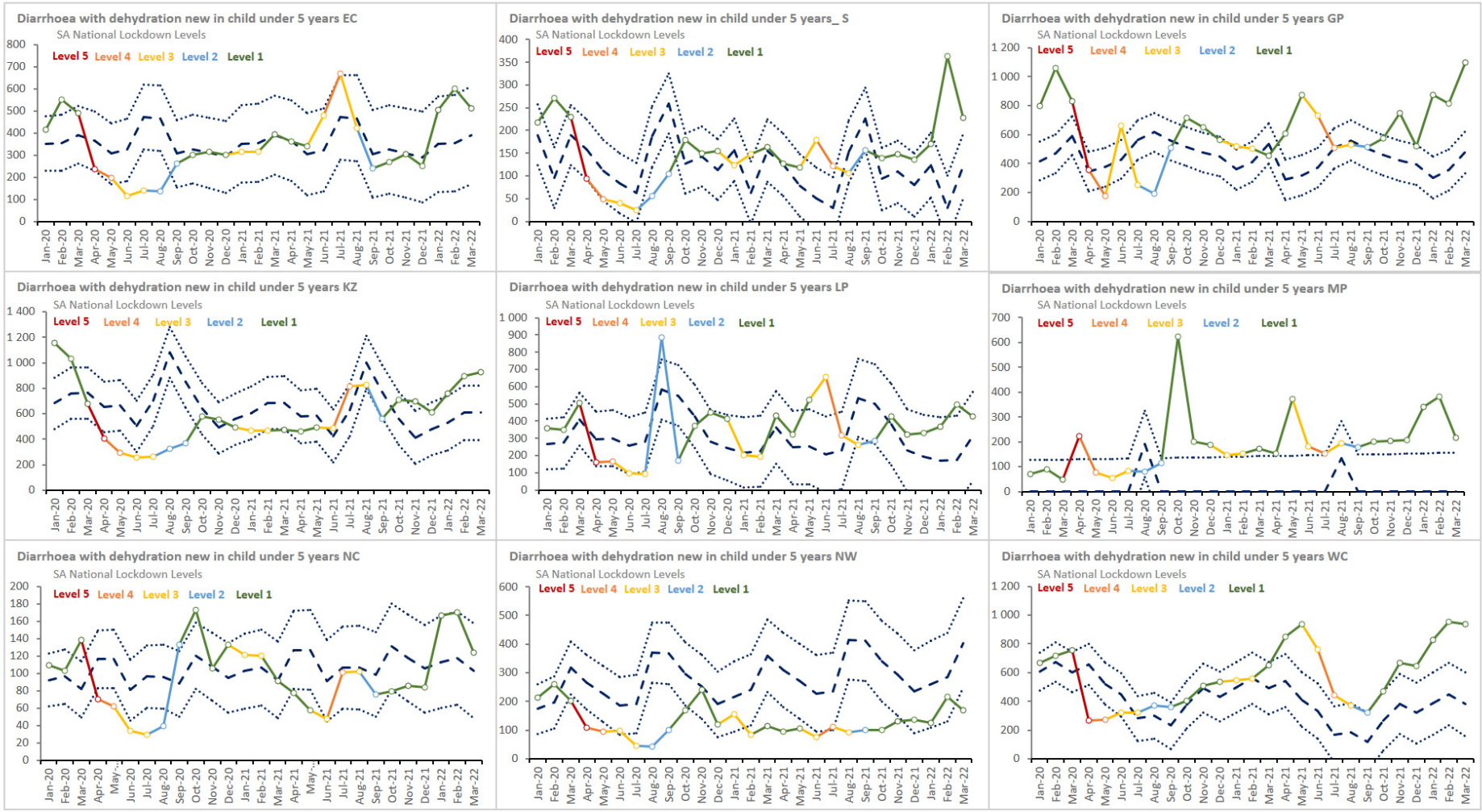


Source: webDHIS[10]

Table 3. Population estimates under 1 year of age by district, 2022/23

Province	District	Female under 1 year	Male under 1 year	Population under 1
EC	BUF: Buffalo City MM	5382	5523	10905
	DC10: Sarah Baartman DM	3587	3622	7209
	DC12 : Amathole DM	7308	7535	14843
	DC13: C Hani DM	6628	6815	13443
	DC14: Joe Gqabi DM	3081	3133	6214
	DC15: OR Tambo DM	19849	20403	40252
	DC44: A Nzo DM	10992	11181	22173
	NMA : N Mandela Bay MM	8078	8095	16173
FS	DC16: Xhariep DM	1268	1287	2555
	DC18: Lejweleputswa DM	5325	5328	10653
	DC19: T Mofutsanyana DM	7232	7336	14568
	DC20: Fezile Dabi DM	4021	4078	8099
	MAN : Mangaung MM	7092	7389	14481
GP	DC42: Sedibeng DM	7298	7556	14854
	DC48: West Rand DM	7410	7706	15116
	EKU : City of Ekurhuleni MM	34209	34970	69179
	JHB : Johannesburg MM	48794	49799	98593
	TSH : Tshwane MM	31681	32573	64254
KZ	DC21: Ugu DM	9322	9446	18768
	DC22: uMgungundlovu DM	11349	11575	22924
	DC23: uThukela DM	8324	8626	16950
	DC24: uMzinyathi DM	7835	8165	16000
	DC25: Amajuba DM	6343	6555	12898
	DC26: Zululand DM	11007	11400	22407
	DC27: uMkhanyakude DM	8805	8941	17746
	DC28: King Cetshwayo DM	11216	11552	22768
	DC29: iLembe DM	7699	7856	15555
	DC43: Harry Gwala DM	6243	6374	12617
	ETH : eThekwini MM	37009	38396	75405
LP	DC33: Mopani DM	12416	12951	25367
	DC34: Vhembe DM	14902	15513	30415
	DC35: Capricorn DM	13361	13909	27270
	DC36: Waterberg DM	6623	6863	13486
	DC47: Sekhukhune DM	14107	14653	28760
MP	DC30: G Sibande DM	12643	12883	25526
	DC31: Nkangala DM	14498	14931	29429
	DC32: Ehlanzeni DM	19827	20302	40129
NC	DC6 : Namakwa DM	928	916	1844
	DC7 : Pixley Ka Seme DM	2090	2141	4231
	DC8 : ZF Mgcawu DM	2548	2524	5072

Figure 30. Diarrhoea with dehydration in child under 5 years incidence, per province, January 2020 - March 2022



Source: webDHIS[10]

Table 15. Child health indicators by province, 2018- 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
BCG coverage	2020	UNICEF	86,0										a
	2021	both sexes WHO/ UNICEF	86,0										b
	2020/21	both sexes DHIS	88,4	68,0	93,2	102,5	73,0	93,2	98,7	106,7	65,3	94,9	c
	2021/22	both sexes DHIS	87,6	84,6	96,1	95,0	83,7	93,5	84,7	88,3	55,6	97,2	c
Child under 5 years diarrhoea with dehydration incidence	2018/19	both sexes DHIS	7,1	4,9	9,2	5,9	7,9	8,0	2,7	8,5	5,6	14,0	c
	2019/20	both sexes DHIS	7,0	6,5	8,7	5,8	8,0	6,9	1,3	9,4	6,4	11,9	c
	2021/22	both sexes DHIS	7,3	7,2	7,7	6,4	6,6	7,3	5,9	9,3	3,6	14,6	c
Child under 5 years pneumonia incidence	2019/20	both sexes DHIS	23,6	10,3	32,2	16,8	28,9	14,2	4,0	27,7	8,4	80,8	c
	2020/21	both sexes DHIS	12,6	5,5	13,1	10,5	11,6	5,8	3,3	12,3	3,4	48,1	c
	2021/22	both sexes DHIS	19,1	8,7	19,9	13,7	17,6	8,9	5,1	16,7	4,0	82,0	c
Child under 5 years severe acute malnutrition incidence	2019/20	both sexes DHIS	1,9	0,8	5,9	1,5	1,9	1,1	0,8	8,3	4,3	1,7	c
	2020/21	both sexes DHIS	1,5	1,3	4,1	1,1	1,3	1,5	0,7	5,6	2,1	1,0	c
	2021/22	both sexes DHIS	2,0	2,0	5,5	1,6	1,6	2,2	1,0	6,1	2,7	1,3	c
Diarrhoea case fatality under 5 years rate	2019/20	both sexes DHIS	1,8	2,8	0,9	1,7	1,7	2,8	2,1	1,5	2,8	0,2	c
	2020/21	both sexes DHIS	2,6	4,0	2,7	2,7	2,6	3,8	2,5	2,3	2,7	0,2	c
	2021/22	both sexes DHIS	1,8	3,4	2,3	1,8	1,8	2,4	1,9	2,1	2,3	0,3	c
DTaP-IPV-Hib-HBV 3rd dose coverage	2019/20	both sexes DHIS	84,5	69,8	83,0	90,3	82,3	93,3	90,9	100,5	62,3	96,1	c
	2020/21	both sexes DHIS	82,7	67,2	79,8	90,2	78,6	79,0	95,7	93,7	72,9	98,3	c
	2021/22	both sexes DHIS	87,6	87,1	86,2	88,0	83,9	105,6	90,7	80,9	64,1	92,5	c
DTaP-IPV-Hib-HBV 4th dose coverage	2018/19	both sexes DHIS	65,5	56,2	61,3	67,9	68,2	66,5	67,1	74,7	55,8	71,8	c
	2019/20	both sexes DHIS	65,5	59,4	63,8	68,2	65,6	65,9	70,5	78,1	47,3	75,7	c
	2021/22	both sexes DHIS	69,5	69,3	70,2	69,9	71,3	72,9	66,2	62,4	49,0	80,0	c
DTP3 coverage	2020	both sexes WHO	84,0										d
	2021	both sexes WHO/ UNICEF	86,0										b

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Immunisation under 1 year coverage	2019/20	both sexes DHIS	83,5	76,0	77,4	86,9	91,4	73,6	96,6	89,0	63,0	84,9	c
	2020/21	both sexes DHIS	79,5	69,5	75,9	85,0	86,4	60,6	91,5	79,9	71,2	85,0	c
	2021/22	both sexes DHIS	85,5	88,7	83,6	88,0	94,8	69,2	97,3	72,8	62,8	83,2	c
Infant mortality rate (deaths under 1 year per 1 000 live births)	2019	RMS	27,0										e
	2020	both sexes <1 year mid-year	23,6										f
		RMS	21,0										e
	2021	both sexes mid-year	24,1										g
Measles 1st dose under 1 year coverage	2020	UNICEF	84,0										a
	2021	both sexes WHO/ UNICEF	87,0										b
	2020/21	both sexes DHIS	85,9	69,3	83,6	88,3	79,0	89,4	96,3	93,9	73,8	99,3	c
	2021/22	both sexes under 1 year DHIS	88,5	88,1	89,6	88,8	84,0	95,6	97,8	81,8	73,5	94,5	c
Measles 2nd dose coverage	2020	WHO/UNICEF	76,0										h
	2021	both sexes WHO/ UNICEF	82,0										b
	2020/21	both sexes DHIS	76,4	66,7	73,3	77,8	80,6	76,3	84,2	83,5	65,0	80,6	c
	2021/22	both sexes DHIS	84,0	83,3	77,5	83,2	91,3	83,2	91,6	72,2	71,5	79,2	c
Number of under-5 deaths	2019	GBD	38 500										i
		UNICEF	41 000										a
OPV 1st dose coverage	2020	UNICEF	84,0										a
	2021/22	both sexes DHIS	72,7	88,7	88,7	77,5	77,7	87,8	80,3	81,1	69,5		c
Orphanhood	2021	both sexes <18 years GHS double	2,4	3,9	3,0	1,5	3,2	2,4	1,9	1,6	0,8	1,7	c
		both sexes <18 years GHS maternal	2,2	2,3	2,7	1,6	2,8	2,1	3,1	2,9	2,6	0,9	c
		both sexes <18 years GHS paternal	7,0	9,0	8,0	5,8	7,6	5,3	7,4	4,6	8,8	6,2	c

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
PCV 3rd dose coverage	2020	both sexes WHO	83,0										d
	2021	both sexes WHO/ UNICEF	87,0										b
	2020/21	both sexes DHIS	82,3	70,4	77,6	86,9	86,8	73,5	91,9	86,3	75,6	91,7	c
	2021/22	both sexes DHIS	89,6	89,6	83,9	88,5	95,2	94,1	95,8	76,0	69,1	89,2	c
Pneumonia case fatality under 5 years rate	2020/21	both sexes DHIS	2,1	3,3	3,1	2,3	2,3	4,2	5,3	2,1	3,2	0,2	c
	2021/22	both sexes DHIS	1,7	3,3	3,2	1,5	2,2	2,3	2,2	3,0	2,3	0,2	c
Pneumonia death under 5 years	2019/20	both sexes DHIS	806	139	44	116	192	154	66	24	42	29	c
	2020/21	both sexes DHIS	621	98	26	98	148	109	74	16	32	20	c
	2021/22	both sexes DHIS	690	117	44	98	196	89	36	40	44	26	c
RV 2nd dose coverage	2020	UNICEF	83,0										a
	2021	both sexes WHO/ UNICEF	85,0										b
	2020/21	both sexes DHIS	83,2	67,4	78,7	91,4	77,5	71,2	97,7	93,1	76,4	95,3	c
	2021/22	both sexes DHIS	86,7	87,2	87,7	88,7	83,3	92,7	92,7	80,5	69,9	90,4	c
Severe acute malnutrition case fatality under 5 years rate	2019/20	both sexes DHIS	7,8	9,9	6,0	6,4	7,6	7,9	10,6	4,7	11,8	1,5	c
	2020/21	both sexes DHIS	7,3	8,6	3,2	7,7	10,5	8,0	16,0	5,0	4,9	2,2	c
	2021/22	both sexes under 5 years DHIS	7,9	9,7	8,6	7,7	10,4	6,2	10,9	5,9	6,6	2,4	c
Under 5 mortality rate (deaths under 5 years per 1 000 live births)	2020	both sexes WHO	32,0										b
		both sexes mid-year	34,1										f
		RMS	28,0										e
	2021	both sexes mid-year	30,8										g
Vaccine expenditure per population under 1 year	2019/20	all programs real 2021/22 prices	2 376	3 182	2 387	2 843	2 400	2 196	2 550	731	1 103	1 586	j
	2020/21	all programs real 2021/22 prices	2 522	2 695	3 197	2 785	2 694	2 528	2 642	184	1 907	1 860	j
	2021/22	all programs real	2 399	2 740	2 482	2 591	2 421	2 338	2 632	122	2 666	1 641	j

