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FOREWORD

Care home residents are generally at high risk for SARS-CoV-2. Data for SARS-CoV-2 cases reported from 42 long-term care facilities ('care homes') in South Africa that serve as DATCOV sentinel surveillance sites show an encouraging trend of decreasing cases from the first to the second COVID-19 waves, and a decreasing risk of mortality. Risk factors for mortality among care home residents were age over 60 years and chronic kidney disease, notwithstanding other comorbidities as identified for the general populace.

This is the eleventh special issue of our COVID-19 series, and we trust that the information it contains will be of interest to all stakeholders in the care home service. As the third COVID-19 wave rages in South Africa, we encourage our readers to be especially vigilant by adopting all publicized measures to reduce the risk of infection and rate of transmission.

Prof Basil Brooke - Editor

SARS-CoV-2 CASES REPORTED FROM LONG TERM CARE FACILITIES (CARE HOMES) IN SOUTH AFRICA

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SUMMARY

Data for SARS-CoV-2 cases reported from 42 long-term care facilities ('care homes') that serve as DATCOV sentinel surveillance sites in eight provinces across South Africa are reported for the period 5 March 2020 to 12 March 2021. During this period, 1,976 SARS-CoV-2 cases, of whom 1,220 (62%) were residents and 756 (38%) staff, were reported. The majority of cases were reported from four provinces, 549 (28%) in Gauteng, 360 (18%) in KwaZulu-Natal, 294 (15%) in Free State and 243 (12%) in Eastern Cape. Psychiatric facilities reported the most cases (808, 41%), followed by old age homes (362, 18%), retirement villages (342, 17%), substance abuse recovery facilities (276, 14%) and frail care facilities (188, 10%). Among sentinel care homes, 6 (14%) reported sporadic cases only. Of the 36 that experienced outbreaks, 8 (22%) reported one and 28 (78%) reported more than one outbreak, while 17 (47%) reported small outbreaks and 19 (53%) reported large outbreaks of 20 or more cases. During COVID-19 wave 1 in South Africa, there were 1,240 cases and 71 deaths with a case fatality risk (CFR) of 6%. During wave 2 there were 351 cases and 28 deaths with a CFR of 8%. Among residents, the median age of SARS-CoV-2 cases was 58 years (IQR 41-74) and 669/1,222 (55%) were male. Among 1,191 (97%) residents for whom data on comorbidities were collected, 285 (24%) had comorbid condition(s). Of these, 200 (70%) had one comorbid condition, 64 (23%) had reported two comorbid conditions and 21 (7%) had three or more comorbid conditions. The most common comorbidities were hypertension (199, 17%), diabetes mellitus (66, 6%) and chronic cardiac disease (50, 4%). Among all cases in residents, 1,080 (89%) recovered, 4 (0.3%) were active cases, 10 (0.8%) were currently admitted to hospital and 126 (10%) had died. The CFR of closed cases amongst residents was 126/1,026 (10%). Among staff, the median age of SARS-CoV-2 cases was 42 years IQR (34-51) and 653/756 (86%) were female. Among 732 (97%) staff for whom data on comorbidities was collected,

104 (14%) had comorbid condition(s). Of these, 82 (79%) had one comorbid condition, 19 (18%) had two comorbid conditions and three (3%) had 3 or more comorbid conditions. The most common comorbid conditions among staff were hypertension (68, 9%), diabetes mellitus (27, 4%), HIV (15 , 2%) and asthma (14, 2.0%). Among all cases in staff, 698 (92%) recovered, 54 (7%) were active cases and 4 (0.5%) had died. The CFR of closed cases amongst staff was 4/702 (0.6%). On multivariable analysis, factors associated with SARS-CoV-2 mortality among care home residents were age group 60-79 years (54/391, 13.8%; aOR 5.7, 95% CI 2.5-12.7) and ≥80 years (43/184, 23.4%; aOR 10.7, 95% CI 4.6-24.5) compared to <40 years; chronic kidney disease (4/8, 50%; aOR 5.8, 95%CI 1.5-27.0) and pre-wave 1 period (25/118, 21.2%; aOR 2.1, 95% CI 1.2-3.6) compared to wave 1. The analysis of SARS-CoV-2 cases in sentinel care homes in South Africa points to an encouraging trend of decreasing cases from the first to the second wave, and a decreasing risk of mortality. This is likely due to improved measures to limit transmission and administer appropriate clinical care.

BACKGROUND

The COVID-19 pandemic has greatly impacted on long-term care facilities ('care homes'), with outbreaks reported in many countries, affecting residents, staff and visitors. In the early period of the pandemic, countries in Europe and North America reported that a significant proportion of the total number of deaths due to the SARS-CoV-2 infection occurred in nursing homes.[1] Close living conditions put this population at risk for SARS-CoV-2 transmission. Advanced age and the presence of comorbid conditions among residents are risk factors for poor COVID-19 outcomes.[1,2]

The care home structure in South Africa is complex, fragmented and largely based on care of the elderly. South Africa provides old-age pensions to persons who are financially disadvantaged[3], and all persons aged 60 and older are eligible for free primary healthcare, while access to hospital care is free only for those who are not able to afford it.[4,5] This includes long-term care services such as residential care services, rehabilitation services, and substance abuse recovery centres. In South Africa, an estimated 1,150 residential care homes exist for the elderly and 1,000 private long-term care facilities for older persons.[5]

In addition to old age and retirement homes, many people are housed in congregate settings such as mental health and substance abuse facilities. The availability of long-term care facilities reflects urban-rural and historical racial divides, and most are managed by non-governmental and faith-based organisations. The standard of care in these facilities varies in quality.[5]

South Africa experienced a first wave of COVID-19 that peaked in July 2020 and a second wave that peaked in January 2021. By 17 April 2021, 1 566 769 SARS-CoV-2 cases and 53 736 deaths had been reported.[6]

DATCOV, a hospital surveillance system for COVID-19 admissions, was initiated on 1 April 2020 and then subsequently expanded to include sentinel surveillance in care homes, implemented on 4 June 2020. Data are submitted by Care Homes that have agreed to report COVID-19 cases via the DATCOV care homes module. Participation in the care homes surveillance was voluntary and currently only a small number of facilities in the country have joined. When new facilities enrolled, they captured historical cases going back to their first recorded SARS-CoV-2 case.

The aim of this study was to describe the demographics, characteristics and risk factors for mortality among residents and staff who tested positive for SARS-CoV-2 in 42 care homes across South Africa.

METHODS

DATCOV is an active prospective sentinel surveillance system. This report describes the characteristics of SARS-CoV-2 positive cases in care homes across South Africa from 5 March 2020 – 12 March 2021, and the risk factors for COVID-19 mortality in this group. Data were collected from 42 care homes across eight provinces in South Africa, with the highest proportions of participating facilities being in KwaZulu-Natal (10, 23.8%) and Mpumalanga provinces (11, 26.2%) (Table 1).

Table 1. Number of care homes reporting data on COVID-19 admissions by province, South Africa, 5 March 2020 – 12 March 2021.

