COVID-19 HOSPITAL SURVEILLANCE UPDATE

NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

SOUTH AFRICA | WEEK **40** 2021

OVERVIEW

This report summarises data of COVID-19 cases admitted to hospital in all provinces. The report is based on data collected from 5 March 2020 to 9 October 2021.

HIGHLIGHTS

- As of 9 October 2021, 392,953 COVID-19 admissions were reported from 667 facilities (409 public-sector and 258 private-sector) in all nine provinces of South Africa, representing 100% coverage of public and private hospitals that have had COVID-19 admissions. There were 205,310 (52.3%) and 187,643 (47.8%) admissions reported in public and private sector respectively. The majority of COVID-19 admissions were reported from four provinces, Gauteng 119,738 (30.5%), Western Cape 76,717 (19.5%), KwaZulu-Natal 65,592 (16.7%) and Eastern Cape 39,004 (10.0%).
- Of the 392,953 admissions, 5,319 (1.4%) patients were in hospital at the time of this report, 294,507 (74.9%) patients were discharged alive or transferred out and 93,127 (23.7%) patients died in hospital.
- Of the 380,819 COVID-19 patients who had recorded in-hospital outcome (died and discharged), the case fatality ratio (CFR) was 24.5%. On multivariable analysis, factors associated with in-hospital mortality were older age; male sex; black African, Coloured and Indian compared to white race; admission in the public sector; and having comorbid hypertension, diabetes, chronic cardiac disease, chronic renal disease, malignancy, HIV, current and past tuberculosis, and obesity. Compared to March 2020, there was increased risk of mortality at the peak of each wave – wave 1 in May, June and July 2020, wave 2 in December 2020 and January 2021, and wave 3 in May, June and July 2021. Compared to the Western Cape Province, individuals hospitalised in all other provinces were more likely to die in-hospital.

METHODS

DATCOV hospital surveillance for COVID-19 admissions, was initiated on the 1 April 2020. Data are submitted by public and private hospitals that have agreed to report COVID-19 admissions through DATCOV surveillance in all nine provinces of South Africa. A COVID-19 case was defined as a person with a positive reverse transcriptase polymerase chain reaction (RT-PCR) assay for SARS-CoV-2 or a person who had a positive SARS-CoV-2 antigen test who was admitted to hospital. An individual was defined as having severe disease if treated in high care or intensive care unit (ICU), or ventilated or diagnosed with acute respiratory distress syndrome (ARDS) or if dead. Case fatality ratio (CFR) was calculated for all closed cases, i.e. COVID-19 deaths divided by COVID-19 deaths plus COVID-19 discharges, excluding individuals who are still admitted in hospital.

Data are submitted by public and private hospitals that have agreed to report COVID-19 admissions through DATCOV surveillance in all nine provinces of South Africa. On 15 July 2020, the National Health Council adopted DATCOV as the national COVID-19 hospital surveillance system. As of 9 October 2021, a total of 667 facilities submitted data on hospitalised COVID-19 cases, 409 from public sector and 258 from private sector (Table 1). This reflects 100% coverage of all public and private hospitals that have had COVID-19 admissions to date.

Table 1. Number of hospitals reporting data on COVID-19 admissions by province and sector, South Africa, 5 March 2020 to 9 October 2021

Name of province	Public Sector	Private Sector
Eastern Cape	86	18
Free State	35	20
Gauteng	40	94
KwaZulu-Natal	70	47
Limpopo	41	7
Mpumalanga	31	9
North West	18	13
Northern Cape	29	6
Western Cape	59	44
South Africa	**409**	**258**

RESULTS

Epidemiological and geographic trends in admissions

From 5 March 2020 to 9 October 2021, a total of 392,953 COVID-19 admissions were reported from 667 facilities in all nine provinces of South Africa. Of these admissions, 205,310 (52.3%) and 187,643 (47.8%) were reported in public and private sector, respectively. The peak number of weekly COVID-19 admissions was higher in the second than the first and third waves (Figure 1). Decreases in the most recent week may reflect delays in data submission in the public sector, however private sector data submission is up to date.