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		2021/22 prices											

Reference notes

a SWChildren 2021.[47]
b Immunization 2022.[85]
c webDHIS.[10]
d World Health Statistics 2022.[32]
e RMS 2019 & 2021.[46]
f Stats SA MYE 2020.[13]
g Stats SA MYE 2021.[12]
h Immunization 2021.[86]
i GBD 2021 Child Health.[79]

Definitions

- Number of under-5 deaths [Number]: The estimated number of deaths in children younger than 5 years.
- Pneumonia death under 5 years [Number]: A child under 5 years who died in a health facility where pneumonia was documented as the main cause of death
- BCG coverage [Percentage]: The proportion of expected live born babies that received BCG under 1 year of age (note: usually given immediately after birth).
- Child mortality (deaths between 1-4 years per 1 000 live births) [per 1 000 live births]: The number of children aged 12 months to 5 years (i.e. to the end of the 4th year) who die in a year, per 1 000 live births.
- Child under 5 years diarrhoea with dehydration incidence [Cases per 1 000 children]: Children under 5 years newly diagnosed with diarrhoea with dehydration per 1 000 children under 5 years in the population.
- Child under 5 years pneumonia incidence [Cases per 1 000 children]: Children under 5 years newly diagnosed with pneumonia per 1 000 children under 5 years in the population.
- Child under 5 years severe acute malnutrition incidence [Cases per 1 000 children]: Children under 5 years newly diagnosed with severe acute malnutrition per 1 000 children under 5 years in the population.
- Diarrhoea case fatality under 5 years rate [Percentage]: Diarrhoea deaths in children under 5 years as a proportion of diarrhoea separations under 5 years in health facilities.
- Diarrhoea incidence under 5 years [Cases per 1 000 children]: Children with diarrhoea per 1 000 children in the catchment population. Diarrhoea is formally defined as 3 or more watery stools in 24 hours, but any episode diagnosed and/or treated as diarrhoea after an interview with the adult accompanying the child.
- DTaP-IPV-Hib-HBV 3rd dose coverage [Percentage]: Children under 1 year who received DTaP-IPV-Hib-HBV 3rd dose, normally at 14 weeks as a proportion of population under 1 year. Both Pentaxim and Hexavalent will form part of the numerator to ensure accurate coverage of historical data.
- DTaP-IPV-Hib-HBV 4th dose coverage [Percentage]: Children under 2 years who received DTaP-IPV-Hib-HBV 4th dose, normally at 18 months as a proportion of the 1 year population. Both Pentaxim and Hexavalent will form part of the numerator to ensure accurate coverage of historical data.
- DTP3 coverage [Percentage]: The proportion of children who received their third DTP doses (normally at 14 weeks).
- Immunisation under 1 year coverage [Percentage]: The proportion of all children in the target area under one year who complete their primary course of immunisation. A Primary Course includes BCG, OPV 1, 2 & 3, DTP-Hib 1, 2 & 3, HepB 1, 2 & 3, and 1st measles (usually at 9 months).
- Infant mortality rate (deaths under 1 year per 1 000 live births) [per 1 000 live births]: The number of children less than one year old who die in a year, per 1 000 live births during that year.
- Measles 1st dose under 1 year coverage [Percentage]: Children under 1 year who received measles 1st dose, as a proportion of population under 1 year.
- Measles 1st to 2nd drop-out rate [Percentage]: The percentage of children who dropped out between the first and the second dose of the measles vaccine.
- Measles 2nd dose coverage [Percentage]: Children 1 year (12 months) who received measles 2nd dose, as a proportion of the 1 year population.
- OPV 1st dose coverage [Percentage]: The proportion of children under 1 immunised with OPV dose 1.
- Orphanhood [Percentage]: Proportion of children under 18 years whose biological mother, biological father or both parents have died.
- PCV 3rd dose coverage [Percentage]: Children under 1 year who received PCV 3rd dose, normally at 9 months as a proportion of population under 1 year.
- Percentage of children under 5 years of age with suspected pneumonia taken to a health facility [Percentage]: Percentage of children under 5 years of age with suspected pneumonia (cough and difficult breathing NOT due to a problem in the chest and a blocked nose) in the two weeks preceding the survey taken to an appropriate health facility or provider.
- Pneumonia case fatality under 5 years rate [Percentage]: Pneumonia deaths in children under 5 years as a proportion of pneumonia separations under 5 years in health facilities.
- Post-neonatal mortality rate (deaths 28-365 days age per 1 000 live births) [per 1 000 live births]: Number of deaths occurring between 28 and 365 days after birth per 1 000 live births in the same period.
- RV 2nd dose coverage [Percentage]: Children under 1 year who received RV 2nd dose as a proportion of children under 1 year.
- Severe acute malnutrition case fatality under 5 years rate [Percentage]: Severe acute malnutrition deaths in children under 5 years as a proportion of severe acute malnutrition (SAM) under 5 years in health facilities.
- Under 5 mortality rate (deaths under 5 years per 1 000 live births) [per 1 000 live births]: The number of children under 5 years who die in a year, per 1 000 live births during the year. It is a combination of the infant mortality rate, plus the age 1-4 mortality rate.
- Vaccine expenditure per population under 1 year [Rand per population U1 (real prices)]: Provincial expenditure on vaccines per population under 1 year.

Table 16. Non-communicable disease indicators by province, 2019 - 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Diabetes client treatment new 18 - 44 years	2020/21	both sexes DHIS	259093	45278	3076	44351	9835	90762	27866	4137	30251	3537	a
	2021/22	both sexes DHIS	187508	22584	2305	39389	9410	85658	10535	4837	9246	3544	a
Diabetes client treatment new 45 years and older	2020/21	both sexes DHIS	207372	29533	4451	42830	14607	61984	24236	3298	17863	8570	a
	2021/22	both sexes DHIS	151682	16137	3630	37524	16883	45315	12105	2102	9143	8843	a
Diabetes new client 18 years and older detection rate	2020/21	both sexes DHIS	1,2	1,8	0,4	0,8	0,3	4,1	1,7	0,9	1,8	0,2	a
	2021/22	both sexes DHIS	0,8	0,9	0,3	0,7	0,4	3,5	0,7	0,8	0,7	0,2	a
Diabetes prevalence	2021	both sexes 20-79 years Diabetes Atlas	11,3										b
Hypertension client treatment new 18-44 years	2020/21	both sexes DHIS	258695	29824	5509	34966	32821	98682	32678	4273	12282	7660	a
	2021/22	both sexes DHIS	189992	20156	4935	29891	34250	69786	11607	3518	7580	8269	a
Hypertension client treatment new 45 years and older	2020/21	both sexes DHIS	274116	33934	11341	61379	21811	63485	35112	8014	18139	20901	a
	2021/22	both sexes DHIS	222870	22422	9208	61842	24707	44469	20105	8734	9902	21481	a
Hypertension new client 18 years and older detection rate	2020/21	both sexes DHIS	1,30	1,50	0,90	0,90	0,80	4,40	2,20	1,50	1,10	0,60	a
	2021/22	both sexes DHIS	1,00	1,00	0,70	0,80	0,80	3,00	1,00	1,40	0,60	0,60	a
Mental disorders treatment rate new	2020/21	both sexes DHIS	0,14	0,06	0,18	0,22	0,04	0,47	0,06	0,05	0,03		a
	2021/22	both sexes DHIS	0,06	0,07	0,03	0,06	0,05	0,20	0,02	0,06	0,01		a
Mental Health Quotient	2021	MHQ	46,0										c
Mental health separation rate	2019/20	DHIS	2,8	2,2	10,5	1,2	2,5	2,1	1,3	1,6	1,7	3,5	a
	2021/22	both sexes DHIS	3,8	2,4	20,1	1,9	2,3	2,4	1,7	1,5	1,9	4,3	a
Mortality between 30-70 years from cardiovascular, cancer, diabetes or chronic respiratory disease	2019	both sexes WHO	24,1										d
Suicide mortality rate (per 100 000 population)	2019	both sexes WHO	23,5										d
Cancer incidence rate, by type of cancer (per 100 000 population)	2020	both sexes age-standardised NCR all cancers	209,5										e
		both sexes age-standardised NCR bladder	4,3										e
		both sexes age-standardised NCR breast	52,6										e
		both sexes age-standardised NCR cervix	35,3										e
		both sexes age-standardised NCR colorectal	14,6										e

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		both sexes age-standardised NCR Corpus uteri	8,0										e
		both sexes age-standardised NCR karposi sarcoma	6,1										e
		both sexes age-standardised NCR Liver	4,8										e
		both sexes age-standardised NCR lung	18,3										e
		both sexes age-standardised NCR Ovary	5,1										e
		both sexes age-standardised NCR prostate	68,3										e
		female age-standardised NCR all cancers	194,2										e
		male age-standardised NCR all cancers	242,1										e

Reference notes

a webDHIS.[10]
b IDF Diabetes Atlas 2021.[92]
c MHQ 2021.[93]
d World Health Statistics 2022.[32]
e GLOBOCAN 2020.[81]

Definitions

- The MHQ provides an aggregate metric of wellbeing. An aggregate mental wellbeing score based on these aspects (the MHQ) positions individuals on a spectrum from Distressed to Thriving. The positive range of the scale represents the spectrum of normal functioning, and is a 200-point scale calibrated to a mean of 100 based on pre-pandemic responses in 2019, similar to the IQ scale. The negative range of the scale represents mental wellbeing scores associated with a negative impact on the ability to function and is associated with clinical level risks and challenges mental wellbeing (the MHQ) as well as multiple dimensional views.
- Diabetes client treatment new 18-44 years [Number]: Newly diagnosed clients 18-44 years with a fasting blood glucose of >7mmol/L or random blood glucose >11.1mol/L.
- Diabetes client treatment new 45 years and older [Number]: Newly diagnosed clients 45 years and older with a fasting blood glucose of >7mmol/L or random blood glucose >11.1mol/L.
- Diabetes prevalence [Percentage]: Percentage of people with diabetes.
- Hypertension client treatment new 18-44 years [Number]: Total number of new hypertension clients 18 - 44 years put on treatment.
- Hypertension client treatment new 45 years and older [Number]: Total number of new hypertension clients 45 years and older put on treatment.
- Age-standardised prevalence of non-raised blood pressure (index) [Scale 0-100]: Percentage of population 15 years and older with non-raised blood pressure, regardless of treatment status, age-standardised (Census 2011 population).
- Diabetes new client 18 years and older detection rate [Percentage]: Newly diagnosed clients 18 years and older with a fasting blood glucose of >7mmol/L or random blood glucose >11.1mol/L. initiated on treatment.
- Diabetes new client 40 years and older detection rate [Percentage]: Newly diagnosed clients with a fasting blood glucose of >7mmol/L or random blood glucose >11.1mol/L initiated on treatment.
- Hypertension new client 18 years and older detection rate [Percentage]: Newly diagnosed clients, >18 years, with a BP >140/90mmHg.
- Mental disorders treatment rate new [Percentage]: Clients treated for mental disorders (depression, anxiety, dementia, psychosis, mania, suicide, developmental disorders, behavioural disorders and substance use) as a proportion of total PHC headcount.
- Mental health admission rate [Percentage]: Proportion of clients admitted/separated for mental health problems. Inpatient separations are the total of day clients, inpatient discharges, inpatient deaths and inpatient transfers out.
- Mental health separation rate [Percentage]: Proportion of clients admitted for mental health problems. Inpatient separations is the total of inpatient discharges, inpatient deaths and inpatient transfers out.
- Mortality between 30-70 years from cardiovascular, cancer, diabetes or chronic respiratory disease [Percentage]: Unconditional probability of dying between exact ages 30 and 70 from any of cardiovascular disease, cancer, diabetes, or chronic respiratory disease.
- Suicide mortality rate (per 100 000 population) [per 100 000 population]: Suicide rate per 100 000 population in a specified period (age-standardised).
- Cancer incidence rate, by type of cancer (per 100 000 population) [per 100 000 population]: Number of new cancers of a specific site/type occurring per 100 000 population.