Province	Number of care homes n (%)
Eastern Cape (EC)	4 (9.5)
Free State (FS)	4 (9.5)
Gauteng (GP)	6 (14.2)
KwaZulu-Natal (KZN)	10 (23.8)
Limpopo (LP)	1 (2.4)
North West (NW)	1 (2.4)
Western Cape (WC)	5 (12.0)
Mpumalanga (MP)	11 (26.2)
South Africa	42 (100)

Definitions of care homes: A wide range of long-term residential facilities or congregate settings were included in the sentinel surveillance, including old age homes, retirement villages, frail care centres, substance abuse centres and mental health facilities. An old age home is defined as a care home where residents require daily care in a comfortable, safe and active environment.[7] Retirement villages are defined as accommodating places that provide an independent lifestyle for those who do not need additional living assistance.[13] A frail care centre is defined as a place giving care to those who are unable to care for themselves as a result of a motor-vehicle accident, physical disability, severe stroke or old age.[7] Psychiatric and mental hospitals are defined as specialized hospital-based facilities that provide inpatient care and long-stay residential services for people with mental disorders. These facilities are usually independent and stand-alone, although they may have some links with the rest of the healthcare system.[7] Substance abuse rehabilitation treatment facilities are defined as centres helping patients make positive changes in their lives by rectifying maladaptive behaviours, and they provide help with recovery from substance use disorders.[8]

The most common types of care home reporting to DATCOV were old age homes (19, 45.2%) and retirement villages (11, 26.2%) (Table 2). A list of care homes is provided in Supplementary Table 1, that indicates the numbers of residents and staff in each care home, the numbers of cases reported, and the proportion of residents and staff infected.

Table 2. Number of care homes reporting COVID-19 admission by type, South Africa, 5 March 2020 – 12 March 2021.

Category of care home	Number of care homes n (%)
Frail care	2 (4.8)
Old age	19 (45.2)
Psychiatric/Mental	6 (14.3)
Retirement village	11 (26.2)
Substance abuse recovery	4 (9.5)
Total	42 (100)

Study population: The study population included all care home residents and staff with a positive reverse transcriptase polymerase chain reaction (RT-PCR) result or rapid antigen test for SARS-CoV-2, among participating care homes across South Africa.

For the purpose of this study, we defined an outbreak in a care home as follows:

- A small outbreak was defined as ≥2 cases and less than or equal to 20, in residents or staff of a care home, with an epidemiological link, within a 14-day period, who had a confirmed SARS-CoV-2 diagnosis.[9]
- A large outbreak was defined as >20 cases, residents and staff of a care home combined, with an epidemiologic link, within a 14-day period, who had a confirmed SARS-CoV-2 diagnosis.

The first, second and pre- and post-wave periods were defined by the case incidence data with a national weekly incidence of 30 cases per 100,000 as cut off for start and end of wave periods:

- Pre-wave-1: epidemiologic weeks 10 – 23 (1 March – 6 June 2020)
- First wave: epidemiologic weeks 24 – 34 (7 June – 22 August 2020)
- Post-wave 1: epidemiologic weeks 35 – 46 (23 August – 14 November 2020)
- Second wave: epidemiologic weeks 47 of 2020 – week 5 of 2021 (15 November 2020 – 6 February 2021)
- Post-wave 2: epidemiological weeks 6 - 10 (7 February - 12 March 2021)

Data collection and management: Data collection was either through direct entry onto the DATCOV online platform via the care homes module or through importation of electronic data via bulk-upload for care homes that did not have a stable internet connection. If a resident or staff member tested positive for SARS-CoV-2, the dedicated data entry clerk in the care home would complete the electronic data form. The case reporting form was adapted from the World Health Organisation (WHO) SARS-CoV-2 case reporting tool and included basic demographic data, pre-existing health conditions including obesity, and outcomes (died and recovered).

Data imports contained validation checks to identify data errors. Routine checks were performed on all data. Missing and discrepant data were followed up telephonically or by email with the submitting person.

Covariates: Age, race, sex and comorbidities (hypertension, diabetes mellitus, chronic cardiac disease, asthma, other chronic respiratory disease, chronic renal disease, malignancy in the past five years, HIV, past and current tuberculosis) and obesity were included in models assessing risk factors for COVID-19 mortality. The care home reported HIV status by confirmation of previous HIV ELISA test result; and antiretroviral status. COVID-19 mortality was defined as a death related to SARS-CoV-2 that

occurred at the care home or while being admitted to hospital, and excluded deaths that occurred due to other causes or after recovery.

Data analysis: Descriptive statistics including frequencies and percentages were used for categorical variables, while for continuous variables a median and interquartile range (IQR) were calculated.
A multivariable logistic regression model was used to assess risk factors for mortality amongst care home residents. For each multivariable model we assessed all variables that were significant at $p<0.2$ on univariate analysis and dropped non-significant factors ($p\geq0.05$) with manual backward elimination. Pairwise interactions were assessed by inclusion of product terms for all variables remaining in the final multivariable additive model. We also reported the univariate association of all covariates evaluated in the analyses described above to the main outcomes (COVID-19 mortality). The statistical analysis was implemented using Stata 15 (Stata Corp®, College Station, Texas, USA).
Ethical considerations: The data used for this study were de-identified to assure confidentiality. All personal information of the residents and staff, concerning health status, treatment or stay in a health establishment, were kept confidential and stored in a secure server. For analysis, patient identifiers were de-linked from other data and stored separately. Ethical approval for this study was obtained from the University of the Witwatersrand Human Research Ethics Committee (M160667).

RESULTS

Characteristics of COVID-19 patient admissions

As of 12 March 2021, 1,976 COVID-19 cases were reported from 42 facilities in eight of nine provinces in South Africa. The majority of COVID-19 cases in care homes were reported from four provinces, 549 (27.8%) in Gauteng, 360 (18.2%) in KwaZulu-Natal, 294 (13.5%) in Free State and 243 (14.8%) in Eastern Cape. (Figure 1).