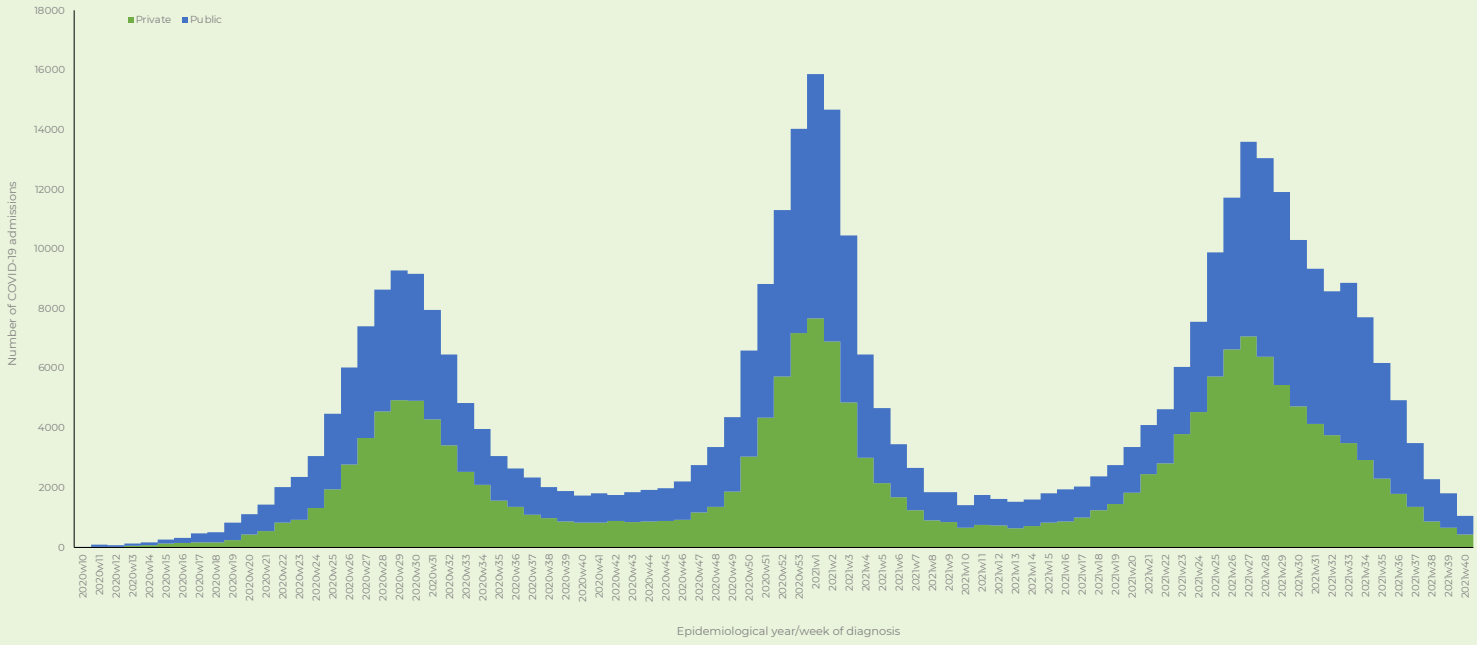


Figure 1. Number of reported COVID-19 admissions by health sector and epidemiological year and week of diagnosis, 5 March 2020-9 October 2021, n=392,953

The majority of admissions 301051/392,953 (76.6%) were recorded in four provinces, with the highest number reported in Gauteng 119,738 (30.5%), Western Cape 76,717 (19.5%), KwaZulu-Natal 65,592 (16.7%) and Eastern Cape 39,004 (10.0%) (Figure 2). All provinces have exited the third wave.

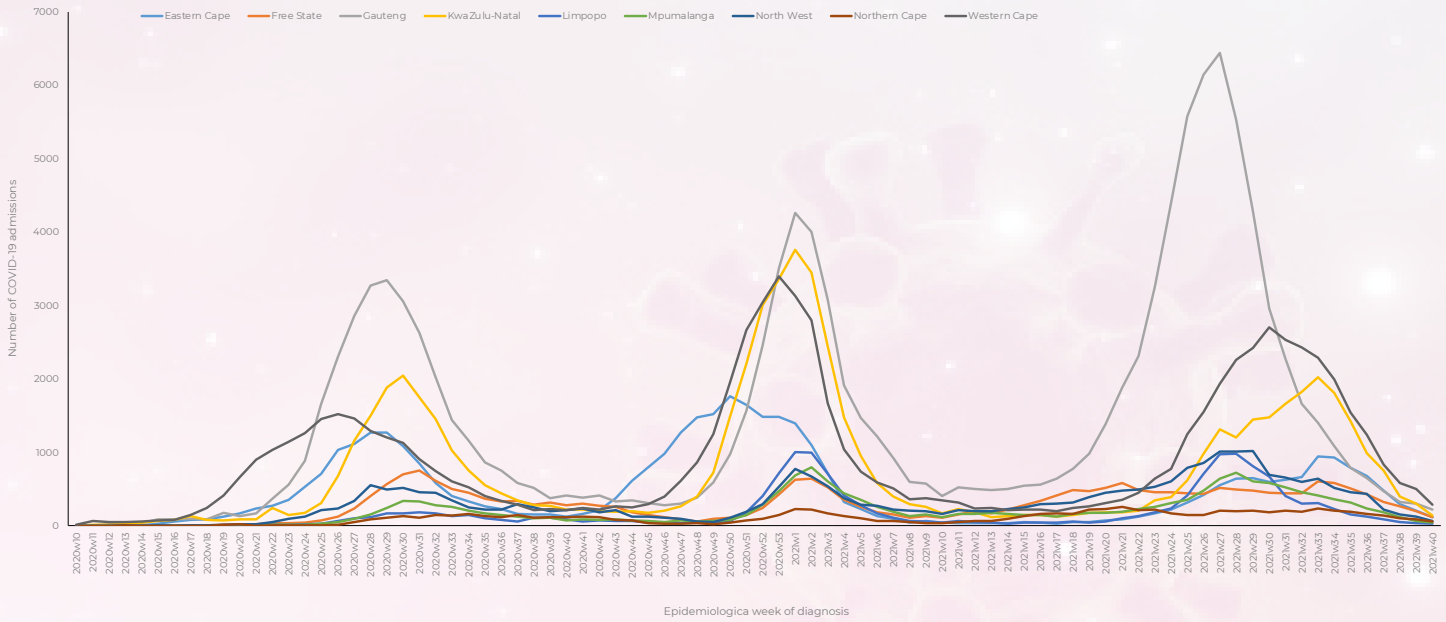


Figure 2. Number of reported COVID-19 admissions, by province and epidemiological year and week of diagnosis, South Africa, 5 March 2020-9 October 2021, n=392,953

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF ADMISSIONS

The median age of COVID-19 admissions was 54 years (interquartile range [IQR] 39 – 66). There were 19,174 (4.9%) admissions in patients 18 years and younger and 71,643 (18.2%) in patients older than 70 years. Among admitted individuals with COVID-19, 216,980 (55.2%) were female. Females were more common than males in all age groups except in individuals younger than 10 years (Figure 3).

Figure 3. Number of reported COVID-19 admissions by age, sex and percentage of males, South Africa, 5 March 2020-9 October 2021, n=392,953

Of the 255,669 (65.1%) patients for whom race was known, 190,580 (74.5%) were black African, 18,850 (7.4%) were Coloured, 13,974 (5.5%) were Indian, 31,487(12.3%) were White and 778 (0.3%) were classified as Other race group. There were 9,914 (2.5%) health care workers (HCW) that were reported to be hospitalised. Among the 87,383 admissions in females of child-bearing age 15-50 years, there were 11,510 (13.2%) females admitted who were pregnant or within 6 weeks post-partum.