Province	District	Female under 1 year	Male under 1 year	Population under 1
	DC9 : Frances Baard DM	3963	4083	8046
	DC45: JT Gaetsewe DM	3025	3062	6087
NW	DC37: Bojanala Platinum DM	17818	18060	35878
	DC38: NM Molema DM	8620	8682	17302
	DC39: RS Mompati DM	5929	6105	12034
	DC40: Dr K Kaunda DM	7683	7754	15437
WC	CPT : Cape Town MM	34900	36470	71370
	DC1 : West Coast DM	3847	3929	7776
	DC2 : Cape Winelands DM	7848	8167	16015
	DC3 : Overberg DM	2583	2749	5332
	DC4 : Garden Route DM	4989	5202	10191
	DC5 : Central Karoo DM	578	594	1172
Total		**560113**	**575658**	**1135771**

Source: webDHIS[10]

Table 8. Number of excess natural deaths by province relative to revised predicted numbers, 2022

Region	Period	Excess deaths vs base	Excess deaths per 100000 population	Age standardised excess deaths per 100000
South Africa	3 May 20 - 10 Dec 22	339146	570	570
Eastern Cape	31 May 20 - 10 Dec 22	59139	899	724
Free State	21 Jun 20 - 10 Dec 22	19502	670	670
Gauteng	7 Jun 20 - 10 Dec 22	66564	427	469
KwaZulu-Natal	7 Jun 20 - 10 Dec 22	70009	612	704
Limpopo	21 Jun 20 - 10 Dec 22	37990	643	563
Mpumalanga	21 Jun 20 - 10 Dec 22	26013	541	583
Northern Cape	28 Jun 20 - 10 Dec 22	10338	883	826
North West	28 Jun 20 - 10 Dec 22	18330	455	467
Western Cape	3 May 20 - 10 Dec 22	31260	443	390

Source: SA MRC.[44]

Table 17. Injury and risk behaviour indicators by province, 2018 -2021

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Mortality rate attributed to unintentional poisoning (per 100 000 population)	2019	both sexes WHO	1,7										a
Mortality rate due to homicides (per 100 000 population)	2018	both sexes SAPS	35,8										b
	2019	both sexes WHO	35,9										a
Road accident fatalities	2020	both sexes all ages RTMC	9 969	1 336	647	1 855	2 031	1 161	1 046	265	720	908	c
Road accident fatalities per 100 000 population	2018	both sexes all ages RTMC	22,3	25	33	17	22	27	29	28	25	16	d
	2019	both sexes WHO	22,2										a
		both sexes all ages RTMC	21,3	23,8	29,5	16,2	20,5	25,7	29,1	30,1	21,2	17,1	d
Prevalence of smoking	2020	both sexes 15 years and older WHO	20,3										a
Total alcohol per capita (age 15+ years) consumption (litres per year)	2019	both sexes WHO	9,5										a
Primary drug of abuse as % of all drugs of abuse	Jan-Jun 2021	both sexes <20 years SACENDU alcohol		12,0		10,8	8,2					9,5	e
		both sexes <20 years SACENDU cannabis		44,0		39,3	52,5					23,2	e
		both sexes <20 years SACENDU cocaine		4,0		3,2	1,9					0,4	e
		both sexes <20 years SACENDU heroin		0,0		22,2	19,6					18,3	e
		both sexes <20 years SACENDU mandrax		2,0		2,5	1,9					7,2	e
		both sexes <20 years SACENDU methamphetamine		14,0		12,7	8,2					39,5	e
	Jul-Dec 2021	both sexes <20 years SACENDU alcohol		3,3		4,1	1,5					2,8	e

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		both sexes <20 years SACENDU cannabis		58,2		49,0	56,9					84,3	e
		both sexes <20 years SACENDU cocaine				0,6	8,4					0,2	e
		both sexes <20 years SACENDU heroin				16,1	14,1					0,6	e
		both sexes <20 years SACENDU mandrax				1,5	1,1					2,1	e
		both sexes <20 years SACENDU methamphetamine		38,5		21,7	10,7					8,5	e

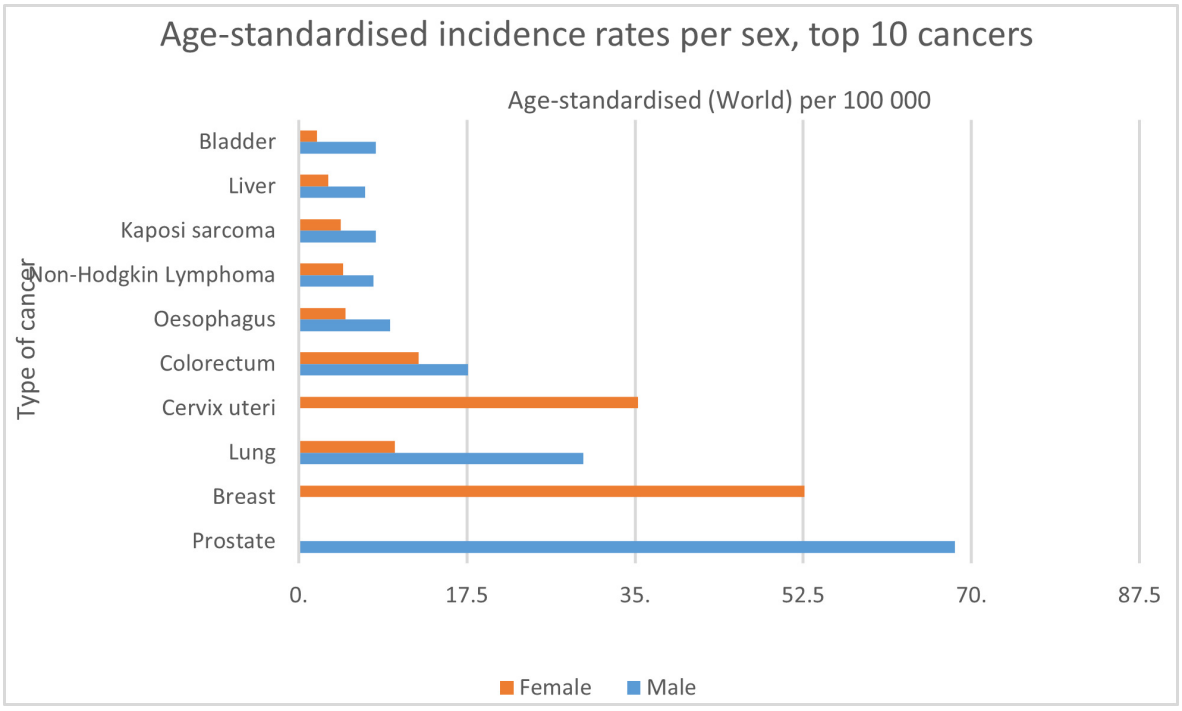
Reference notes

a World Health Statistics 2022.[32]
b SDG SA Report 2019.[98]
c Road Traffic Report 2020.[99]
d Road Traffic Report 2019.[100]
e SACENDU Phase 51.[97]

Definitions

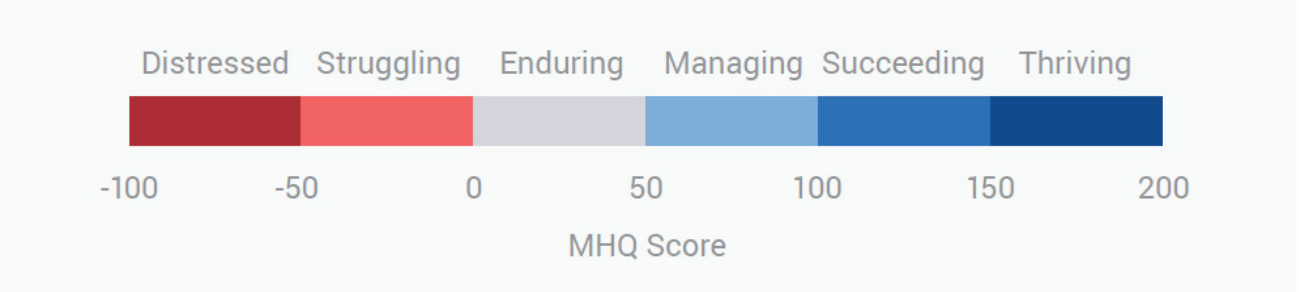
- Road accident fatalities [Number]: Number of people killed during or immediately after a crash, or death within 30 days after a crash happened as a direct result of such crash.
- Mortality rate attributed to unintentional poisoning (per 100 000 population) [per 100 000]:
- Mortality rate due to homicides (per 100 000 population) [per 100 000]
- Road accident fatalities per 100 000 population [per 100 000 population]: Number of fatalities due to road accidents per 100 000 population. WHO Core indicator is mortality rate from road traffic injuries (per 100 000 population) defined as: Number of road traffic fatal injury deaths per 100 000 population (age-standardised).
- Prevalence of smoking [Percentage]: Proportion of population who currently smoke.
- Primary drug of abuse as % of all drugs of abuse [Percentage]: Percentage breakdown of the primary drug of abuse reported by patients admitted to treatment centres that are part of the SACENDU sentinel surveillance system.

Figure 31. Age-standardised (world) incidence rates per sex for highest-incidence cancers in South Africa, 2020



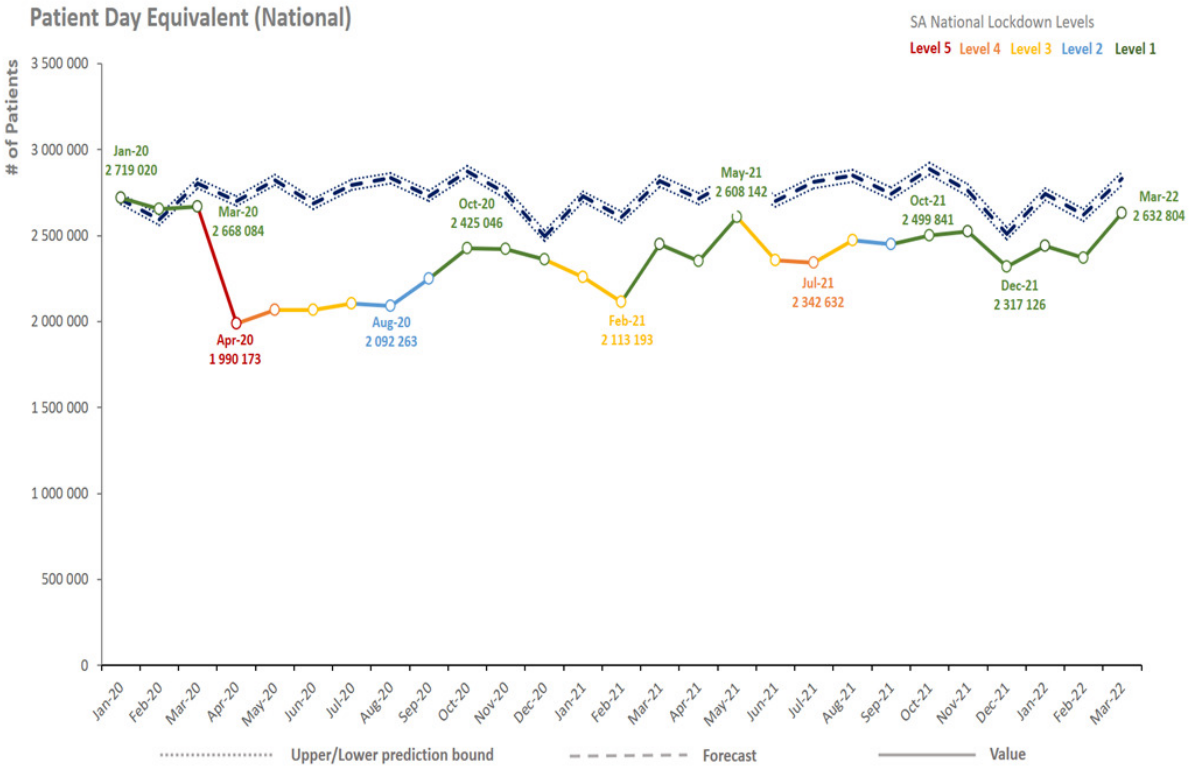
Source: Globocan, 2020.[81]

Figure 32. Mental Health Quotient assessment score range



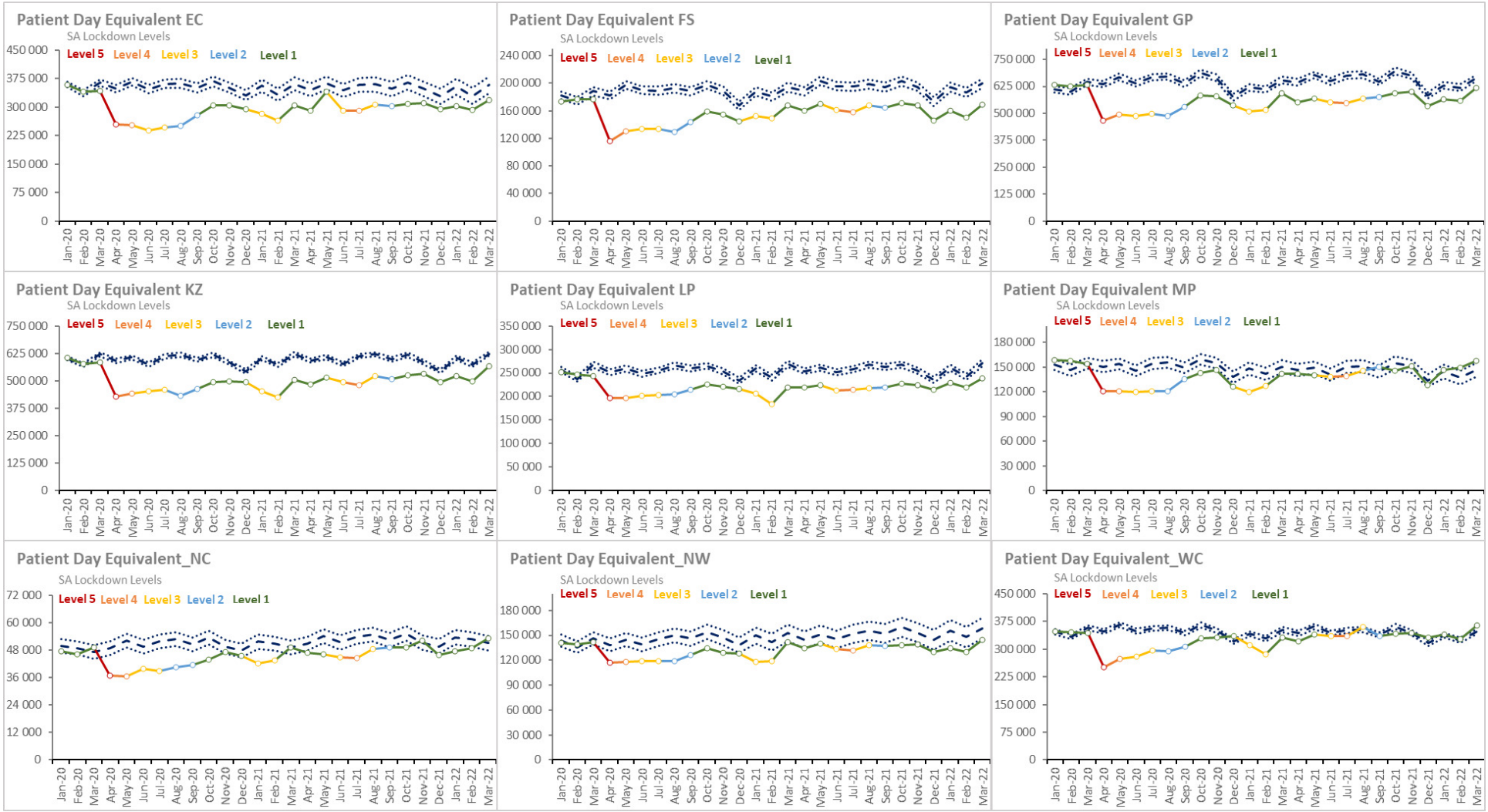
Source: Mental Health Million Project, 2022[93]