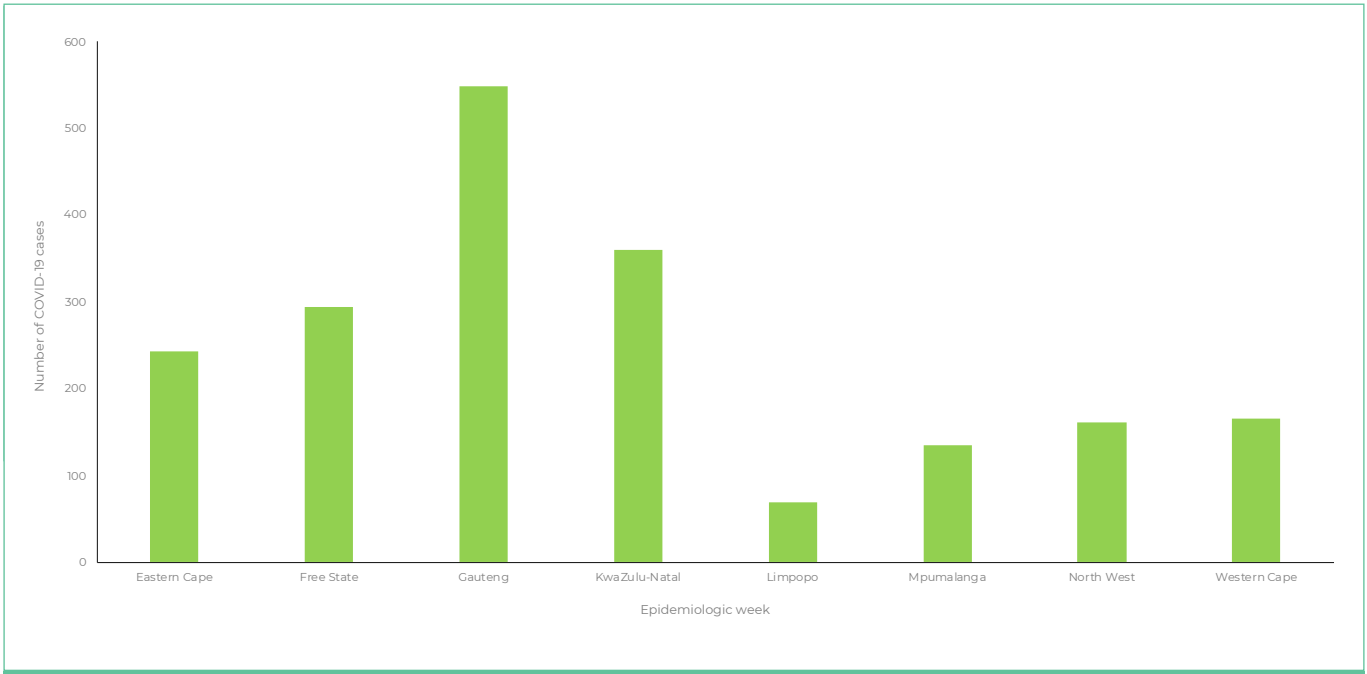

Figure 1. Number of SARS-CoV-2 cases in care homes, by province, South Africa, 5 March 2020 – 12 March 2021, n= 1,976.

Of the 1,976 cases reported from care homes, psychiatric facilities reported the most cases (808, 40.8%), of which 569 (70.4%) were residents and 239 (29.6%) were staff (Figure 2). This was followed by old age homes (362, 18.3%), retirement villages (342, 17.3 %), substance abuse recovery facilities (276, 14.0%) and frail care facilities (188, 9.5%). The proportion of cases amongst residents was higher than in staff in most facility types, but was roughly equal in retirement villages and substance abuse recovery sites. Supplementary Table 1 details the numbers of residents and staff that tested positive in each facility.

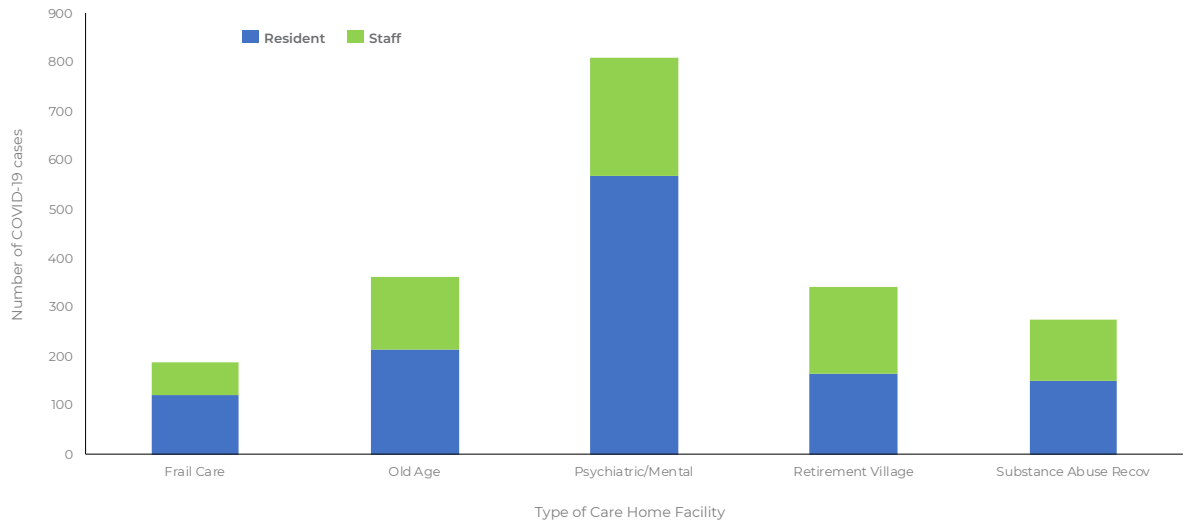

Figure 2. Number of SARS-CoV-2 cases in care homes by facility type, 5 March 2020 – 12 March 2021, South Africa, n=1,976.

Frail care centres reported 38.4% of residents and 19.6% of staff infected; while retirement villages reported 9.9% and 19.1%, old age homes 9.8% and 14.9%, psychiatric facilities 19.2% and 10.0% and substance abuse recovery centres 11.4% and 19.4% in residents and staff respectively (Figure 3). The proportion of residents and staff who were infected in care homes varied from 0-66.7% of residents; and from 0-92.6% of staff (Supplementary Table 1).

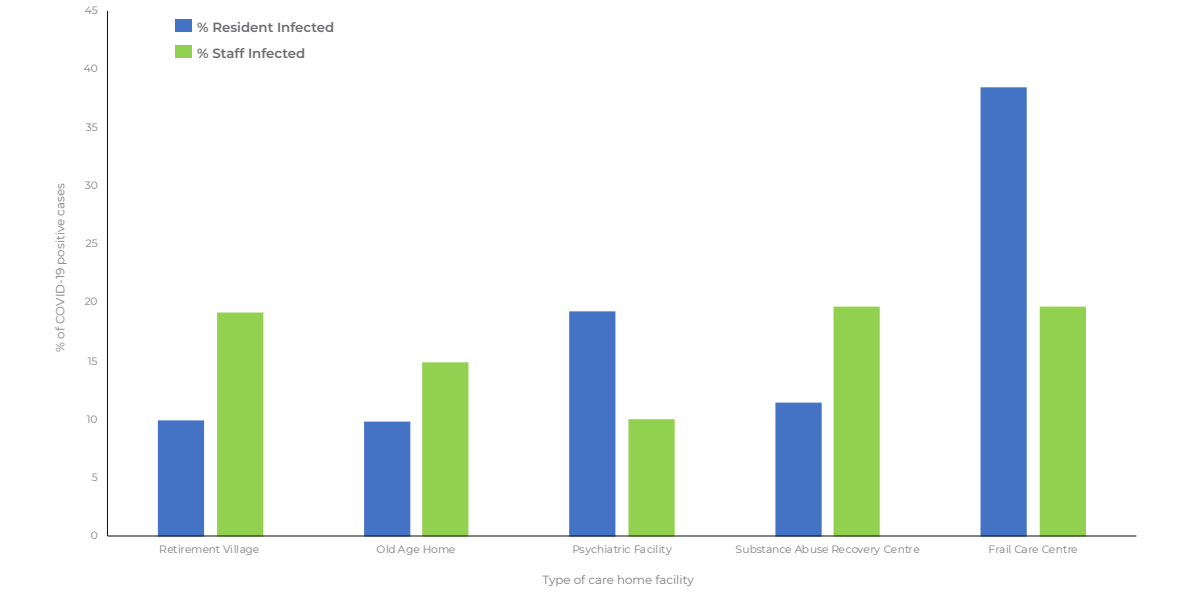

Figure 3. Proportion of SARS-CoV-2 infected care home residents and staff per facility type, South Africa, 5 March 2020 – 12 March 2021, n=1,976.