Among 301,743 (76.7%) patients for whom comorbid conditions were known, 145,202 (48.1%) had no comorbid condition reported, 85,490 (28.3%) had one comorbid condition reported, 53,441 (17.7%) had two comorbid conditions and 17,610 (5.8%) had three or more comorbid conditions reported. The most commonly reported comorbidities were hypertension (105,600, 26.9%) and diabetes (71,068, 18.1%); there were 22,736 (5.8%) patients who were HIV-infected, 4,536 (1.2%) patients with active tuberculosis (TB) and 7,473 (2.0%) patients with previous history of TB (Table 2). Obesity, defined by body mass index where available or by the subjective opinion of the attending HCW, while not consistently reported for all COVID-19 admissions, was recorded as a risk factor in 14,744 (3.4%) of all patients hospitalised.

Table 2. Reported comorbid conditions among COVID-19 admissions, South Africa, 5 March 2020 to 9 October 2021, n= 301,743 *

Comorbid disease*	n	%
Hypertension	105,600	26.9
Diabetes mellitus	71,068	18.1
Chronic cardiac disease	6,481	1.7
Chronic pulmonary disease/ Asthma	18,487	4.8
Chronic renal disease	6,661	1.7
Malignancy	1,672	0.4
HIV	22,736	5.8
Active tuberculosis	4,536	1.2
Previous history of tuberculosis	7,473	2.0

* Multiple comorbid conditions are counted more than once so the total number may be more than the total number of individuals reporting comorbid conditions.

** Presence of a comorbid condition includes only the conditions reported in the table; obesity is not included.

OUTCOMES

Of the 392,953 admitted individuals, 5,319 (1.4%) were currently in hospital, 287,692 (73.2%) were discharged alive, 6,815 (1.7%) were transferred out to either higher-level care or step-down facilities and 93,127 (23.7%) died in hospital of COVID-19. Of the 380,819 COVID-19 patients who had recorded in-hospital outcome (died and discharged), the case fatality ratio (CFR) was 24.5%.

EPIDEMIOLOGICAL AND GEOGRAPHIC TRENDS IN MORTALITY

The peak numbers of weekly deaths were higher in the second wave than the first and third wave (Figure 4). The CFR was higher in the public health sector (28.6%) than in the private health sector (20.0%) (p<0.001).

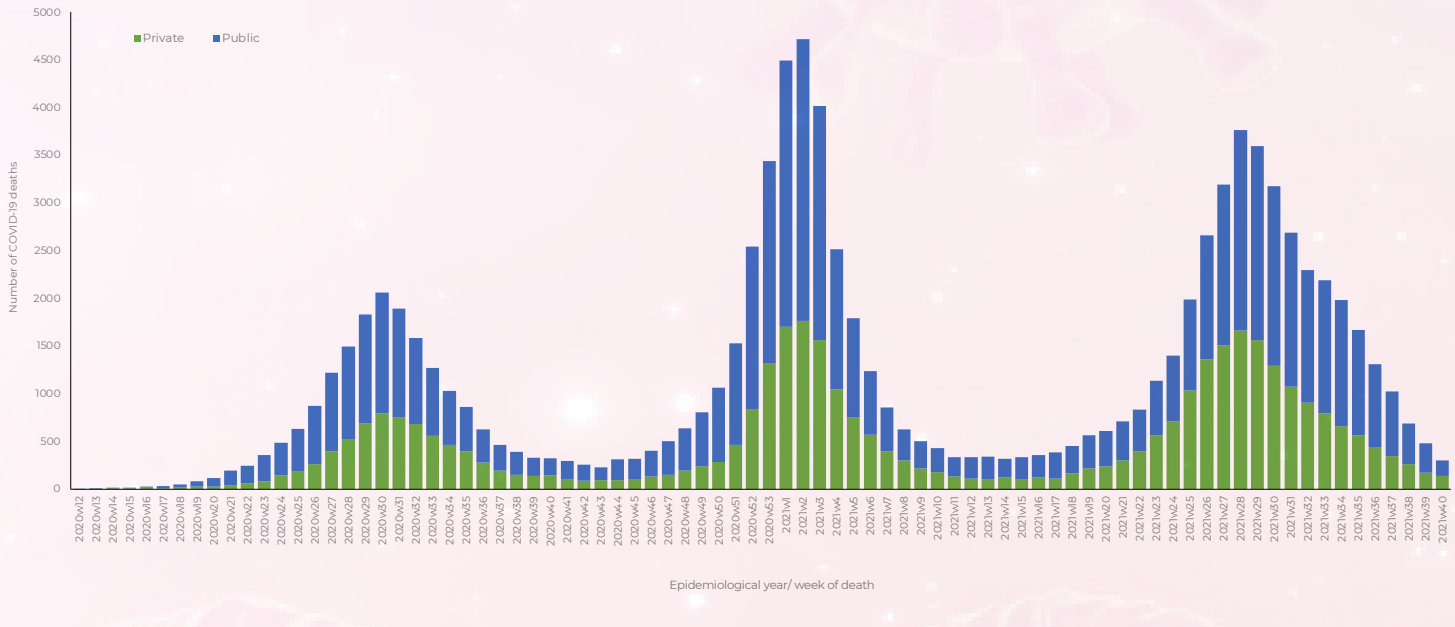


Figure 4: Number of COVID-19 deaths reported per week by health sector and epidemiologic year and week, South Africa, 5 March 2020-9 October 2021, n=93,127

Most deaths were reported in Gauteng (27,372, 29.4%), Western Cape (16,965,18.2%), KwaZulu-Natal (15,462, 16.6%) and Eastern Cape (12,059,13.0%) (Figure 5). The numbers of COVID-19 deaths have decreased in all provinces over the past twelve weeks.