Figure 33. Patient-day equivalent (national), January 2020 – March 2022



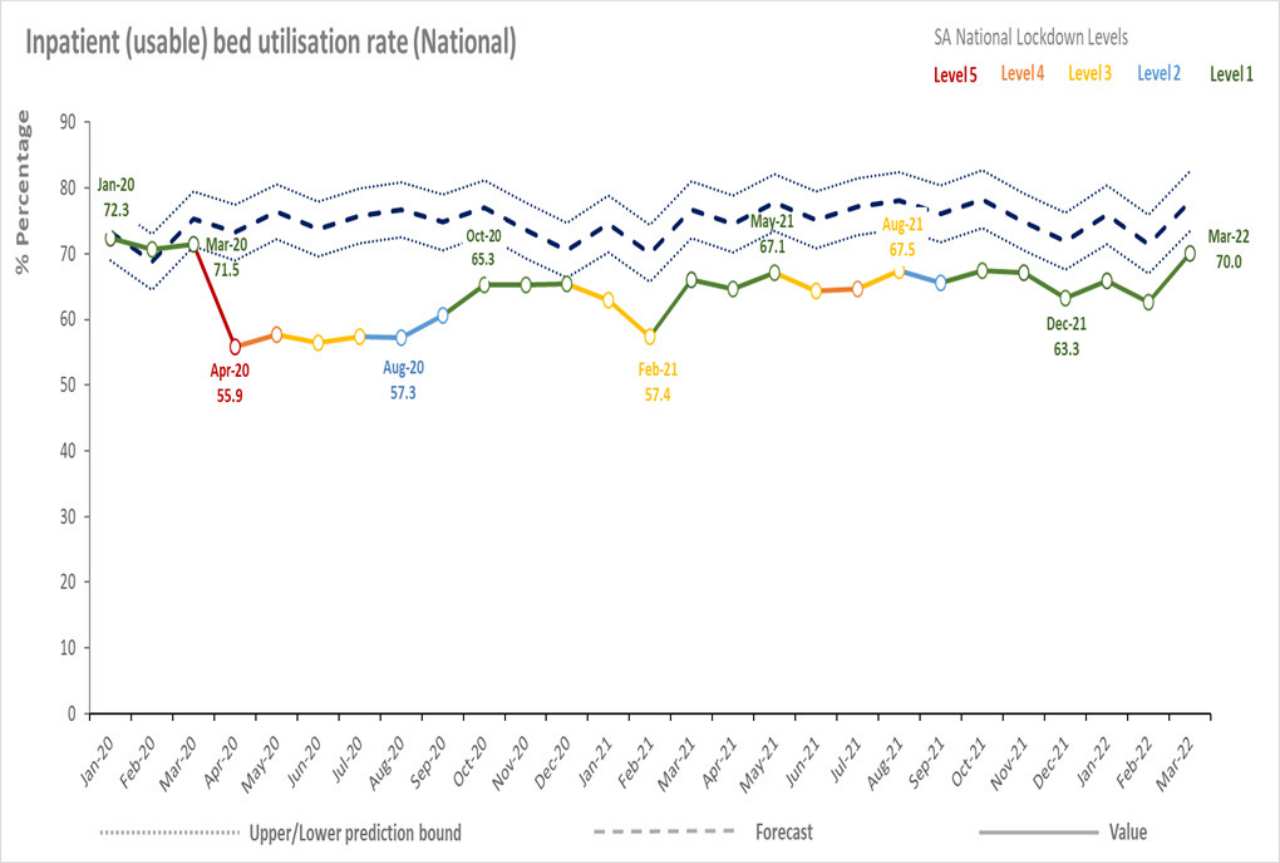
Source: webDHIS[10]

Figure 34. Patient-day equivalent by province, January 2020 – March 2022



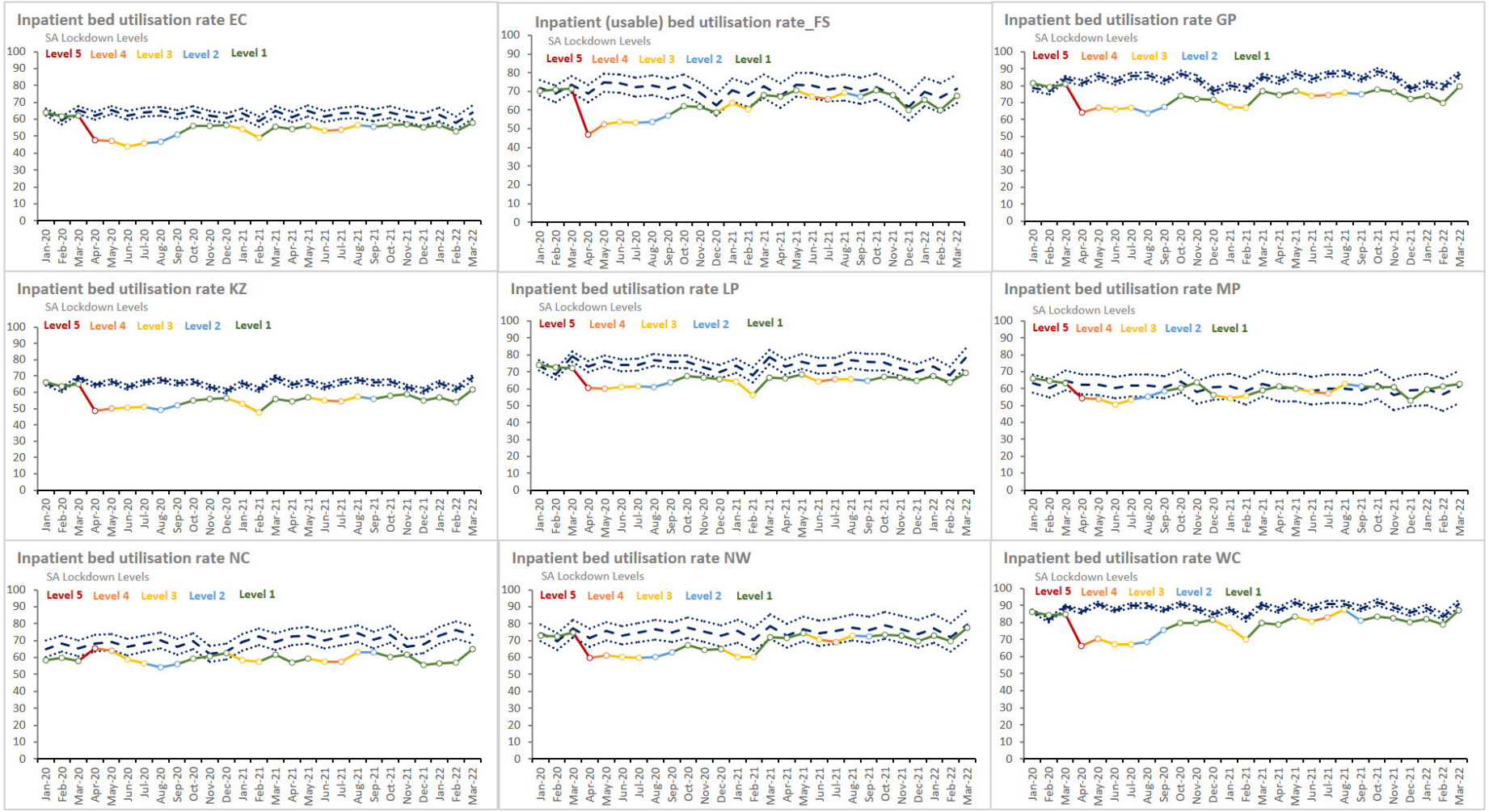
Source: webDHIS[10]

Figure 35. Inpatient bed utilisation rate (national), January 2020 – March 2022



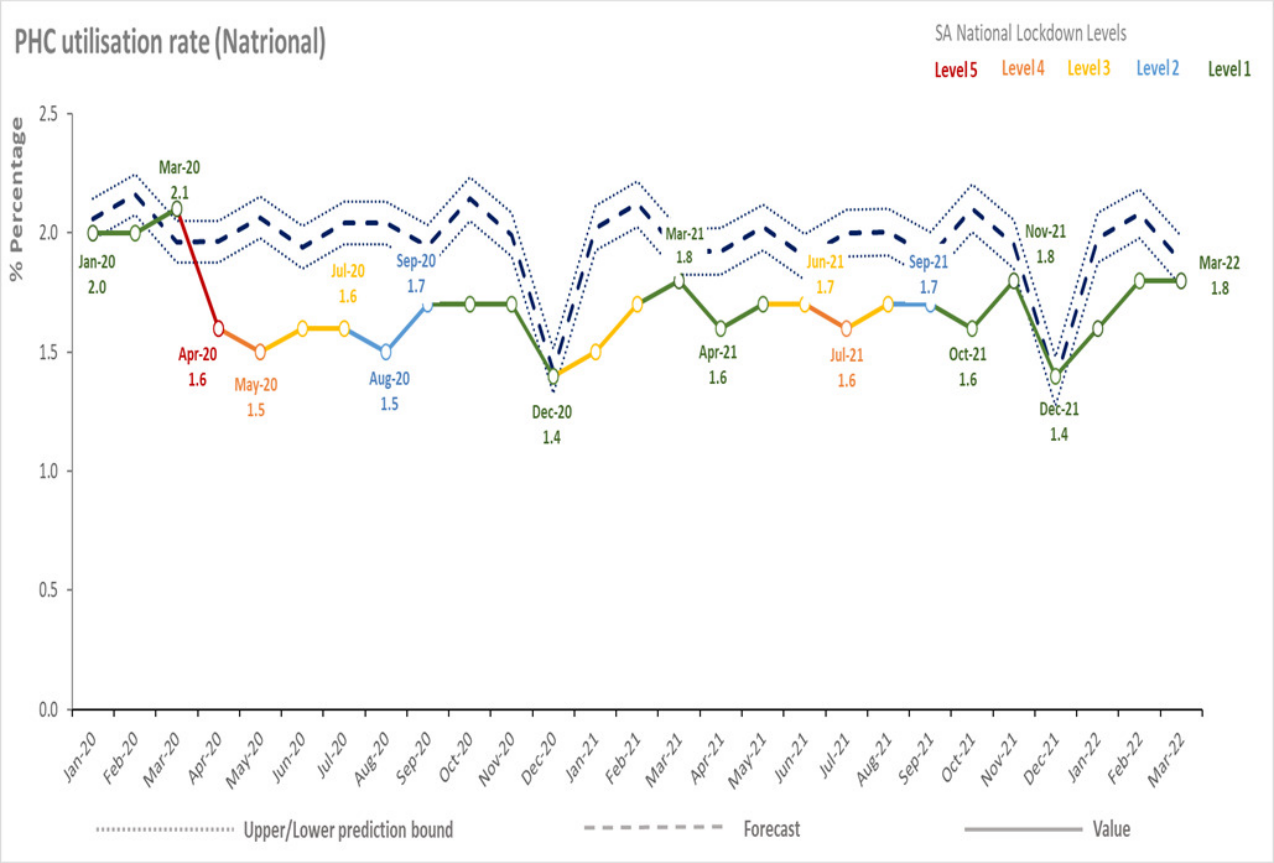
Source: webDHIS[10]