More SARS-CoV-2 cases from sentinel care homes were reported during the first wave (1,240; 62.7%) compared to the second wave (351; 17.8%) (Figure 4). There were 239 SARS-CoV-2 cases reported during pre-wave-1, 118 (49.4%) among residents and 121 (50.6%) among staff; 1,240 SARS-CoV-2 cases during the first wave, 793 (64.0%) among residents and 447 (36.0%) among staff; 137 SARS-CoV-2 cases during post-wave 1, 59 (43.1%) among residents and 78 (59.6%) among staff; 351 SARS-CoV-2 cases during the second wave, 242 (69.0%) among residents and 109 (31.0%) among staff; and nine SARS-CoV-2 cases during post-wave 2, eight (88.9%) among residents and one (11.1%) among staff.

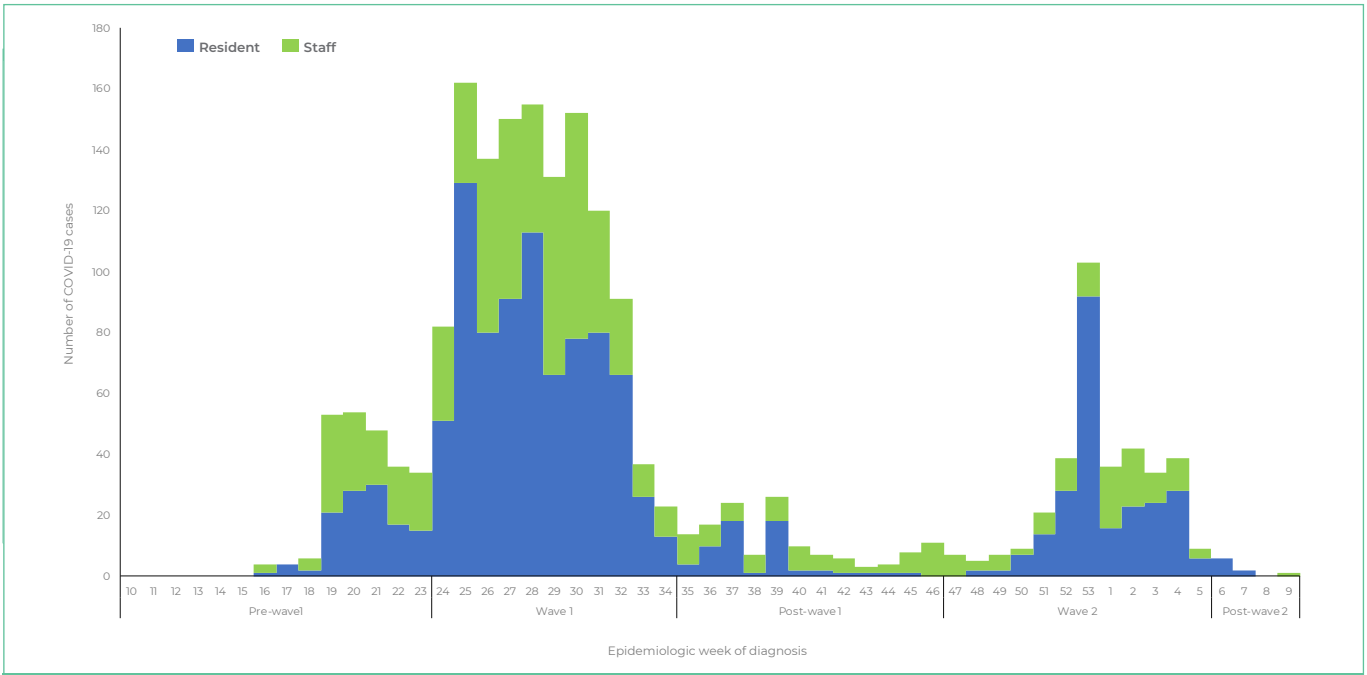

Figure 4. Number of SARS-CoV-2 cases in care homes by epidemiologic week, 5 March 2020 – 12 March 2021, South Africa, n=1,976.

There were varying patterns of outbreaks amongst the individual care homes, with six (14.0%) reporting no outbreaks, nine (20.9%) reporting one outbreak and 28 (65.1%) reporting more than one outbreak.
The six (14.0%) care homes reporting sporadic SARS-CoV-2 positive cases included four old age homes and two retirement villages (Figure 5).
Of the 36 care homes that reported SARS-CoV-2 outbreaks, the 17 (47.2%) that reported small outbreaks (<20 cases reported) included 10 (58.8%) old age homes, 4 (23.6%) retirement villages, 2 (11.8%) substance recovery abuse centres, and 1 (5.8%) frail care centre (Figure 6).
There were 19 (51.4%) care homes that reported at least one large SARS-CoV-2 outbreak (>20 cases): 6 (31.6%) psychiatric facilities, 5 (26.3%) old age homes, 5 (26.3%) retirement villages, 2 (10.5%) substance abuse recovery centres and 1 (5.3%) frail care centre (Figure 7).