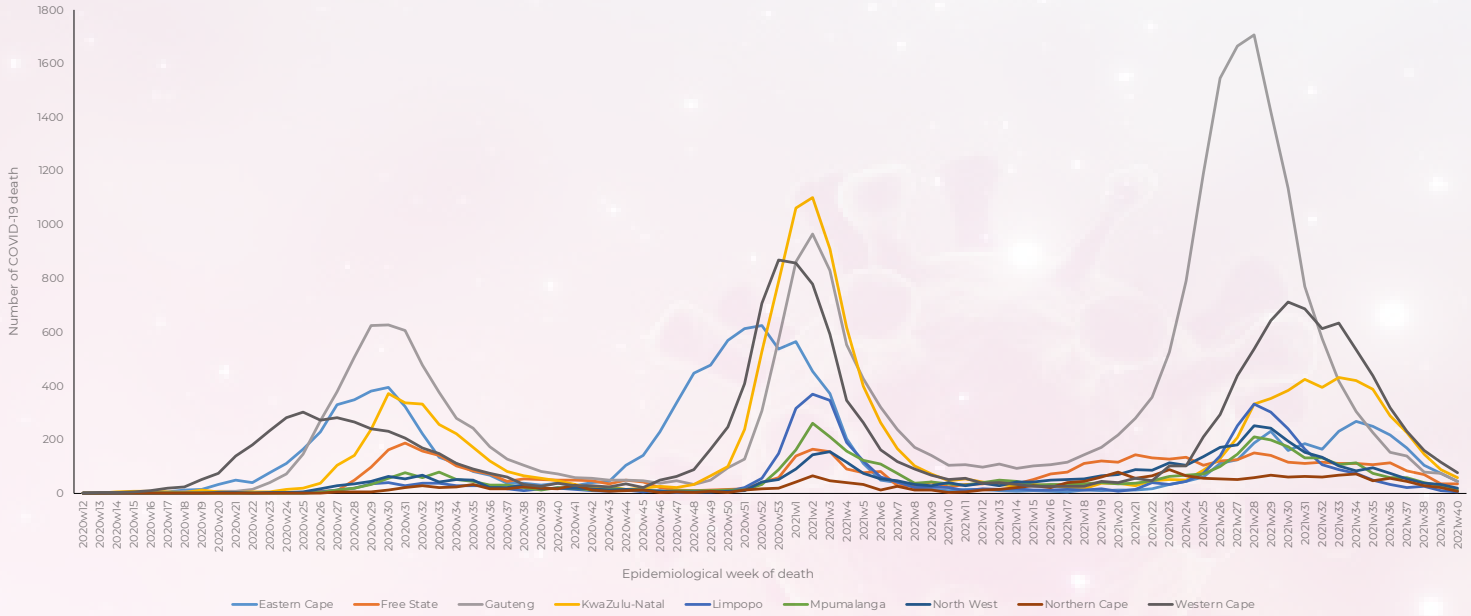


Figure 5: Number of reported COVID-19 deaths, by province and epidemiological years and week of death, South Africa, 5 March 2020-9 October 2021, n=93,127

DEMOGRAPHIC CHARACTERISTICS OF DEATHS

The median age of patients who died was 63 (IQR 53–73) years, and for those who were discharged alive was 50 (IQR 36 – 62) years. There were 642 (0.7%) deaths in children aged ≤18 years, many of these deaths were in children with serious underlying comorbid conditions. There were 7,052 (7.5%) deaths in patients younger than 40 years (Figure 6). The CFR was higher in males (25.6%) than females (22.2%) ($p<0.001$).

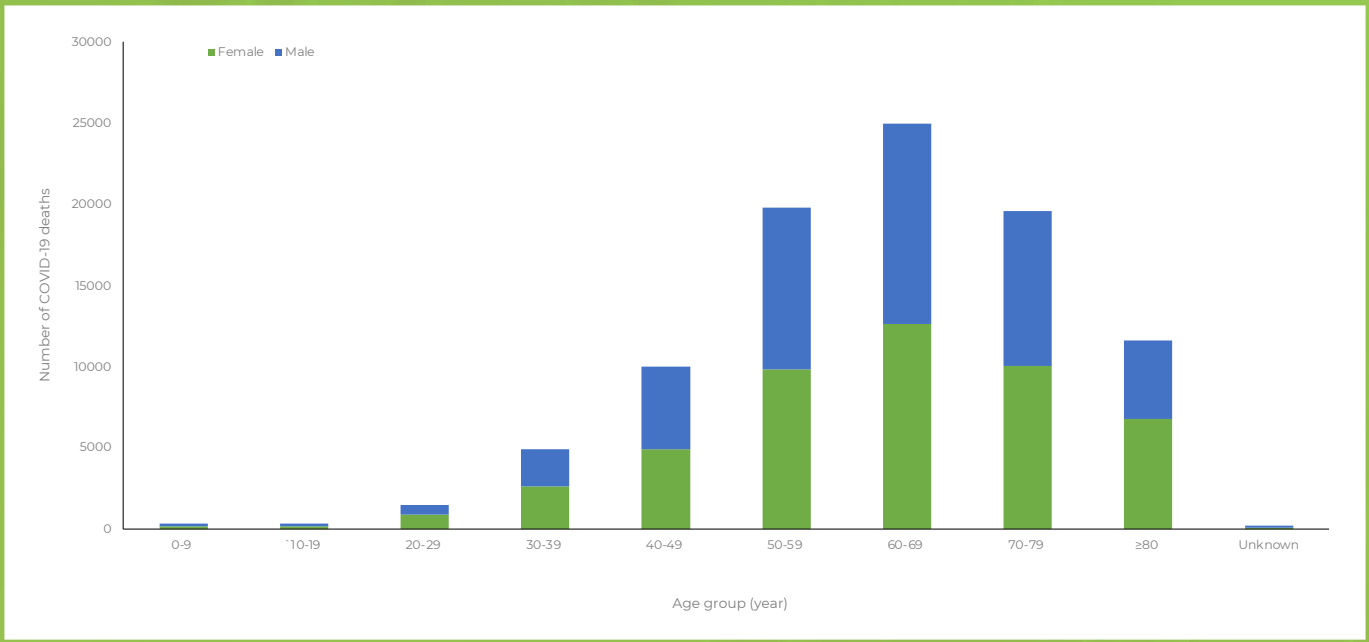


Figure 6: Number of reported COVID-19 deaths by age and gender, South Africa, 5 March 2020-9 October 2021, n=93,127