Figure 36. Inpatient bed utilisation rate by province, January 2020 – March 2022



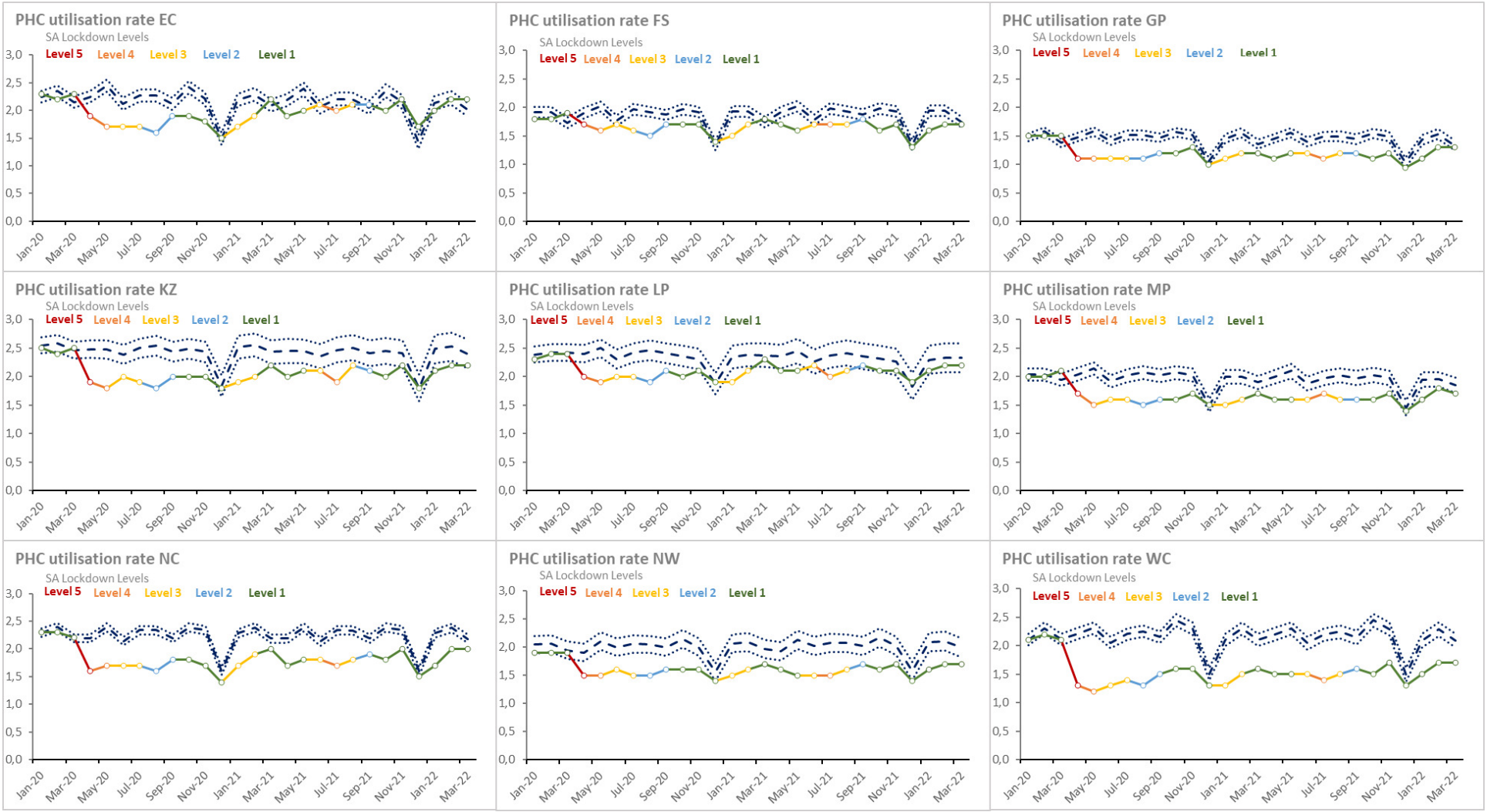
Source: webDHIS[10]

Figure 37. PHC utilisation rate (national), January 2020 – March 2022



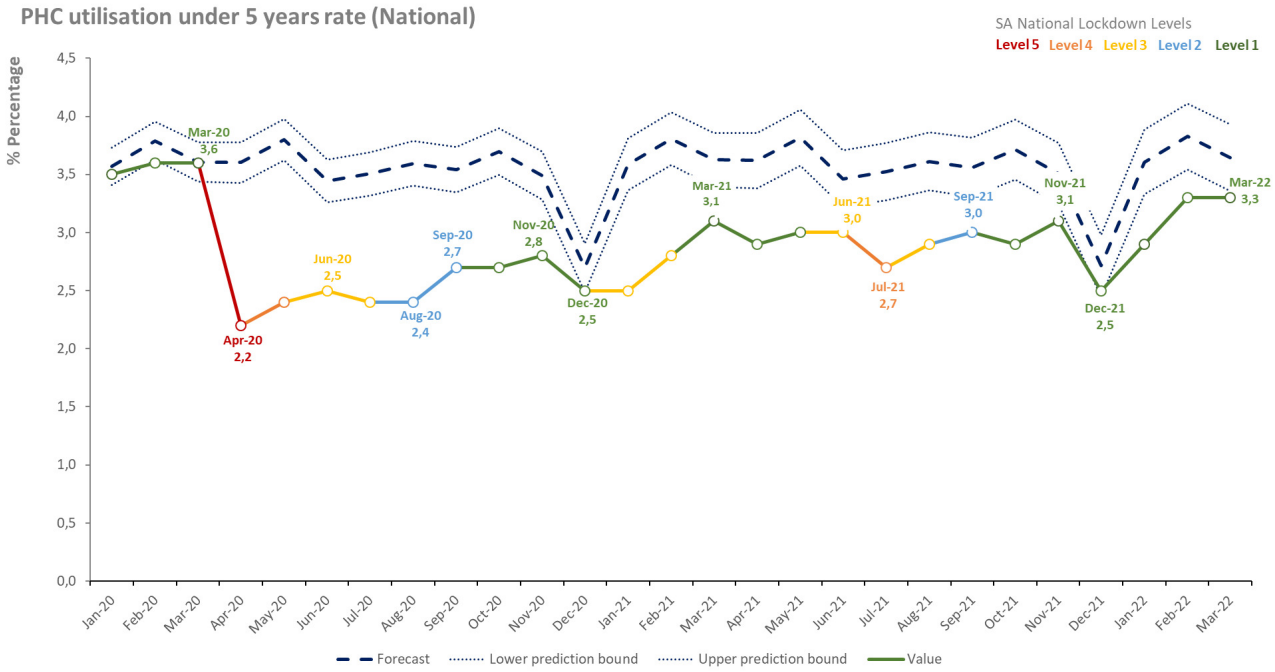
Source: webDHIS[10]

Figure 38. PHC utilisation rate by province, January 2020 – March 2022



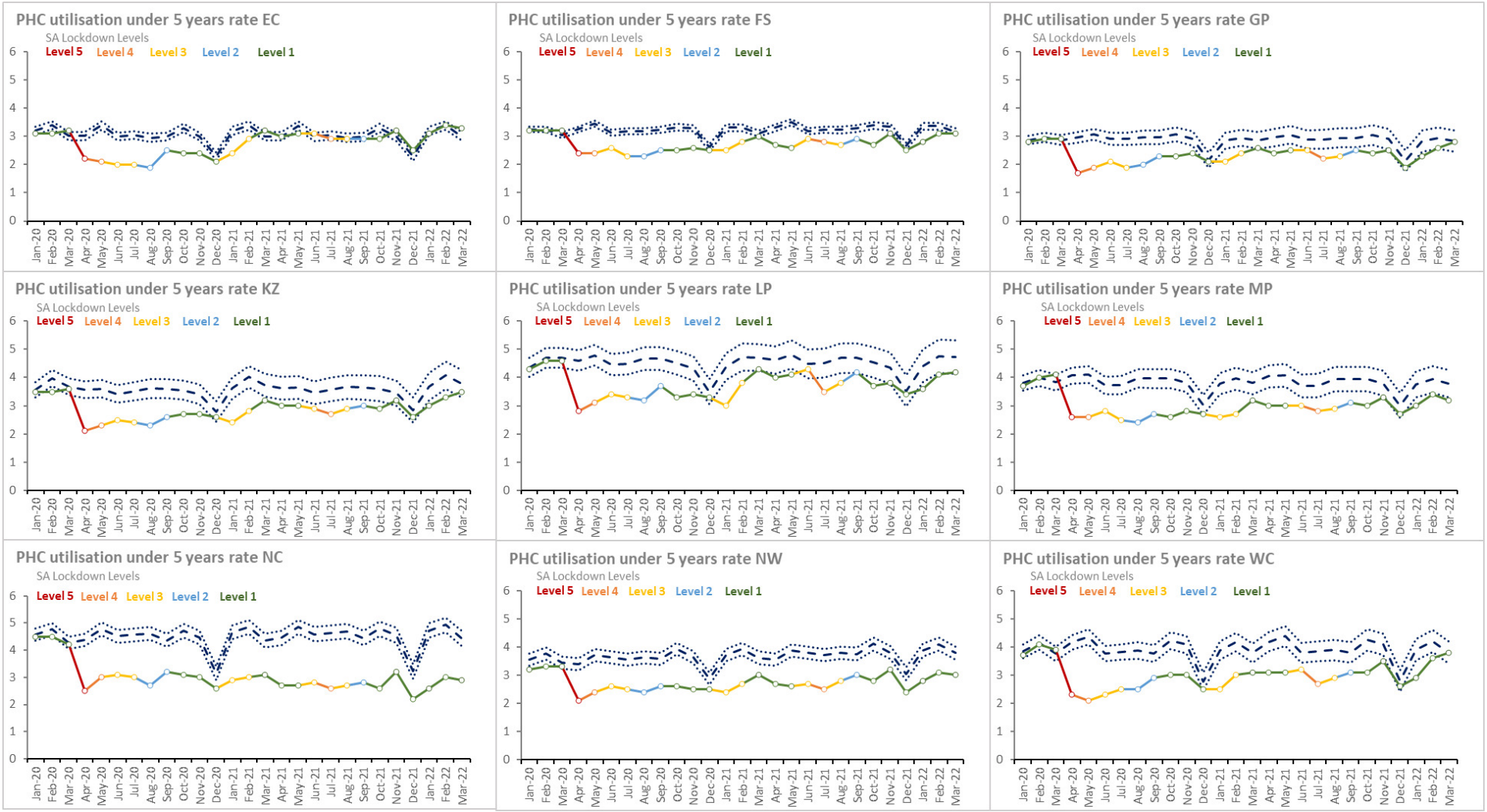
Source: webDHIS[10]

Figure 39. PHC utilisation under 5 years rate (national), January 2020 – March 2022



Source: webDHIS[10]

Figure 40. PHC utilisation under 5 years rate by province, January 2020 – March 2022



Source: webDHIS[10]