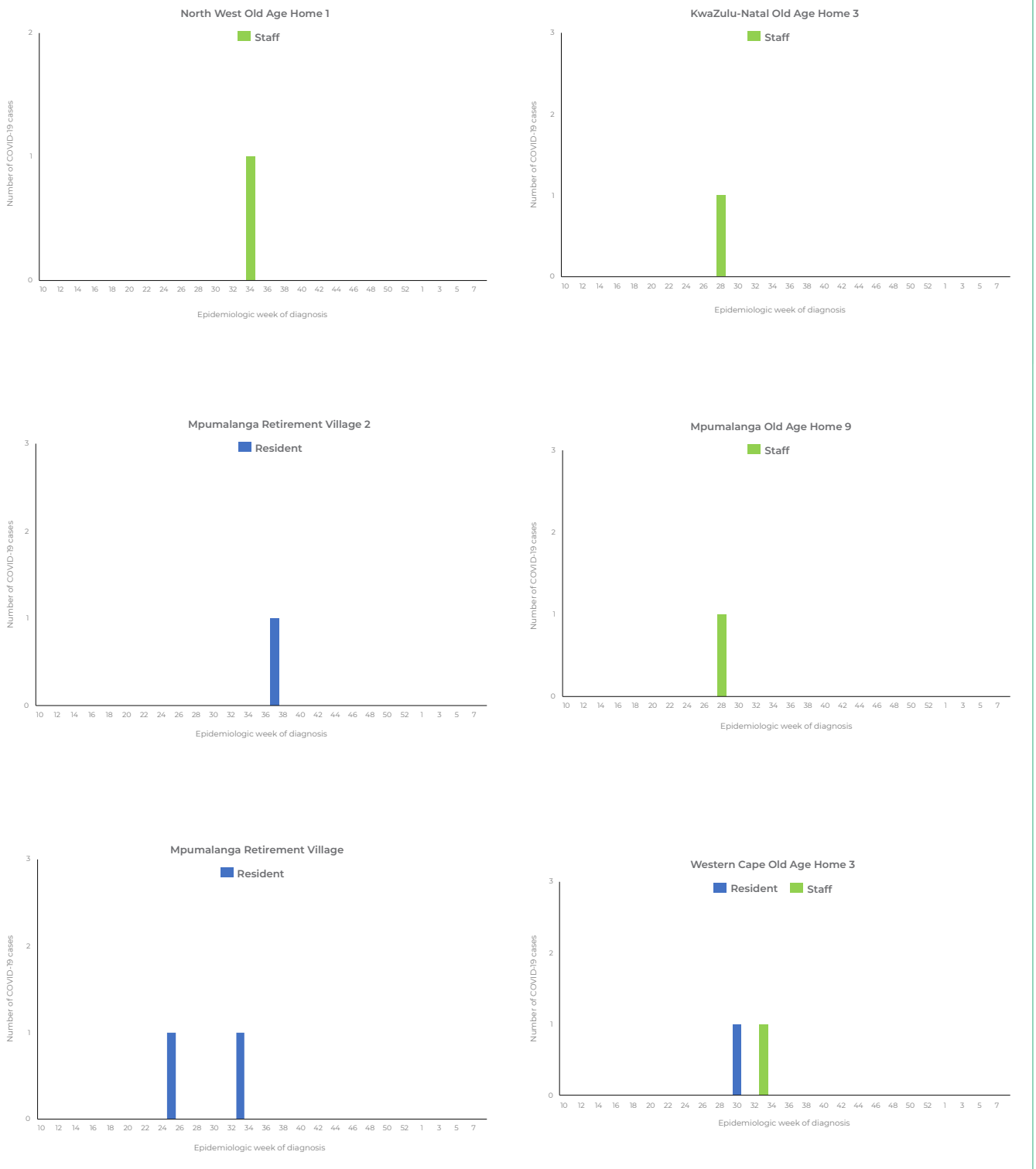

Figure 5. Care homes reporting sporadic SARS-CoV-2 cases, South Africa, 5 March 2020 – 12 March 2021, n=6.

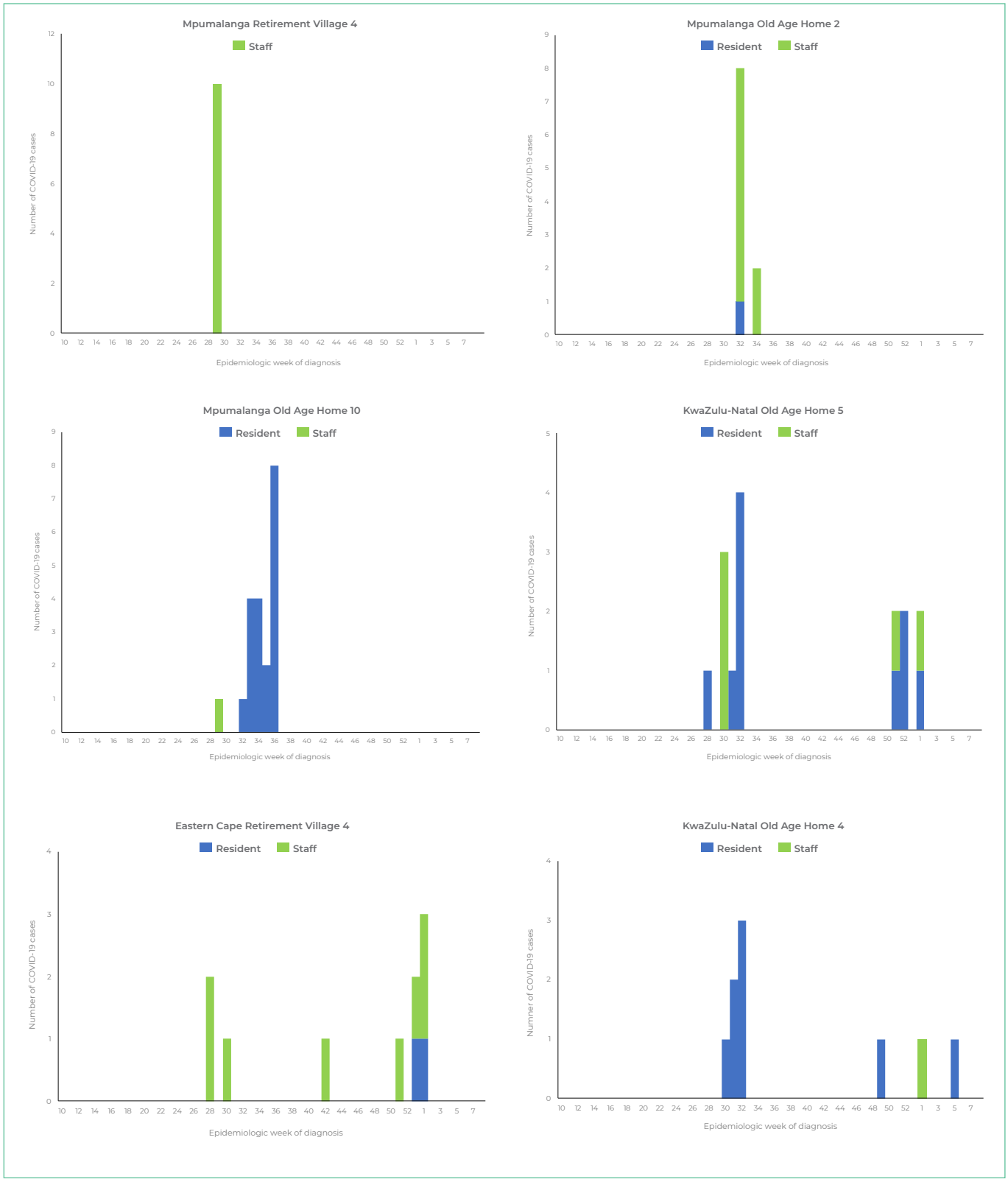

Figure 6. Care homes reporting small SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=17.