COMMON COMORBIDITIES REPORTED AMONG DEATHS

In all age groups older than 40 years, hypertension and diabetes were most commonly reported comorbidities among patients who died. In patients between 20 and 60 years, HIV, tuberculosis and obesity were commonly reported (Figure 7).

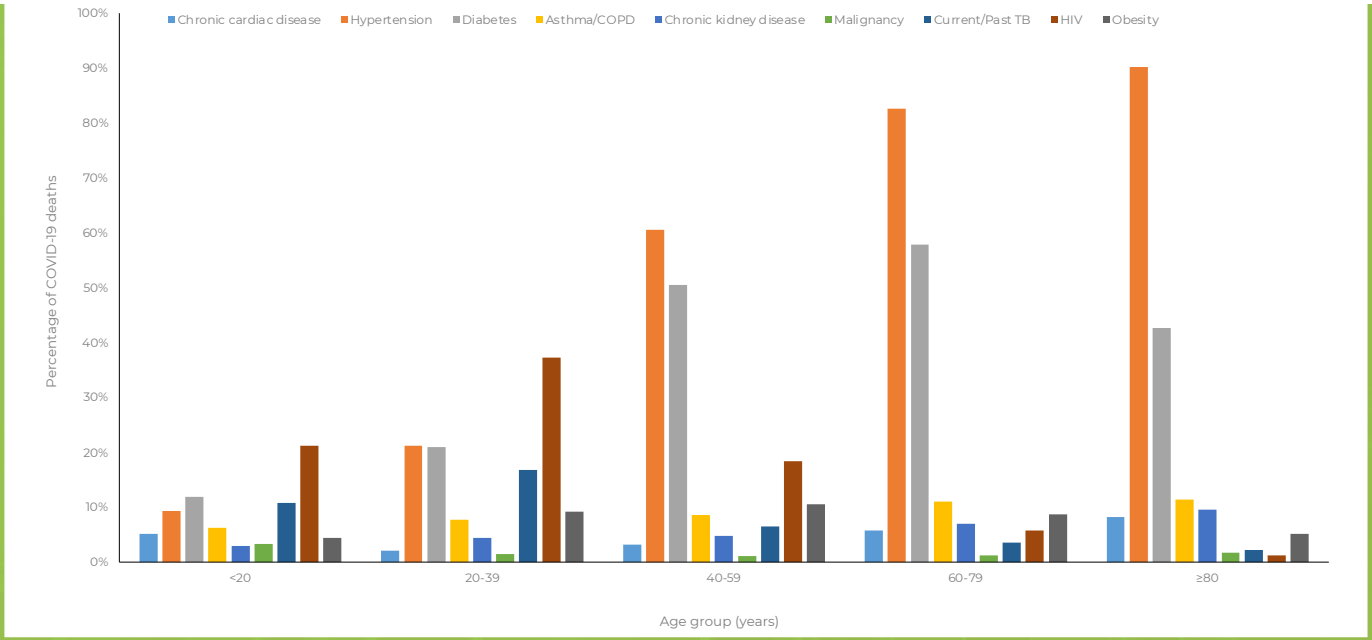


Figure 7: Frequency of comorbid conditions for reported COVID-19 deaths by age group, South Africa, 5 March 2020-9 October 2021, n=72,848

FACTORS ASSOCIATED WITH IN-HOSPITAL MORTALITY

On multivariable analysis, factors associated with in-hospital mortality were older age; male sex; black African, Coloured and Indian compared to white race; admission in the public sector; and having comorbid hypertension, diabetes, chronic cardiac disease, chronic renal disease, malignancy, HIV, current tuberculosis alone or both current and past tuberculosis, and obesity. Compared to March 2020, there was increased risk of mortality at the peak of each wave – wave 1 in May, June and July 2020, wave 2 in December 2020 and January 2021, and wave 3 in May, June and July 2021. Compared to the Western Cape Province, individuals hospitalised in Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West and Northern Cape provinces were more likely to die in-hospital (Table 3 and Figure 8).