Table 18. Health services indicators by province, 2019 -2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Average length of stay - total	2019/20	DHIS	6,1	6,8	5,6	6,7	6,6	5,3	4,5	5,1	6,8	5,3	a
	2020/21	DHIS	5,9	6,3	5,7	6,9	6,3	5,1	4,2	5,2	6,0	5,6	a
	2021/22	DHIS	6,1	6,4	5,9	7,0	6,4	5,3	4,5	5,4	6,3	5,6	a
Average length of stay (district hospitals)	2019/20	DHIS	4,2	4,6	3,3	4,2	5,2	4,2	4,1	3,5	4,3	3,4	a
	2020/21	DHIS	4,1	4,4	3,0	4,3	4,9	4,0	3,9	3,0	4,0	3,5	a
	2021/22	DHIS	4,2	4,5	3,2	4,4	5,0	4,0	4,0	3,1	4,3	3,6	a
Complaints resolution rate	2019/20	DHIS	90,1	89,1	87,5	88,4	93,1	87,9	88,6	61,5	90,7		a
	2020/21	DHIS	89,3	89,4	89,5	85,4	93,7	92,0	85,6	83,5	95,4		a
	2021/22	DHIS	90,2	88,8	83,4	87,1	94,7	91,2	85,2		92,8		a
Complaints resolution rate within 25 working days	2019/20	DHIS	96,8	97,2	98,1	96,5	96,0	97,8	95,8	87,5	99,0		a
	2020/21	DHIS	95,1	97,6	91,4	96,2	95,1	97,7	96,4	89,1	97,5		a
	2021/22	DHIS	94,6	95,0	89,0	94,5	93,5	97,1	95,4		98,7		a
Death registration coverage	2018	both sexes 15 years and older vital registration	96,0										b
Inpatient bed utilisation rate - total	2019/20	DHIS	72,4	64,0	72,4	82,0	65,0	74,2	63,6	61,7	73,8	86,9	a
	2020/21	DHIS	60,7	50,8	57,1	70,7	51,9	63,1	57,4	62,0	63,6	73,7	a
	2021/22	DHIS	65,9	55,4	66,6	75,0	56,5	66,2	59,8	59,4	72,2	82,2	a
Inpatient bed utilisation rate (district hospitals)	2019/20	DHIS	64,8	54,5	57,7	70,2	59,2	72,9	67,0	53,6	62,8	90,4	a
	2020/21	DHIS	53,6	42,2	47,0	59,9	47,6	60,9	57,0	48,8	52,7	78,5	a
	2021/22	DHIS	57,3	46,0	51,5	63,7	50,2	62,6	58,7	43,4	59,3	90,0	a
Inpatient crude death rate	2019/20	both sexes DHIS	4,6	5,8	4,1	5,0	4,6	4,8	4,6	5,2	5,5	2,9	a
	2020/21	both sexes DHIS	5,7	7,7	5,4	6,3	5,8	5,2	4,7	5,8	5,8	4,2	a
	2021/22	both sexes DHIS	5,3	6,4	5,2	6,1	5,0	5,2	4,9	6,6	5,8	4,1	a
Inpatient deaths - total	2019/20	both sexes DHIS	179752	27472	12904	40064	35920	19216	11922	4306	10134	17814	a
	2020/21	both sexes DHIS	188814	30103	13068	41296	37118	18340	11642	3950	10802	22495	a
	2021/22	both sexes DHIS	187531	27206	13829	42653	33879	18500	11912	4914	10964	23674	a
International Health Regulations (IHR) core capacity index	2019	WHO	70,0										c
	2020	WHO	79,0										d
	2021	both sexes WHO	68,0										e
Number of beds	Mar 2022	DHIS District Hospital	30904	6040	1600	2806	4265	3006	8297	588	1235	3067	a
		DHIS National Central Hospital	10356	576	603	5956	846					2375	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
		DHIS Provincial Tertiary Hospital	10194	1772	588	2254	1586	1016	799	661	1236	282	a
		DHIS Regional Hospital	19820	2082	1230	4734	6824	1561	877	227	847	1438	a
		DHIS Specialised Psychiatric Hospital	10105	1286	760	1524	2447	969		178	1114	1827	a
		DHIS Specialised TB Hospital	2997	1143			321	89	417	44		983	a
		DHIS public sector	88556	13186	6525	17836	7900	5099	20897	1895	4432	10786	a
Number of health facilities	Mar 2022	DHIS District Hospital	251	65	25	12	39	30	23	11	13	33	a
		DHIS Central/Tertiary Hospital	27	4	2	7	4	2	2	1	2	3	a
		DHIS PHC fixed facilities	3505	776	220	373	618	482	295	162	312	267	a
		DHIS Regional Hospital	48	5	4	9	13	5	3	1	3	5	a
		DHIS Other hospitals	63	751	212	340	610	460	243	131	268	205	a
OHH headcount under 5 years coverage	2019/20	DHIS	86,8	67,1	53,8	60,6	160,3	84,1	54,6	126,0	138,7	0,0	a
	2020/21	DHIS	69,7	35,2	39,8	52,3	118,3	100,2	27,5	82,2	51,4	120,7	a
	2021/22	DHIS	95,0	48,5	74,2	67,6	145,3	117,9	63,1	74,1	72,7	134,3	a
OPD new client not referred rate	2019/20	DHIS	46,5	50,0	57,4	30,6	48,2	65,4	56,5	64,9	38,2	11,3	a
	2020/21	DHIS	47,0	49,0	50,9	24,9	48,5	61,1	58,1	63,7	49,6	17,4	a
	2021/22	DHIS	39,5	26,0	44,4	30,0	48,6	59,5	54,8	64,1	56,6	16,1	a
OPD new client not referred rate (district hospitals)	2019/20	DHIS	60,0	63,7	66,1	66,8	52,1	71,8	64,3	70,8	57,8	9,6	a
	2020/21	DHIS	57,5	62,2	59,2	66,4	55,0	69,3	63,0	65,4	53,6	15,5	a
	2021/22	DHIS	47,0	24,5	53,0	64,6	57,1	69,8	63,4	64,2	58,6	20,3	a
Patient Day Equivalent	2019/20	DHIS	32461949	4295480	2172659	7521238	7100648	3010254	1869054	579169	1676989	4236460	a
		DHIS District Hospital	10933666	1715092	550806	1031431	2579960	1757156	1213878	200939	428439	1455965	a
	2020/21	DHIS	26607840	3276297	1708744	6360779	5539302	2493263	1579260	509518	1511852	3628823	a
		DHIS District Hospital	8969900	1345068	457235	855601	2085569	1442600	997636	163152	395338	1227700	a
	2021/22	DHIS	29679714	4083839	1946643	6834424	6139074	2659570	1733190	577039	1630542	4075393	a
		DHIS District Hospital	10292018	1940468	485871	983355	2263705	1515641	1083171	177088	427167	1415552	a
PHC doctor clinical work load	2019/20	DHIS	22,0	21,0	16,2	23,9	20,5	25,3	18,2	17,3	11,4	25,8	a
	2020/21	DHIS	15,2	13,9	18,9	10,3	17,8	20,5	15,3	11,7	10,4	18,0	a
	2021/22	DHIS	12,6	15,9	18,5	7,9	15,0	12,6	15,5	14,2	10,2	20,7	a
PHC heacount total	2019/20	both sexes all ages DHIS	119747336	16420094	5303035	21309158	28353937	14347755	9220716	2728252	7714952	14349437	a
	2020/21	both sexes all ages DHIS	95346987	12950671	4809591	16963951	22809881	12389041	7319603	2214000	6300025	9590224	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021/22	both sexes all ages DHIS	101 393 994	13 692 661	4 771 693	18 647 814	23 906 112	12 752 688	7 734 010	2 333 065	6 605 539	10 950 412	a
PHC headcount 5 years and older	2019/20	both sexes DHIS	99 703 955	13 898 719	4 540 511	17 648 204	23 767 046	11 407 847	7 514 391	2 279 773	6 374 431	12 273 033	a
	2020/21	both sexes DHIS	80 516 387	11 081 913	4 130 819	14 243 014	19 470 124	10 151 654	6 117 585	1 896 206	5 295 661	8 129 411	a
	2021/22	both sexes DHIS	84 511 186	11 622 030	4 038 494	15 504 806	20 163 058	10 222 814	6 291 455	1 989 014	5 483 454	9 196 061	a
PHC headcount under 5 years	2019/20	both sexes DHIS	20 149 466	2 524 151	845 825	3 672 144	4 598 365	2 936 295	1 710 321	449 974	1 333 974	2 078 417	a
	2020/21	both sexes DHIS	14 830 600	1 868 758	678 772	2 720 937	3 339 757	2 237 387	1 202 018	317 794	1 004 364	1 460 813	a
	2021/22	both sexes DHIS	16 882 808	2 070 631	733 199	3 143 008	3 743 054	2 529 874	1 442 555	344 051	1 122 085	1 754 351	a
PHC professional nurse clinical work load	2019/20	DHIS	25,9	29,1	26,5	25,3	31,6	21,6	32,0	20,7	17,8	22,4	a
	2020/21	DHIS	20,5	23,7	23,2	18,7	26,2	18,0	27,2	15,6	14,9	17,2	a
	2021/22	DHIS	21,9	25,4	23,4	18,3	27,3	19,4	30,4	17,2	16,3	19,4	a
PHC utilisation rate	2019/20	DHIS	2,0	2,2	1,8	1,5	2,4	2,4	2,0	2,2	1,9	2,2	a
	2020/21	DHIS	1,6	1,7	1,6	1,2	1,9	2,0	1,6	1,8	1,6	1,4	a
	2021/22	DHIS	1,7	2,0	1,6	1,2	2,1	2,1	1,6	1,8	1,6	1,5	a
PHC utilisation rate under 5 years	2019/20	DHIS	3,4	3,0	3,1	2,9	3,5	4,4	3,9	4,3	3,4	3,8	a
	2020/21	DHIS	2,6	2,7	2,6	2,1	2,7	3,4	2,6	2,5	2,5	2,6	a
	2021/22	DHIS	3,0	3,0	2,8	2,4	3,0	3,9	3,0	2,7	2,8	3,1	a
Universal health coverage: service coverage index	2021	GBD 2016 scaled	49,4										f
	2022	GBD 2016 scaled	50,5										f

Reference notes

a webDHIS.[10]
b Stats SA Causes of Death 2018.[101]
c World Health Statistics 2020.[78]
d World Health Statistics 2021.[31]
e World Health Statistics 2022.[32]
f GBD 2016 SDGs.[102]

Definitions

- Inpatient deaths - total [Number]: An inpatient death is a death recorded against an admitted inpatient, including the death of a patient admitted earlier on the same day. The total is specialities plus all others that do not appear on the identified specialities.
- Number of beds [Number]: Total number of beds in health facility.
- Number of health facilities [Number].
- Patient Day Equivalent [Number]: The sum of Inpatient days total x 1, Day patient total x 0.5, and OPD/Emergency total headcount x 0.3333333.
- PHC headcount total [Number].
- PHC headcount 5 years and older [Number].
- PHC headcount under 5 years [Number]: All individual clients not yet reached five years (60 months) seen for Primary Health Care services at a facility.
- Average length of stay - total [Days]: The average number of patient days that an admitted patient spends in hospital before separation.
- Average length of stay (district hospitals) [Days]: The average number of patient days that an admitted patient spends in hospital before separation.
- Complaints resolution rate [Percentage]: Complaints resolved as a proportion of complaints received.
- Complaints resolution rate within 25 working days [Percentage]: Complaints resolved within 25 working days as a proportion of all complaints resolved.
- Death registration coverage [Percentage]: Percentage of deaths that are registered (with age and sex).

- Inpatient bed utilisation rate - total [Percentage]: A measure of the average number of beds that are occupied - expressed as the proportion of all available bed days, which is calculated as the number of actual beds multiplied by the average number of days in a month (30.42).
- Inpatient bed utilisation rate (district hospitals) [Percentage]: A measure of the average number of beds that are occupied - expressed as the proportion of all available bed days, which is calculated as the number of actual beds multiplied by the average number of days in a month (30.42).
- Inpatient crude death rate [Percentage]: Proportion of admitted clients/separations who died during hospital stay. Inpatient separations is the total of day clients, inpatient discharges, inpatient deaths and inpatient transfer outs.
- International Health Regulations (IHR) core capacity index [Percentage]: Percentage of attributes of 13 core capacities that have been attained at a specific point in time. The 13 core capacities are: (1) National legislation, policy and financing; (2) Coordination and National Focal Point communications; (3) Surveillance; (4) Response; (5) Preparedness; (6) Risk communication; (7) Human resources; (8) Laboratory; (9) Points of entry; (10) Zoonotic events; (11) Food safety; (12) Chemical events; (13) Radio-nuclear emergencies.
- OPD new client not referred rate [Percentage]: New OPD clients not referred as a proportion of OPD new clients – total.
- PHC doctor clinical work load [Clients per doctor per day]: Average number of clients seen per doctor per clinical work day. This includes doctors employed in the public and private sector.
- PHC professional nurse clinical work load [Clients per nurse per day]: Average number of clients seen per professional nurse per professional nurse clinical work day.
- PHC utilisation rate [Average number of visits per person]: Average number of PHC visits per person per year in the population.
- PHC utilisation rate under 5 years [Average number of visits per person under 5 years]: Average number of PHC visits per year per person under 5 years of age in the population.
- Universal health coverage: service coverage index [Scale 0-100]: Coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population). Calculated as the geometric mean of the index score for each of the 4 categories of the index.