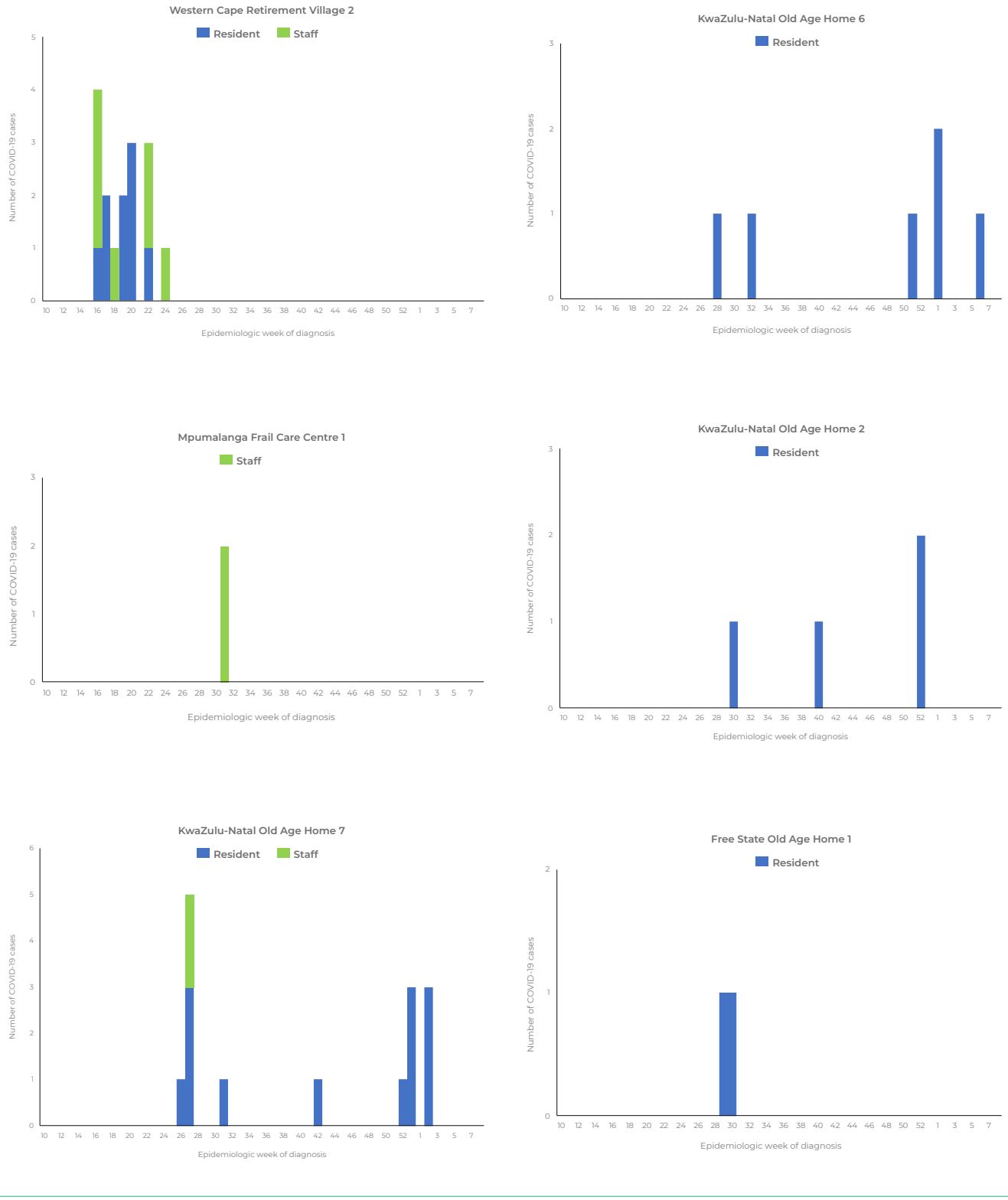

Figure 6. Care homes reporting small SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=17.

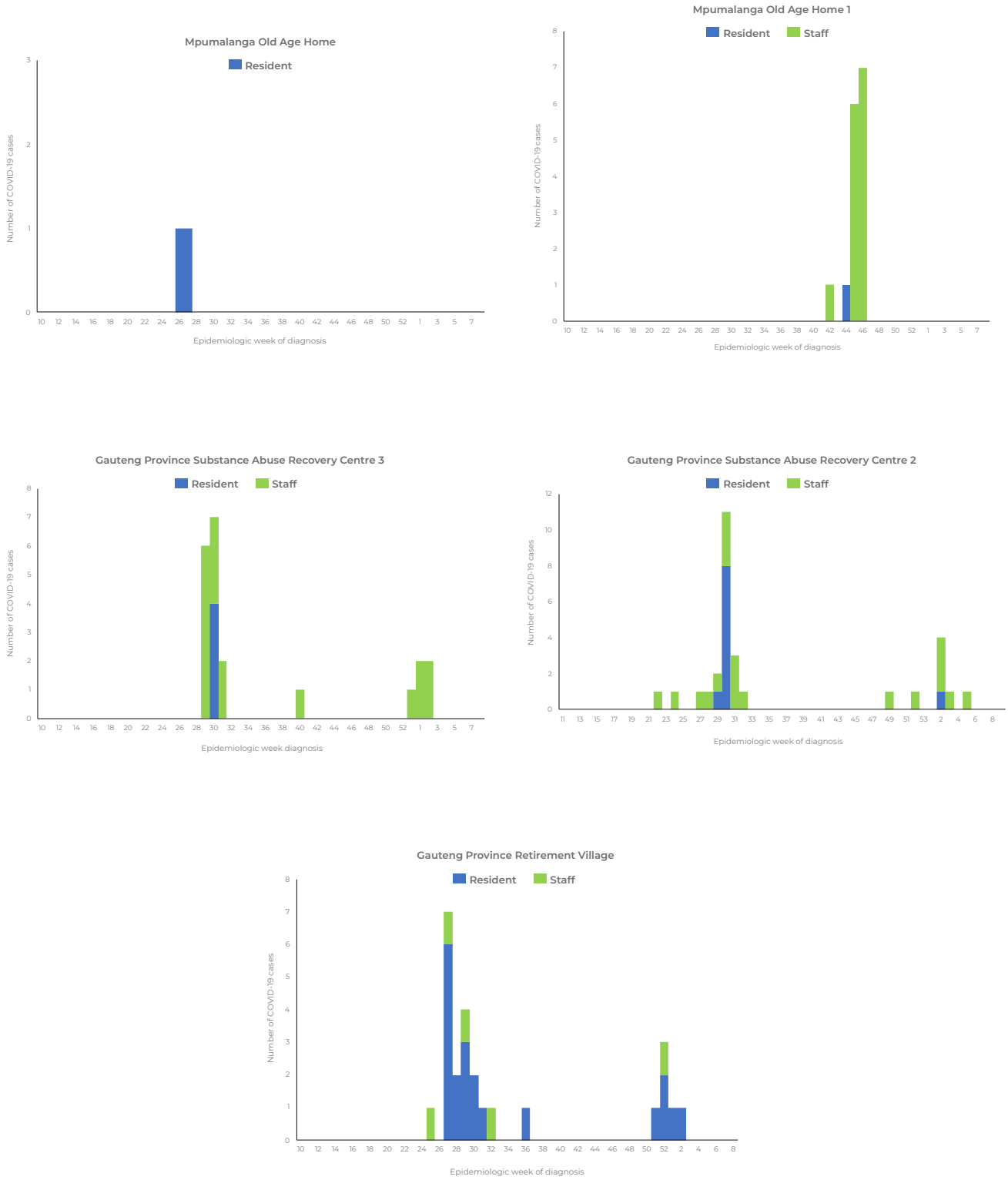

Figure 6. Care homes reporting small SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=17.