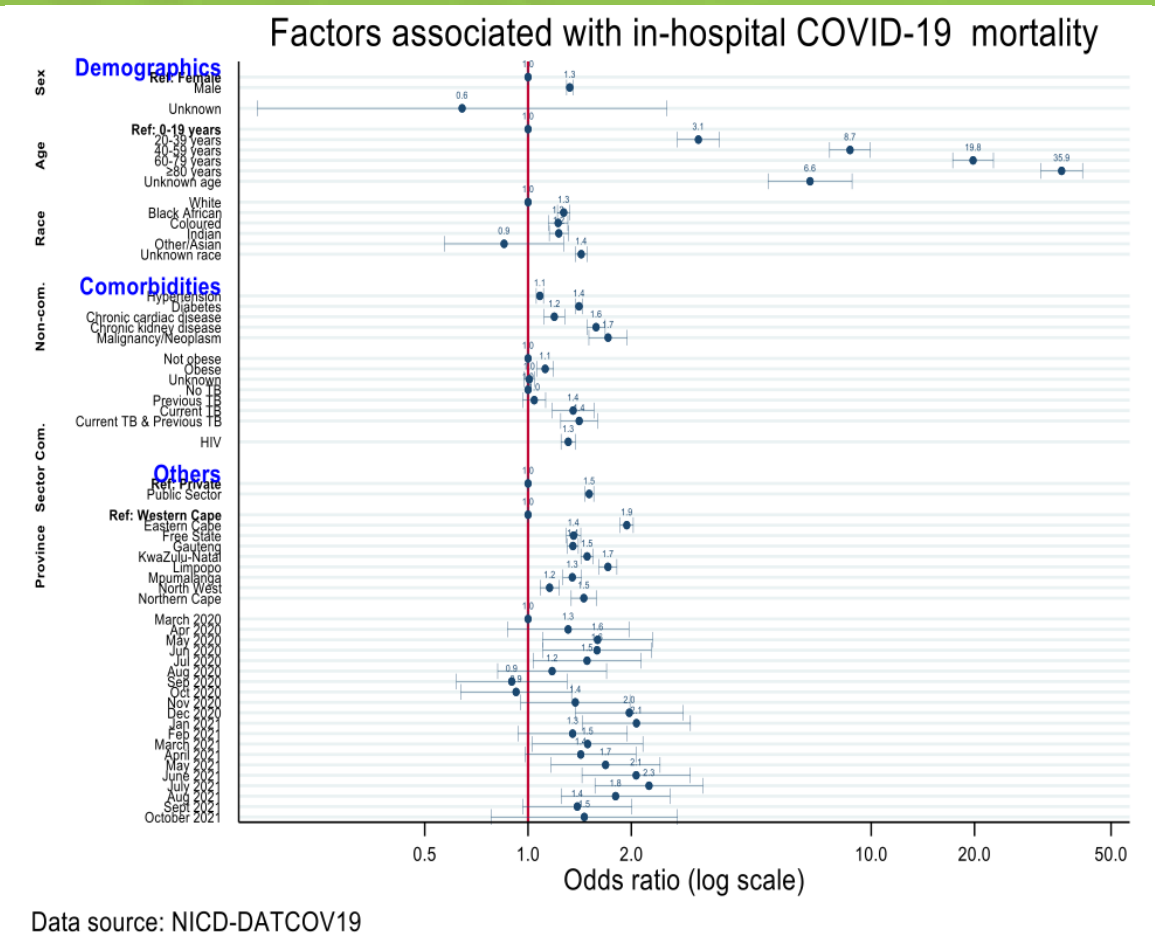
Table 3: Univariate and multivariable analysis of factors associated with mortality among 392,953 individuals with in-hospital outcome (discharges and deaths), South Africa, 5 March 2020 to 9 October 2021

Characteristic	Case-fatality ratio n/N (%)	Unadjusted OR (95% CI)	p-value	Adjusted OR* (95% CI)	p-value
Age group					
<20 years	642/18,295 (3.5)	Reference		Reference	
20-39 years	6,410/75,996 (8.4)	2.5 (2.3-2.8)	<0.001	3.1 (2.7-3.6)	<0.001
40-59 years	29,755/144,965 (20.5)	7.1 (6.6-7.9)	<0.001	8.7 (7.6-9.9)	<0.001
60-79 years	44,547/ 115,682 (38.5)	17.2 (15.9-18.6)	<0.001	19.8 (17.2-22.7)	<0.001
≥80 years	11,595/23,806 (48.7)	26.1 (24.0-28.4)	<0.001	35.8 (31.2-41.3)	<0.001
Unknown age	178/2,075 (8.6)	2.5 (2.2-3.1)	<0.001	6.6 (5.0-8.7)	<0.001
Sex					
Female	48,056/210,329 (22.8)	Reference		Reference	
Male	45,036/170,281 (26.5)	1.2 (1.1-1.2)	<0.001	1.3 (1.3-1.4)	<0.001
Race					
White	7,149/30,640 (23.3)	Reference		Reference	
Black	47,516/182,919 (26.0)	1.2 (1.2-1.3)	<0.001	1.3 (1.2-1.4)	<0.001
Coloured	4,469/17,913 (25.0)	1.1 (1.1-1.2)	<0.001	1.2 (1.1-1.3)	<0.001
Indian	3,221/13,560 (23.8)	1.0 (0.9-1.1)	0.335	1.3 (1.2-1.4)	<0.001
Other	167/725 (23.0)	0.9 (0.8-1.2)	0.851	0.9 (0.6-1.2)	0.429
Unknown	30,605/135,062 (22.7)	0.9 (0.8-0.9)	0.011	1.5 (1.4-1.6)	<0.001
Healthcare worker					
No	91,765/371,083 (24.7)	Reference			
Yes	1,362/9,736 (14.0)	0.5 (0.4-0.5)	<0.001		
Peri-partum					
No	8,177/73,343 (11.1)	Reference			
Yes	341/11,268 (3.0)	0.2 (0.2-0.3)	<0.001		