Table 19. Number of health personnel practising in the public sector by province, 2020 - 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Number of clinical associates	**2020 Mar**	both sexes public sector	393	113	17	35	111	10	75	2	30		a
	2021 Mar	both sexes public sector	436	107	13	104	99	9	70	3	31		a
	2022 Mar	both sexes public sector	413	95	13	115	87	8	65	3	27		a
Number of CS clinical psychologists	**2020 Mar**	both sexes public sector	66	3	3	39	7	3	0	1	3	7	a
	2021 Mar	both sexes public sector	54	1	3	28	4	2	3	1	5	7	a
	2022 Mar	both sexes public sector	69	3	2	34	14	2	2	2	3	7	a
Number of CS dentists	**2020 Mar**	both sexes public sector	197	21	27	15	46	14	16	15	27	16	a
	2021 Mar	both sexes public sector	179	21	21	30	36	7	16	15	17	16	a
	2022 Mar	both sexes public sector	173	18	24	15	36	15	13	15	22	15	a
Number of CS dieticians	**2020 Mar**	both sexes public sector	227	20	23	54	35	18	24	14	31	8	a
	2021 Mar	both sexes public sector	211	15	24	50	38	11	21	14	32	6	a
	2022 Mar	both sexes public sector	191	14	18	53	35	7	18	13	27	6	a
Number of CS doctors	**2020 Mar**	both sexes public sector	1 527	160	62	253	252	165	209	76	149	201	a
	2021 Mar	both sexes public sector	1 700	169	105	287	269	158	235	75	190	212	a
	2022 Mar	both sexes public sector	2 137	219	94	417	391	220	303	97	194	202	a
Number of CS environmental health practitioners	**2020 Mar**	both sexes public sector	182	3	23	43	4	47	15	13	34		a
	2021 Mar	both sexes public sector	103	1	5	24	3	30	14	8	18		a
	2022 Mar	both sexes public sector	195	3	20	39	7	49	21	12	44		a
Number of CS nurses	**2020 Mar**	both sexes public sector	3 109	642	120	628	479	108	340	100	326	366	a
	2021 Mar	both sexes public sector	2 245	79	77	926	203	28	231	87	254	360	a
	2022 Mar	both sexes public sector	3 249	584	172	750	493	261	245	57	328	359	a
Number of CS occupational therapists	**2020 Mar**	both sexes public sector	289	36	25	74	65	13	26	22	14	14	a
	2021 Mar	both sexes public sector	327	43	26	86	65	6	37	22	28	14	a
	2022 Mar	both sexes public sector	404	45	28	160	69	11	31	23	25	12	a
Number of CS pharmacists	**2020 Mar**	both sexes public sector	612	66	45	91	134	67	48	40	83	38	a
	2021 Mar	both sexes public sector	653	68	48	92	149	65	51	46	96	38	a
	2022 Mar	both sexes public sector	636	71	72	80	150	70	49	36	66	42	a
Number of CS physiotherapists	**2020 Mar**	both sexes public sector	352	35	29	94	73	8	36	24	29	24	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021 Mar	both sexes public sector	383	41	29	95	72	17	35	29	42	23	a
	2022 Mar	both sexes public sector	323	54	23	24	89	16	27	26	38	26	a
Number of CS radiographers	**2020 Mar**	both sexes public sector	367	29	17	94	81	24	34	14	37	37	a
	2021 Mar	both sexes public sector	364	24	13	107	83	19	37	17	28	36	a
	2022 Mar	both sexes public sector	355	30	15	113	78	21	33	15	14	36	a
Number of CS speech therapists	**2020 Mar**	both sexes public sector	247	18	8	61	70	12	40	10	20	8	a
	2021 Mar	both sexes public sector	252	18	9	63	65	13	39	14	23	8	a
	2022 Mar	both sexes public sector	229	20	15	25	73	9	38	13	31	5	a
Number of dental practitioners	**2020 Mar**	both sexes public sector	1 044	145	50	242	103	168	88	23	56	169	a
	2021 Mar	both sexes public sector	1 009	149	48	229	106	164	79	25	59	150	a
	2022 Mar	both sexes public sector	1 006	146	45	228	108	159	78	26	61	155	a
Number of dental specialists	**2020 Mar**	both sexes public sector	152	1	1	113		2	1	1		33	a
	2021 Mar	both sexes public sector	126	1	1	89	1	4	1	1		28	a
	2022 Mar	both sexes public sector	128		1	88	1	4	1	1		32	a
Number of dental therapists	**2020 Mar**	both sexes public sector	359	18	1	42	100	132	26	24	14	2	a
	2021 Mar	both sexes public sector	358	18	1	45	96	130	28	24	14	2	a
	2022 Mar	both sexes public sector	355	18	1	45	94	127	30	24	14	2	a
Number of enrolled nurses	**2020 Mar**	both sexes public sector	29 638	3 321	1 033	7 188	8 939	3 591	1 639	238	962	2 727	a
	2021 Mar	both sexes public sector	32 191	4 145	1 224	7 961	9 710	3 195	1 467	268	1 267	2 954	a
	2022 Mar	both sexes public sector	31 775	3 502	1 231	7 810	10 016	3 151	1 548	253	1 225	3 039	a
Number of enrolled nurses registered	**2020**	both sexes all ages SANC	61 028	5 347	2 069	15 331	21 233	5 155	2 594	376	2 955	5 968	b
	2021	both sexes all ages SANC	56 484	4 922	1 922	14 124	19 831	4 729	2 306	350	2 724	5 576	b
	2022	both sexes all ages SANC	52 334	4 480	1 759	12 975	18 681	4 386	1 915	329	2 536	5 273	b
Number of environmental health practitioners	**2020 Mar**	both sexes public sector	362	20	50	98	82	26	45	11	30		a
	2021 Mar	both sexes public sector	448	30	52	131	75	25	45	12	78		a
	2022 Mar	both sexes public sector	521	20	92	151	73	30	47	21	87		a
Number of medical practitioners	**2020 Mar**	both sexes public sector	15 474	1 906	637	3 749	3 725	1 224	895	337	876	2 125	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021 Mar	both sexes public sector	17017	1993	734	4331	4017	1311	964	375	1018	2274	a
	2022 Mar	both sexes public sector	17413	2071	758	4569	4011	1337	1001	362	1080	2224	a
Number of medical researchers	**2020 Mar**	both sexes public sector	33	2	2	14	5	2		1		7	a
	2021 Mar	both sexes public sector	32	2	2	16	5	1		1		5	a
	2022 Mar	both sexes public sector	128	4		16	90	9	1	1		7	a
Number of medical specialists	**2020 Mar**	both sexes public sector	4835	228	317	1850	837	77	72	45	152	1257	a
	2021 Mar	both sexes public sector	4770	231	314	1826	850	84	64	42	140	1219	a
	2022 Mar	both sexes public sector	4745	225	334	1866	812	84	64	39	150	1171	a
Number of nursing assistants	**2020 Mar**	both sexes public sector	33600	5395	2023	6431	5840	4623	1477	822	2768	4221	a
	2021 Mar	both sexes public sector	36278	6114	2250	7347	5636	4454	2020	892	3138	4427	a
	2022 Mar	both sexes public sector	35453	5251	2308	7409	5527	4478	2116	862	3182	4320	a
Number of nursing assistants registered	**2020**	both sexes all ages SANC	65179	6778	2788	16740	12571	9880	3729	937	4336	7420	b
	2021	both sexes all ages SANC	63539	6519	2720	16409	12299	9718	3719	885	4180	7090	b
	2022	both sexes all ages SANC	61561	6143	2621	15955	11930	9550	3660	840	4034	6828	b
Number of occupational therapists	**2020 Mar**	both sexes public sector	1003	117	50	205	126	207	68	32	48	150	a
	2021 Mar	both sexes public sector	1084	127	53	247	147	201	69	32	55	153	a
	2022 Mar	both sexes public sector	1101	120	53	288	149	193	69	30	47	152	a
Number of optometrists and opticians	**2020 Mar**	both sexes public sector	255	8	5	55	60	111	7	2	5	2	a
	2021 Mar	both sexes public sector	256	6	5	54	65	111	7	2	5	1	a
	2022 Mar	both sexes public sector	257	6	6	57	63	109	7	2	5	2	a
Number of pharmacists	**2020 Mar**	both sexes public sector	5337	865	315	1169	813	520	304	103	259	989	a
	2021 Mar	both sexes public sector	5543	912	331	1251	818	521	332	114	264	1000	a
	2022 Mar	both sexes public sector	5777	887	406	1280	851	583	355	104	284	1027	a
Number of physiotherapists	**2020 Mar**	both sexes public sector	1110	147	48	194	244	158	76	31	71	141	a
	2021 Mar	both sexes public sector	1239	155	51	245	280	159	78	31	80	160	a
	2022 Mar	both sexes public sector	1225	144	53	250	274	164	79	31	70	160	a
Number of professional nurses	**2020 Mar**	both sexes public sector	70437	11091	2104	14001	16772	9109	5799	1491	4846	5224	a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2021 Mar	both sexes public sector	76485	11672	2498	15527	18699	9201	6234	1588	5394	5672	a
	2022 Mar	both sexes public sector	76293	10953	2676	16323	18827	8778	6270	1511	5369	5586	a
Number of professional nurses registered	**2020**	both sexes all ages SANC	154024	16620	8267	40200	35470	13457	8647	2382	10780	18201	b
	2021	both sexes all ages SANC	156392	16661	8398	41183	35807	13659	8889	2383	10947	18465	b
	2022	both sexes all ages SANC	157152	16643	8412	41761	35569	13701	9156	2379	11017	18514	b
Number of psychologists	**2020 Mar**	both sexes public sector	637	67	27	191	61	120	32	15	43	81	a
	2021 Mar	both sexes public sector	705	69	30	224	74	115	48	16	49	80	a
	2022 Mar	both sexes public sector	780	65	29	243	94	132	48	16	48	105	a
Number of pupil auxiliary nurses registered	**2020**	both sexes all ages SANC	1921	357	76	881	275	21	39	115	60	97	b
	2021	both sexes all ages SANC	1156	204	71	443	166	11	21	112	48	80	b
	2022	both sexes all ages SANC	1456	251	76	647	163	16	21	112	59	111	b
Number of pupil nurses registered	**2020**	both sexes all ages SANC	2579	179	78	1243	723	64	51	0	60	181	b
	2021	both sexes all ages SANC	1513	94	59	719	420	52	35		6	128	b
	2022	both sexes all ages SANC	1468	78	58	714	399	52	33		6	128	b
Number of radiographers	**2020 Mar**	both sexes public sector	2716	375	147	650	600	198	119	74	113	440	a
	2021 Mar	both sexes public sector	2882	397	160	737	611	201	121	77	124	454	a
	2022 Mar	both sexes public sector	3034	382	178	878	609	216	125	73	125	448	a
Number of speech therapists and audiologists	**2020 Mar**	both sexes public sector	502	47	9	131	92	69	39	15	27	73	a
	2021 Mar	both sexes public sector	600	57	10	161	146	64	43	15	31	73	a
	2022 Mar	both sexes public sector	617	53	11	161	152	72	44	16	31	77	a
Number of student nurses	**2020 Mar**	both sexes public sector	2765			1593	458	155	552		7		a
	2021 Mar	both sexes public sector	1712			691	472	134	414		1		a
	2022 Mar	both sexes public sector	968			43	537	19	366		3		a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Number of student nurses registered	**2020**	both sexes all ages SANC	19 084	3 962	1 350	4 434	2 431	1 509	578	264	1 825	2 731	b
	2021	both sexes all ages SANC	15 469	3 324	1 068	3 695	1 942	1 147	399	183	1 624	2 087	b
	2022	both sexes all ages SANC	14 836	3 011	1 034	3 507	1 993	1 066	489	167	1 542	2 027	b

Reference notes
a PERSAL.[104]

Table 20. Health personnel per 100 000 uninsured population by province, 2020 - 2022

Indicator	Period	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Clinical Associates per 100 000 population	**2020 Mar**	0,8	1,9	0,7	0,3	1,1	0,2	1,8	0,2	0,8		a
	2021 Mar	0,9	1,8	0,5	0,9	1,0	0,2	1,7	0,3	0,8		a
	2022 Mar	0,8	1,6	0,5	0,9	0,8	0,1	1,5	0,3	0,7		a
Density of dentistry personnel (per 10 000 population)	**2012-2020**	1,1										b
Density of midwifery personnel (per 10 000 population)	**2012-2020**	49,7										b
Density of pharmaceutical personnel (per 10 000 population)	**2012-2020**	2,7										b
Density of physicans (per 10 000 population)	**2010-2018**	9,1										b
	2012-2020	7,9										b
Dental practitioners per 100 000 population	**2020 Mar**	2,5	2,7	3,1	2,2	1,5	3,2	2,5	3,5	2,3	3,3	a
	2021 Mar	2,3	2,8	2,7	2,1	1,4	3,0	2,3	3,6	2,1	2,9	a
	2022 Mar	1,9	2,7	2,7	2,0	1,4	3,1	2,2	3,7	2,2	2,6	a
Dental specialists per 100 000 population	**2020 Mar**	0,3	0,0	0,0	1,0		0,0	0,0	0,1		0,6	a
	2021 Mar	0,3	0,0	0,0	0,7	0,0	0,1	0,0	0,1		0,5	a
	2022 Mar	0,2		0,0	0,7	0,0	0,1	0,0	0,1		0,6	a
Dental therapists per 100 000 population	**2020 Mar**	0,7	0,3	0,0	0,4	1,0	2,4	0,6	2,2	0,4	0,0	a
	2021 Mar	0,7	0,3	0,0	0,4	0,9	2,3	0,7	2,2	0,4	0,0	a
	2022 Mar	0,7	0,3	0,0	0,4	0,9	2,2	0,7	2,2	0,4	0,0	a
Enrolled nurses per 100 000 population	**2020 Mar**	58,6	54,8	41,2	61,0	88,0	64,1	40,0	21,9	26,6	48,8	a
	2021 Mar	62,8	68,4	48,6	66,0	94,6	56,6	35,3	24,3	34,5	51,9	a
	2022 Mar	61,2	57,8	48,7	63,3	96,5	55,4	36,7	22,7	32,9	52,5	a
Environmental health practitioners per 100 000 population	**2020 Mar**	1,1	0,4	2,9	1,2	0,9	1,3	1,5	2,2	1,8		a
	2021 Mar	1,1	0,5	2,3	1,3	0,8	1,0	1,4	1,8	2,6		a
	2022 Mar	0,4	0,4	4,4	1,5	0,8	1,4	1,6	3,0	3,5		a

Indicator	Period	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Medical practitioners per 100 000 population	**2020 Mar**	33,6	34,1	27,9	33,9	39,1	24,8	27,0	37,9	28,3	41,6	a
	2021 Mar	36,5	35,7	33,3	38,3	41,7	26,0	28,9	40,9	32,9	43,7	a
	2022 Mar	32,6	36,1	32,9	39,7	41,7	27,4	28,0	41,2	33,3	41,7	a
Medical researchers per 100 000 population	**2020 Mar**	0,1	0,0	0,1	0,1	0,1	0,0		0,1		0,1	a
	2021 Mar	0,1	0,0	0,1	0,1	0,1	0,0		0,1		0,1	a
	2022 Mar	0,1	0,0		0,1	0,0	0,0		0,1		0,1	a
Medical specialists per 100 000 population	**2020 Mar**	9,6	3,8	12,6	15,7	8,2	1,4	1,8	4,1	4,2	22,5	a
	2021 Mar	9,3	3,8	12,5	15,1	8,3	1,5	1,5	3,8	3,8	21,4	a
	2022 Mar	9,2	3,7	13,4	15,1	7,9	1,5	1,5	3,5	4,0	20,3	a
Nursing assistants per 100 000 population	**2020 Mar**	66,4	89,1	80,6	54,6	57,5	82,5	36,1	75,5	76,5	75,5	a
	2021 Mar	70,8	100,9	89,4	60,9	54,9	78,9	48,6	81,0	85,4	77,8	a
	2022 Mar	68,2	86,7	91,4	60,1	53,3	78,8	50,2	77,5	85,4	74,6	a
Occupational therapists per 100 000 population	**2020 Mar**	2,6	2,5	3,0	2,4	1,9	3,9	2,3	5,0	1,7	2,9	a
	2021 Mar	2,8	2,8	3,1	2,8	2,1	3,7	2,6	4,9	2,3	2,9	a
	2022 Mar	2,1	2,7	3,2	3,6	2,1	3,6	2,4	4,8	1,9	2,8	a
Optometrists per 100 000 population	**2020 Mar**	0,5	0,1	0,2	0,5	0,6	2,0	0,2	0,2	0,1	0,0	a
	2021 Mar	0,5	0,1	0,2	0,5	0,6	2,0	0,2	0,2	0,1	0,0	a
	2022 Mar	0,5	0,1	0,2	0,5	0,6	1,9	0,2	0,2	0,1	0,0	a
Pharmacists per 100 000 population	**2020 Mar**	11,8	15,4	14,4	10,7	9,3	10,5	8,6	13,1	9,5	18,4	a
	2021 Mar	12,1	16,2	15,1	11,1	9,4	10,4	9,2	14,5	9,8	18,2	a
	2022 Mar	11,1	15,8	18,9	11,0	9,6	11,5	9,6	12,6	9,4	18,5	a
Physiotherapists per 100 000 population	**2020 Mar**	2,9	3,0	3,1	2,4	3,1	3,0	2,7	5,1	2,8	3,0	a
	2021 Mar	3,2	3,2	3,2	2,8	3,4	3,1	2,7	5,4	3,3	3,2	a
	2022 Mar	2,4	3,3	3,0	2,2	3,5	3,2	2,5	5,1	2,9	3,2	a
Professional nurses per 100 000 population	**2020 Mar**	145,4	193,8	88,7	124,1	169,8	164,5	149,9	146,1	142,9	100,0	a
	2021 Mar	153,6	194,0	102,3	136,4	184,1	163,4	155,6	152,1	153,8	106,0	a

Indicator	Period	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2022 Mar	146,9	190,6	112,7	138,4	186,2	159,0	154,6	140,9	152,8	102,7	a
Psychologists per 100 000 population	**2020 Mar**	1,4	1,2	1,2	2,0	0,7	2,2	0,8	1,5	1,3	1,6	a
	2021 Mar	1,5	1,2	1,3	2,1	0,8	2,1	1,2	1,5	1,5	1,5	a
	2022 Mar	1,5	1,1	1,2	2,2	1,0	2,4	1,2	1,6	1,4	1,9	a
Radiographers per 100 000 population	**2020 Mar**	6,1	6,7	6,5	6,3	6,7	4,0	3,7	8,1	4,1	8,5	a
	2021 Mar	6,3	7,0	6,9	7,0	6,8	3,9	3,8	8,5	4,1	8,6	a
	2022 Mar	5,7	6,6	7,0	8,0	6,6	3,6	3,7	7,8	4,2	8,4	a
Speech therapists and audiologists per 100 000 population	**2020 Mar**	1,5	1,1	0,7	1,6	1,6	1,4	1,9	2,3	1,3	1,4	a
	2021 Mar	1,7	1,2	0,8	1,9	2,1	1,4	2,0	2,6	1,5	1,4	a
	2022 Mar	1,2	1,2	1,0	1,5	2,2	1,4	1,9	2,6	1,7	1,4	a
Student nurses per 100 000 population	**2020 Mar**	5,5			13,5	4,5	2,8	13,5		0,2		a
	2021 Mar	3,3			5,7	4,6	2,4	10,0		0,0		a
	2022 Mar	1,9			0,3	5,2	0,3	8,7		0,1		a

Reference notes

a PERSAL.[104]

b World Health Statistics 2022.[32]

Definitions

- Indicators are calculated as the number of the specified cadre of health professional per 100 000 uninsured population, as calculated using the webDHIS 2000-30 population time series and the Insight Actuaries modelled estimates for medical schemes coverage at district level circa 2018.