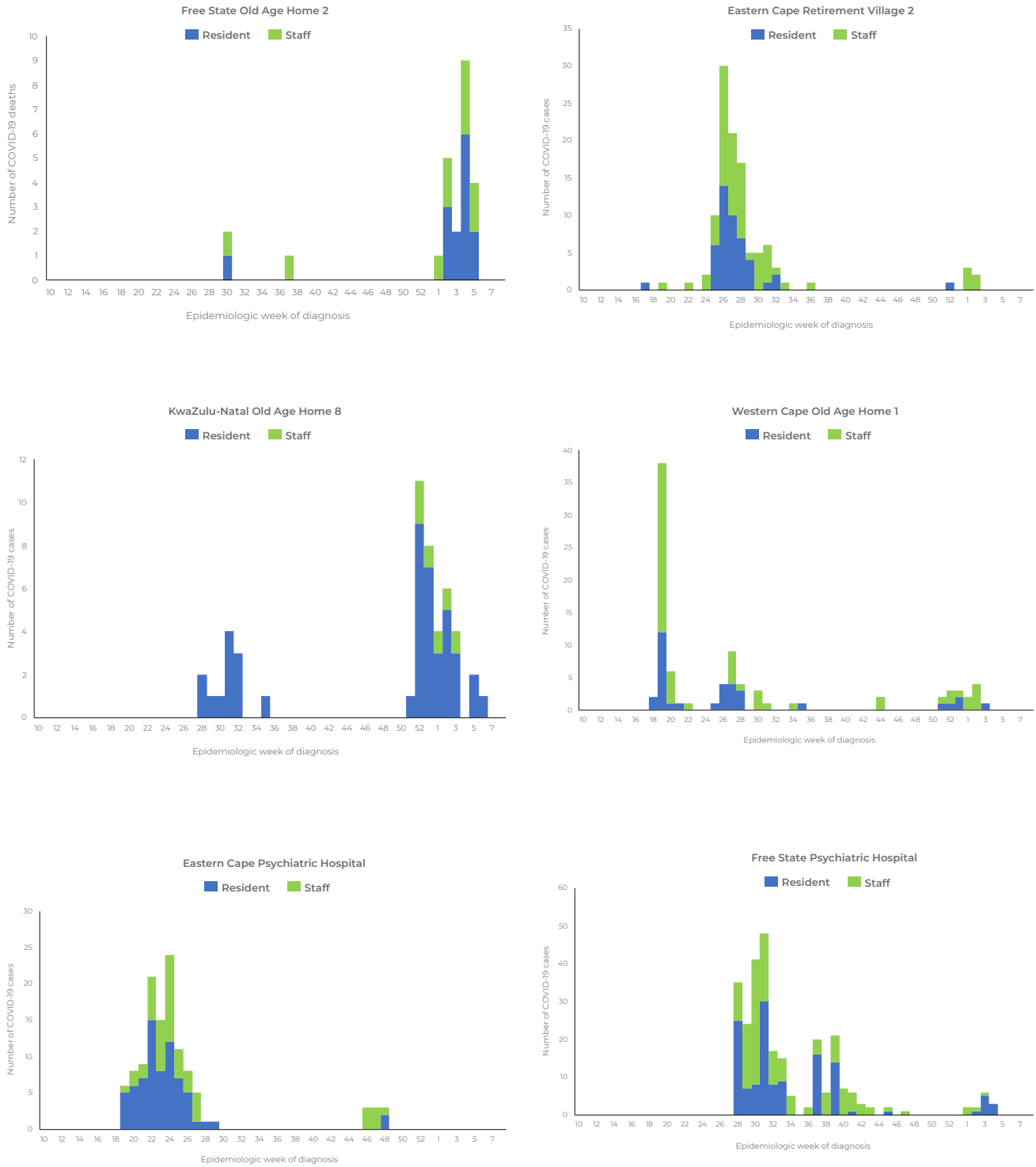

Figure 7. Care homes reporting large SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=19.