Comorbid condition					
No co-morbidity	25,567/141,691 (18.0)	Reference			
1 co-morbid condition	23,165/82,893 (28.0)	1.7 (1.7-1.8)	<0.001		
2 comorbid conditions	18,110/51,836 (34.9)	2.4 (2.4-2.5)	<0.001		
≥3 comorbid conditions	6,006/17,156 (35.1)	2.4 (2.3-2.5)	<0.001		
Unknown	20,279/87,243 (23.2)	1.4 (1.3-1.4)	<0.001		
Hypertension					
No	35,566/181,922 (19.6)	Reference		Reference	
Yes	34,211/102,606 (33.3)	2.1 (2.0-2.1)	<0.001	1.1 (1.1-1.2)	<0.001
Diabetes mellitus					
No	42,678/208,070 (20.5)	Reference		Reference	
Yes	24,266/69,320 (35.0)	2.1 (2.0-2.1)	<0.001	1.4 (1.3-1.4)	<0.001
Chronic cardiac disease					
No	57,924/251,825 (23.0)	Reference		Reference	
Yes	2,387/6,221 (38.4)	2.1 (1.9-2.2)	<0.001	1.2 (1.1-1.3)	0.001
Chronic pulmonary disease/Asthma					
No	55,180/239,269 (23.1)	Reference			
Yes	4,784/18,089 (26.5)	1.2 (1.1-1.2)	0.001		
Chronic renal disease					
No	56,819/250,039 (22.7)	Reference		Reference	
Yes	3,043/6,519 (44.7)	2.9 (2.8-3.1)	<0.001	1.5 (1.5-1.7)	<0.001
Malignancy					
No	58,898/254,412 (23.2)	Reference		Reference	
Yes	616/1,596 (38.6)	2.1 (1.9-2.3)	<0.001	1.7 (1.5-1.9)	<0.001
HIV					
No	55,207/240,199 (22.9)	Reference		Reference	
Yes	5,468/21,685 (25.2)	1.1 (1.1-1.2)	<0.001	1.3 (1.3-1.4)	<0.001
Tuberculosis					
No	55,361/241,155 (22.9)	Reference		Reference	
Previous	1,238/4,787 (25.8)	1.2 (1.1-1.2)	<0.001	1.0 (0.9-1.2)	0.290
Current	362/1,413 (25.6)	1.2 (1.0-1.3)	0.018	1.4 (1.2-1.6)	<0.001
Current and previous	479/2,033 (23.6)	1.0 (0.9-1.2)	0.519	1.4 (1.2-1.6)	<0.001
Obesity					
No	17,142/71,796 (23.8)	Reference		Reference	
Yes	4,244/14,082 (30.1)	1.4 (1.3-1.4)	<0.001	1.1 (1.1-1.2)	<0.001
Unknown	69,522/283,848 (24.5)	1.0 (1.0-1.1)	0.001	1.0 (0.9-1.0)	0.632

Month of admission					
March 2020	48/407 (11.7)	Reference		Reference	
April 2020	188/1,478 (12.7)	1.1 (0.8-1.6)	0.617	1.3 (0.8-1.9)	0.196
May 2020	1,072/5,809 (18.5)	1.7 (1.2-2.3)	0.001	1.6 (1.1-2.3)	0.014
June 2020	3,792/18,153 (20.9)	1.9 (1.5-2.7)	<0.001	1.6 (1.1-2.2)	0.013
July 2020	8,584/38,389 (22.4)	2.2 (1.6-3.0)	<0.001	1.4 (0.9-2.1)	0.032
August 2020	3,847/19,770 (19.5)	1.8 (1.4-2.5)	<0.001	1.2 (0.8-1.6)	0.386
September 2020	1,362/8,878 (15.3)	1.3 (1.0-2.0)	0.052	0.9 (0.6-1.3)	0.563
October 2020	1,210/7,774 (15.6)	1.4 (1.0-1.9)	0.041	0.9 (0.6-1.3)	0.673
November 2020	2,517/11,047 (22.8)	2.2 (1.7-2.9)	<0.001	1.3 (0.9-1.8)	0.090
December 2020	10,858/39,773 (27.3)	2.8 (2.1-3.7)	<0.001	2.0 (1.4-2.8)	<0.001
January 2021	15,882/53,209 (30.0)	3.2 (2.4-4.3)	<0.001	2.0 (1.4-2.9)	<0.001
February 2021	2,571/12,471 (20.5)	1.9 (1.4-2.6)	<0.001	1.2 (0.9-1.8)	0.110
March 2021	1,498/7,615 (19.7)	1.8 (1.3-2.4)	0.001	1.5 (1.0-2.2)	0.035
April 2021	1,633/7,442 (21.9)	2.1 (1.6-2.8)	<0.001	1.4 (0.9-2.0)	0.061
May 2021	3,328/13,656 (24.4)	2.4 (1.8-3.2)	<0.001	1.7 (1.2-2.4)	0.005
June 2021	8,718/32,481 (26.8)	2.7 (2.0-3.7)	<0.001	1.9 (1.3-2.7)	<0.001
July 2021	14,713/52,155 (28.2)	2.9 (2.3-3.9)	<0.001	2.1 (1.5-3.2)	<0.001
August 2021	8,367/35,666 (23.5)	2.3 (1.7-3.1)	<0.001	1.8 (1.3-2.6)	0.002
September 2021	2,831/14,014 (20.2)	1.9 (1.4-2.6)	<0.001	1.4 (0.9-2.0)	0.077
October 2021	105/594 (17.7)	1.6 (1.1-2.3)	0.012	1.5 (0.8-2.7)	0.237
Health sector					
Private sector	36,816/184,024 (20.0)	Reference		Reference	
Public sector	56,311/196,795 (28.6)	1.6 (1.6-1.7)	<0.001	1.5 (1.5-1.6)	<0.001
Province					
Western Cape	16,965/75,109 (22.3)	Reference		Reference	
Eastern Cape	12,059/37,834 (31.8)	1.6 (1.5-1.6)	<0.001	2.0 (1.9-2.1)	<0.001
Free State	5,469/22,928 (23.8)	1.1 (1.1-1.2)	<0.001	1.4 (1.4-1.5)	<0.001
Gauteng	27,372/116,318 (23.5)	1.1 (1.1-1.1)	<0.001	1.3 (1.3-1.4)	<0.001
KwaZulu-Natal	15,462/63,047 (24.5)	1.1 (1.1-1.2)	<0.001	1.5 (1.4-1.6)	<0.001
Limpopo	4,777/15,593 (30.6)	1.5 (1.5-1.7)	<0.001	1.7 (1.6-1.9)	<0.001
Mpumalanga	4,418/16,598 (26.6)	1.2 (1.2-1.4)	<0.001	1.3 (1.2-1.4)	<0.001
North West	4,397/24,753 (17.8)	0.7 (0.6-0.7)	<0.001	1.2 (1.0-1.2)	<0.001
Northern Cape	2,208/8,639 (25.6)	1.2 (1.1-1.2)	<0.001	1.5 (1.3-1.6)	<0.001
Ever ICU					
No	65,432/327,743 (20.0)	Reference			
Yes	27,695/53,076 (52.2)	4.3 (4.2-4.4)	<0.001		
Ever High Care					
No	82,037/348,265 (23.6)	Reference			
Yes	11,090/32,554 (34.1)	1.7 (1.6-1.7)	<0.001		
Ever ventilated					
No	75,955/355,304 (21.4)	Reference			
Yes	17,172/25,515 (67.3)	7.6 (7.4-7.8)	<0.001		
Ever on oxygen					
No	41,904/214,683 (19.5)	Reference			
Yes	51,223/166,136 (30.8)	1.8 (1.8-2.9)	<0.001		