Table 21. Trends in overall provincial and local government health expenditure by programme (Rand million, nominal prices), 2012/13 - 2021/22

Rand million	Financial Year									
Prog	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
1. Administration	3019	3578	3599	4313	4462	4690	5129	5368	8799	7596
2. District Health Services	53586	57991	64181	69854	76540	83671	90978	98688	109448	115084
3. Emergency Health Services	5079	5352	5556	6025	6435	7380	7671	8394	8660	8791
4. Provincial Hospital Services	27741	26420	28694	29576	29675	32262	34275	36609	37623	39134
5. Central Hospital Services	18822	23559	25804	29529	33736	37437	41120	44608	47516	47227
6. Health Sciences and Training	3755	4039	4248	4529	5107	4916	5037	5115	4796	4792
7. Health Care Support Services	1640	1877	1322	2834	1796	1806	4661	2301	3469	3073
8. Health Facilities Management	8967	7895	7491	8514	8316	8651	9014	9844	11526	10433
Local government expenditure	2859	2869	3389	3730	4103	4199	4858	4828	5392	5158
Other	4		-			-	-	-	-	- 14
Grand Total	**125473**	**133581**	**144283**	**158903**	**170171**	**185013**	**202744**	**215755**	**237229**	**241273**

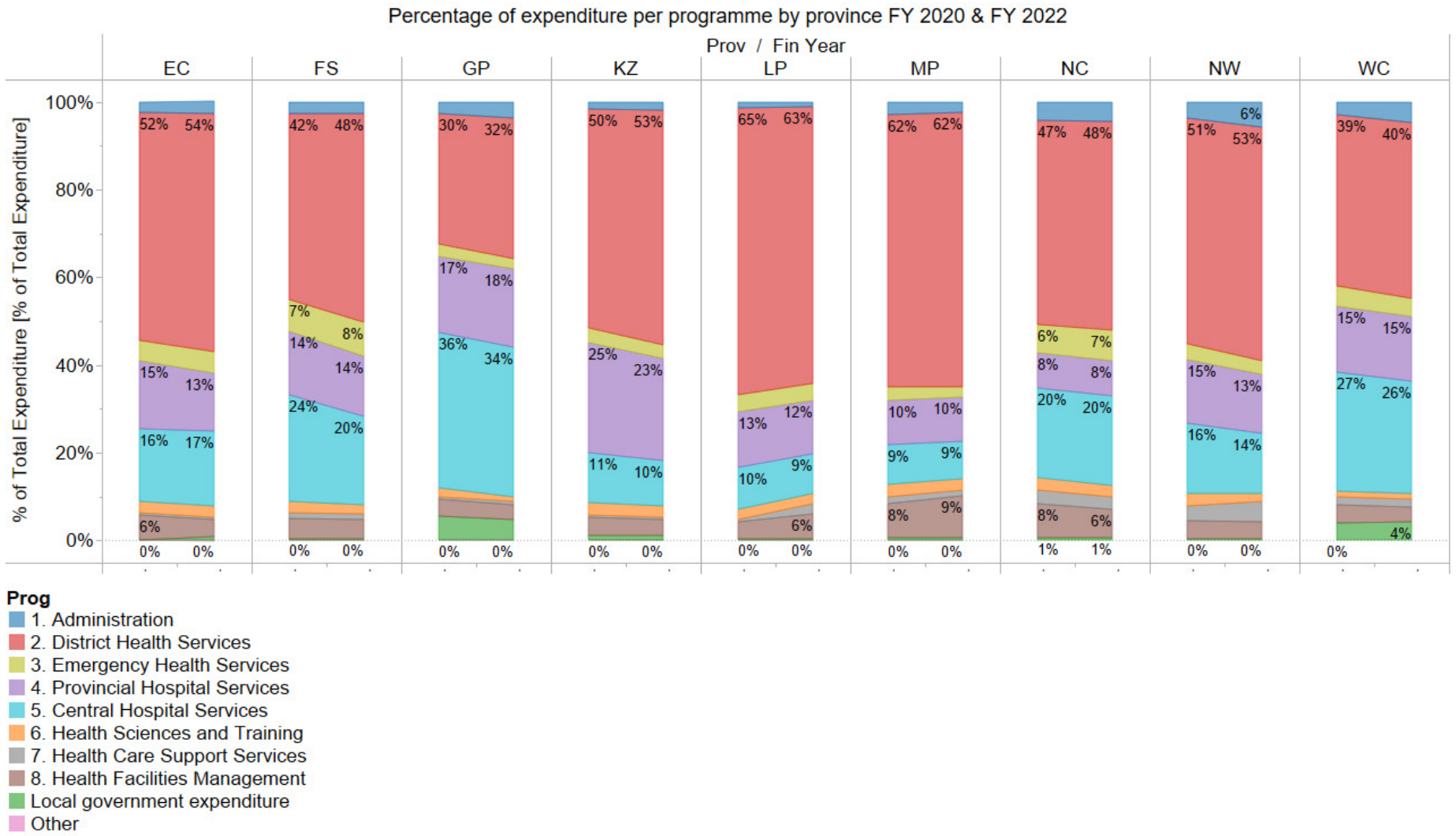
Source: National Treasury databases.[106]
Note: 'Other' includes any other expenditure not indicated as being allocated to any of the above budget programmes.

Table 22. Provincial and local government health expenditure per province by programme (Rand million), 2021/22

Rand million	Financial Year 2021/22									
Programme	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC
1. Administration	7596	770	324	2173	1040	285	421	260	907	1414
2. District Health Services	115084	15109	5834	19251	27363	14488	10347	2828	8216	11647
3. Emergency Health Services	8791	1354	960	1432	1597	904	422	407	475	1240
4. Provincial Hospital Services	39134	3740	1665	10697	11801	2771	1643	470	2076	4270
5. Central Hospital Services	47227	4698	2477	20332	5355	2108	1438	1212	2106	7501
6. Health Sciences and Training	4792	775	261	707	1362	499	409	153	282	344
7. Health Care Support Services	3073	113	157	389	169	569	240	175	714	546
8. Health Facilities Management	10433	1088	534	2068	1942	1285	1567	380	610	959
Local government expenditure	5158	245	47	2801	538	89	111	34	55	1238
Total	**241287**	**27891**	**12260**	**59850**	**51168**	**22999**	**16598**	**5921**	**15442**	**29160**

Source: National Treasury databases.[106]

Figure 41. Percentage of expenditure per programme by province, 2020/21 compared to 2021/22



Source: National Treasury databases.[106]

Table 23. Health financing indicators by province, 2019 - 2022

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
Claims ratio	2019	both sexes all ages med schemes	90,6										a
	2020	both sexes all ages med schemes	81,4										b
	2021	both sexes all ages med schemes	90,9										c
Expenditure per patient day equivalent (district hospitals)	2019/20	BAS real 2021/22 prices	3319	3324	3174	3807	3373	3491	3040	3352	3832	2805	d
	2020/21	BAS real 2021/22 prices	4017	4388	3492	4776	4145	3984	3592	4170	4324	3347	d
	2021/22	BAS real 2021/22 prices	3450	2730	3194	4250	3903	3725	3325	3756	3840	2884	d
Medical scheme beneficiaries	2019	both sexes med schemes	8990106	653755	390841	3598421	1265694	460369	550360	177151	476557	1333363	a
	2020	both sexes all ages med schemes	8895152	664509	396758	3436286	1290329	456321	555404	181845	472351	1387206	c
	2021	both sexes all ages med schemes	8938872	660064	400721	3496871	1274134	468362	556393	193501	469846	1384260	c
Medical scheme coverage	2019	both sexes all ages GHS	17,2	10,8	14,7	24,9	13,1	9,9	12,6	19,3	16,3	24,1	e
		both sexes all ages med schemes	15,1	7,0	4,0	40,0	14,0	5,0	6,0	2,0	6,0	15,0	a
	2020	both sexes all ages med schemes	14,8	7,0	4,0	39,0	15,0	5,0	6,0	2,0	5,0	16,0	b
	2021	both sexes all ages GHS	16,1	10,6	16,3	24,0	10,5	8,2	9,1	19,6	15,3	23,7	f
		med schemes	14,9	7,0	4,0	39,0	14,0	5,0	6,0	2,0	5,0	15,0	c
Medical scheme coverage (ave)	2018	both sexes all ages GHS model	15,4	9,8	13,5	24,6	11,2	7,2	12,5	15,1	11,9	20,1	g
Pensioner ratio	2019	both sexes med schemes	8,6										a
		female med schemes	9,5										a
		male med schemes	7,6										a

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
	2020	both sexes all ages med schemes	8,9										b
	2021	both sexes med schemes	9,0										b
		female med schemes	10,0										c
		male med schemes	7,8										c
Proportion of population with large household expenditures on health as a share of total household expenditure or income	2010-2018	both sexes WHO >10%	1,4										h
		both sexes WHO >25%	0,1										h
	2012-2020	both sexes WHO >10%	1,0										i
		both sexes WHO >25%	0,1										i
Provincial & LG District Health Services expenditure per capita (uninsured)	2019/20	BAS real 2021/22 prices	2 154	2 331	1 981	1 693	2 393	2 602	2 328	2 402	1 887	2 112	d
	2020/21	BAS real 2021/22 prices	2 228	2 530	2 278	1 773	2 462	2 542	2 252	2 366	1 986	2 206	d
	2021/22	BAS real 2021/22 prices	2 102	2 321	2 171	1 480	2 485	2 410	2 341	2 414	2 094	1 928	d
Provincial & LG PHC expenditure per capita (uninsured)	2019/20	BAS real 2021/22 prices	1 328	1 241	1 245	1 311	1 534	1 172	1 276	1 476	1 290	1 316	d
	2020/21	BAS real 2021/22 prices	1 407	1 361	1 585	1 372	1 668	1 193	1 252	1 466	1 223	1 410	d
	2021/22	BAS real 2021/22 prices	1 286	1 265	1 494	1 045	1 708	1 154	1 247	1 481	1 229	1 125	d
Provincial & LG PHC expenditure per PHC headcount	2019/20	BAS real 2021/22 prices	552	458	576	707	543	455	558	582	595	503	d
	2020/21	BAS real 2021/22 prices	745	637	824	953	742	540	700	721	701	821	d
	2021/22	BAS real 2021/22 prices	648	560	785	676	732	511	670	699	682	583	d
Total net official development assistance to medical research and	2018	both sexes WHO	2,6										h
	2019	WHO	1,9										j

Indicator	Period	Sex|Age|Series|Cat	SA	EC	FS	GP	KZ	LP	MP	NC	NW	WC	Ref
basic health sectors per capita (US$), by recipient country	2020	both sexes WHO	0,8										i

Reference notes

a Medical Schemes 2019-20.[77]
b Medical Schemes 2020-21.[17]
c Medical Schemes 2021-22.[19]
d National Treasury.[106]
e Stats SA GHS 2019.[16]
f Stats SA GHS 2021.[18]
g Insight Med Schemes 2019.[107]
h World Health Statistics 2020.[78]
i World Health Statistics 2022.[32]
j World Health Statistics 2021.[31]

Definitions

- Claims ratio [Percentage]: Proportion of member contributions that has been utilised for the payment of benefits claimed by members of medical schemes, as opposed to allocation of contributions for non-health benefits and the building of reserves.
- Expenditure per patient day equivalent (district hospitals) [Rand (real prices)]: Average cost per patient per day seen in a hospital (expressed as Rand per patient day equivalent).
- Medical scheme beneficiaries [Number]: Number of medical scheme beneficiaries, as reported by the Medical Schemes Council.
- Medical scheme coverage (ave) [Percentage]: Percentage of population who have medical scheme insurance.
- Medical scheme coverage [Percentage]: Proportion of population covered by medical schemes.
- Pensioner ratio [Percentage]: Proportion of members of medical schemes who are 65 years or older, in registered medical schemes.
- Proportion of population with large household expenditures on health as a share of total household expenditure or income [Percentage]: Proportion of population (%) with total household expenditures on health >10% and >25% of total household expenditure or income
- Provincial & LG District Health Services expenditure per capita (uninsured) [Rand (real prices)]: Provincial expenditure on District Health Services (all sub-programmes except 2.8 Coroner services) plus net local government expenditure on PHC per uninsured population.
- Provincial & LG PHC expenditure per capita (uninsured) [Rand (real prices)]: Provincial expenditure on sub-programmes of DHS (2.2 - 2.7) plus net local government expenditure on PHC per uninsured population.
- Provincial & LG PHC expenditure per PHC headcount [Rand (real prices)]: Provincial expenditure on sub-programmes of DHS (2.2 - 2.7) plus net local government expenditure on PHC divided by PHC headcount from webDHIS.

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