* Multivariable model excluded all individuals with unknown comorbid conditions



Data source: NICD-DATCOV19

Figure 8: Multivariable analysis of factors associated with mortality among 392,953 individuals with in-hospital outcome (discharges and deaths), South Africa, 5 March 2020 to 9 October 2021

DISCUSSION

DATCOV currently includes 392,953 admissions from 667 public and private hospitals in all nine provinces in South Africa. It also includes 93,127 deaths that have been reported to date.

The findings confirm factors associated with in-hospital mortality were older age; male sex; Black, Indian and Coloured race; and having comorbid hypertension, diabetes, chronic cardiac disease, chronic renal disease, malignancy, HIV, current and previous tuberculosis, and obesity.

Trends in CFR over time and provincial differences may be affected by many factors such as hospital admission criteria, timeousness of closing cases, testing criteria in different provinces, and the severity of illness in admitted cases.

The availability of reliable surveillance data is of critical importance to gain a better understanding of the epidemiology of COVID-19 in South Africa, to monitor the COVID-19 epidemic and to respond with adequate control measures. It has been suggested that when local transmission is widespread and testing strategies change, hospital admission or mortality surveillance systems provide a more reliable picture of the epidemic progression than overall confirmed case numbers.

DATCOV provides real-time data and summary analyses, which inform modelling and reporting at a national level. It also addresses a knowledge gap, in the lack of data from low and middle income countries (LMIC), allowing for analysis of COVID-19 epidemiology in a country with a younger population, unique disease profile with epidemics of both infectious (HIV and tuberculosis) and non-communicable diseases, and an overburdened public health system.

LIMITATIONS

DATCOV now includes reporting from all hospitals with COVID-19 admissions but there may be incomplete submission of historic data. Data quality in a surveillance system is dependent on the information submitted by healthcare institutions. It is not possible for the NICD to verify or check the quality of all these data, however, the NICD has built-in data quality checks. Delays in reporting of admissions and deaths may affect the numbers reported in the most recent week. The National Department of Health have recruited data capturers in eight provinces to support hospitals to improve data submission.

In patients with non-communicable diseases, the current data collection platform is not able to distinguish between those that had pre-existing disease and those that were newly-diagnosed; and between those with well- or poorly-controlled disease.

Data on socioeconomic status are not collected. Data on treatment and medical interventions have not been analysed because the data were incomplete. Efforts are ongoing to improve the quality and completeness of data on symptom of these data will be included in future reports.

As hospitals reached capacity, admission criteria may change and therefore influence trends and inferences about the progression of the epidemic. DATCOV only reports hospital-based admissions and deaths and therefore does not include deaths occurring outside hospitals. DATCOV now has a module to record out-of-hospital deaths.

ACKNOWLEDGEMENTS

All public and private sector hospitals submitting data to DATCOV
Private hospital groups submitting data to DATCOV:

- Netcare
- Life Healthcare
- Mediclinic Southern Africa
- National Hospital Network (NHN)
- Clinix Health Group
- Lenmed
- Joint Medical Holdings (JMH)

Table 4: Number of reported COVID-19 admissions and deaths by age and gender, South Africa, 5 March 2020 to 9 October 2021

	ADMISSIONS				DEATHS			
Age (years)	Female	Male	Unknown	Total	Female	Male	Unknown	Total
0-4	3525	285	26	7836	136	145	2	283
5-9	992	1255	7	2254	20	22	0	42
10-14	1640	1586	6	3232	52	47	0	99
15-19	4802	2574	3	7379	113	110	0	223
20-24	7488	3745	5	11238	272	208	1	481
25-29	12394	5642	10	18046	616	399	0	1015
30-34	16427	9489	8	25924	1056	864	1	1921
35-39	17851	13201	17	31069	1575	1448	4	3027
40-44	17015	15151	11	32177	1994	2033	0	4027
45-49	19489	19158	16	38663	2939	3064	3	6006
50-54	23043	21365	9	44417	4061	4169	2	8232
55-59	25773	23307	19	49099	5812	5793	7	11612
60-64	22618	20647	18	43283	6230	6411	4	12645
65-69	19388	17210	15	36613	6437	5965	5	12407
70-74	16143	14175	17	30335	5652	5477	5	11134
75-79	11929	9777	11	21717	4422	4087	2	8511
80-84	9007	6126	7	15140	3586	2752	3	6341
85-89	4720	2902	2	7624	1955	1422	0	3377
90-94	2048	983	1	3032	952	522	0	1474
>=95	615	305	2	922	297	130	0	427
Unknown	1084	1070	45	2199	71	107	0	178
Total	**237991**	**193953**	**255**	**432199**	**48248**	**45175**	**39**	**93462**