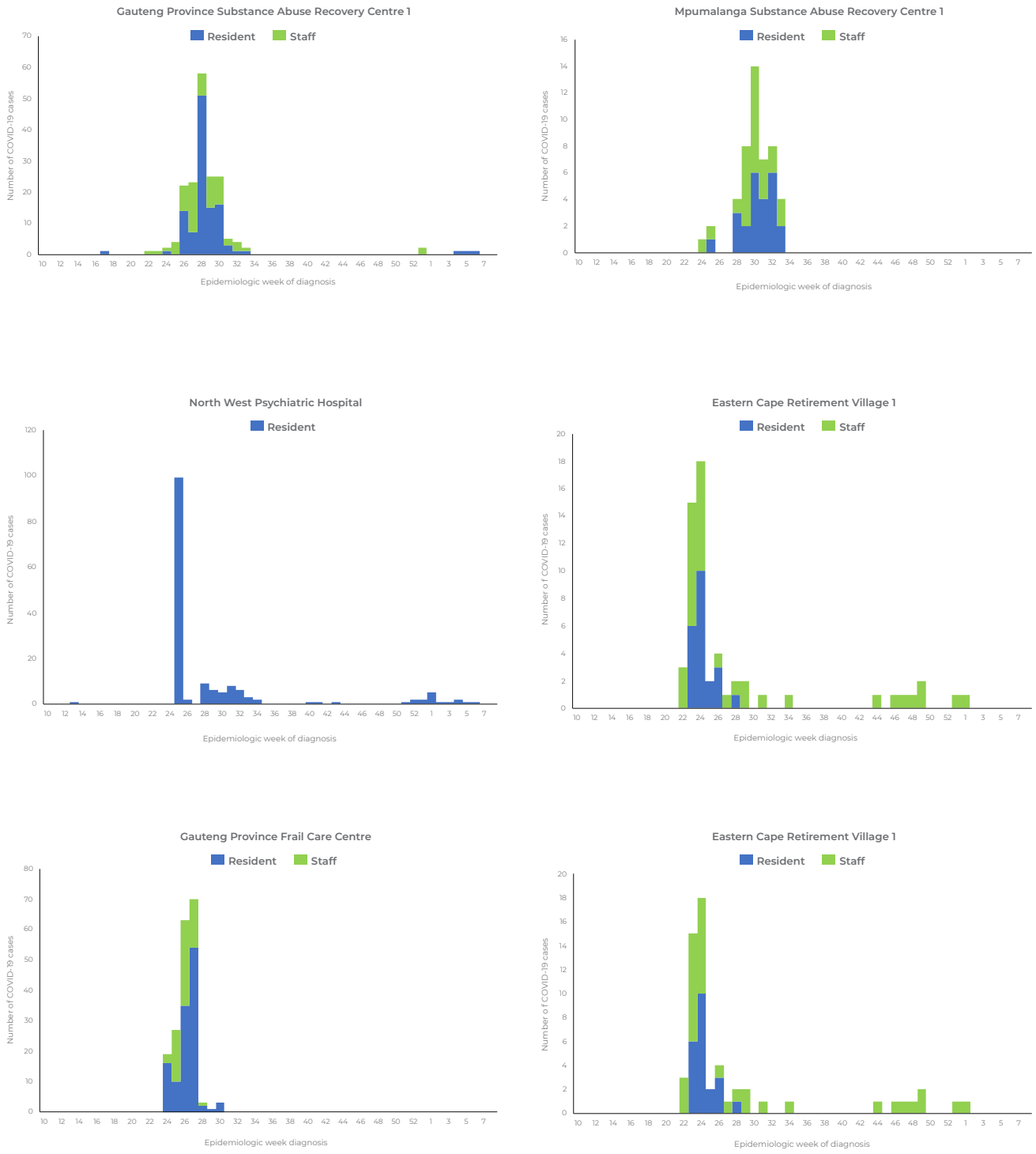

Figure 7. Care homes reporting large SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=19.

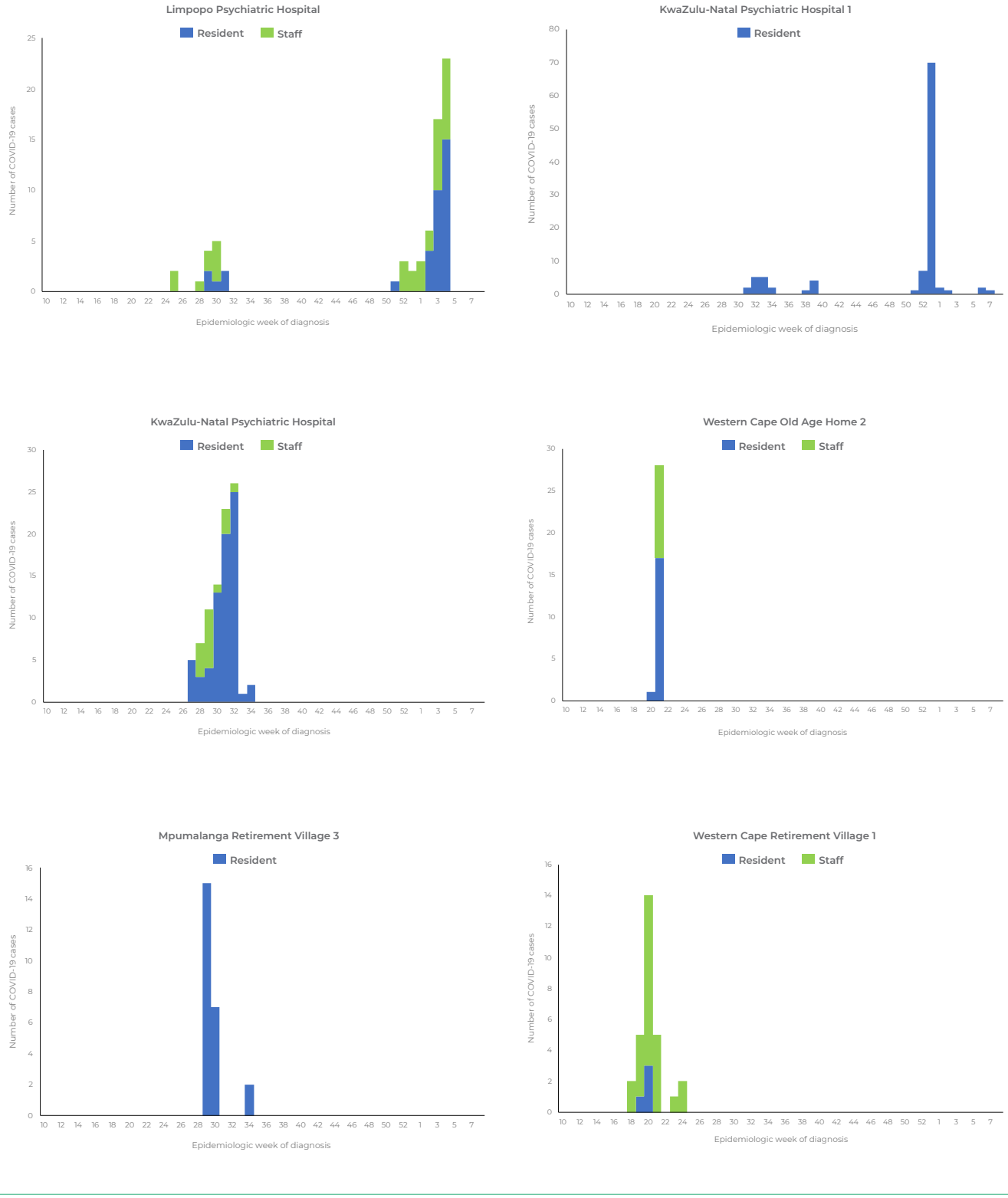

Figure 7. Care homes reporting large SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=19.

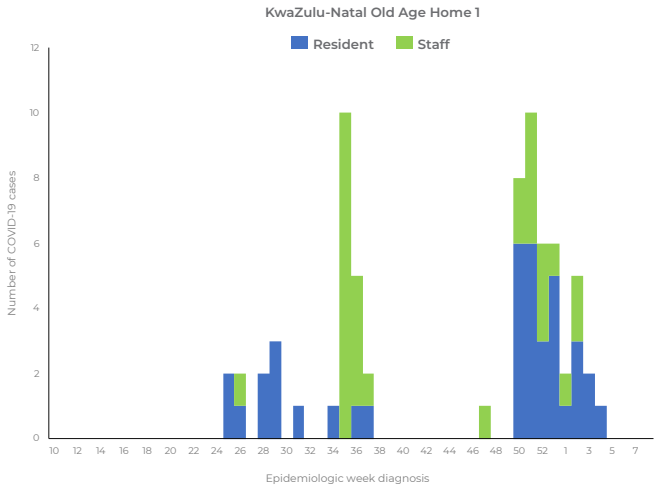

Figure 7. Care homes reporting large SARS-CoV-2 outbreaks, South Africa, 5 March 2020 – 12 March 2021, n=19.

Demographic and clinical characteristics of SARS-CoV-2 cases among care home residents

The median age of COVID-19 admissions among residents was 58 years (IQR 41-74) and 669/1,220 (54.8%) were male (Figure 8). Of the 1,217 (99.8%) residents for whom race was known, 595 (48.9%) were Black African, 486 (39.9%) were White, 86 (7.1%) were Coloured and 50 (4.1%) were Indian.

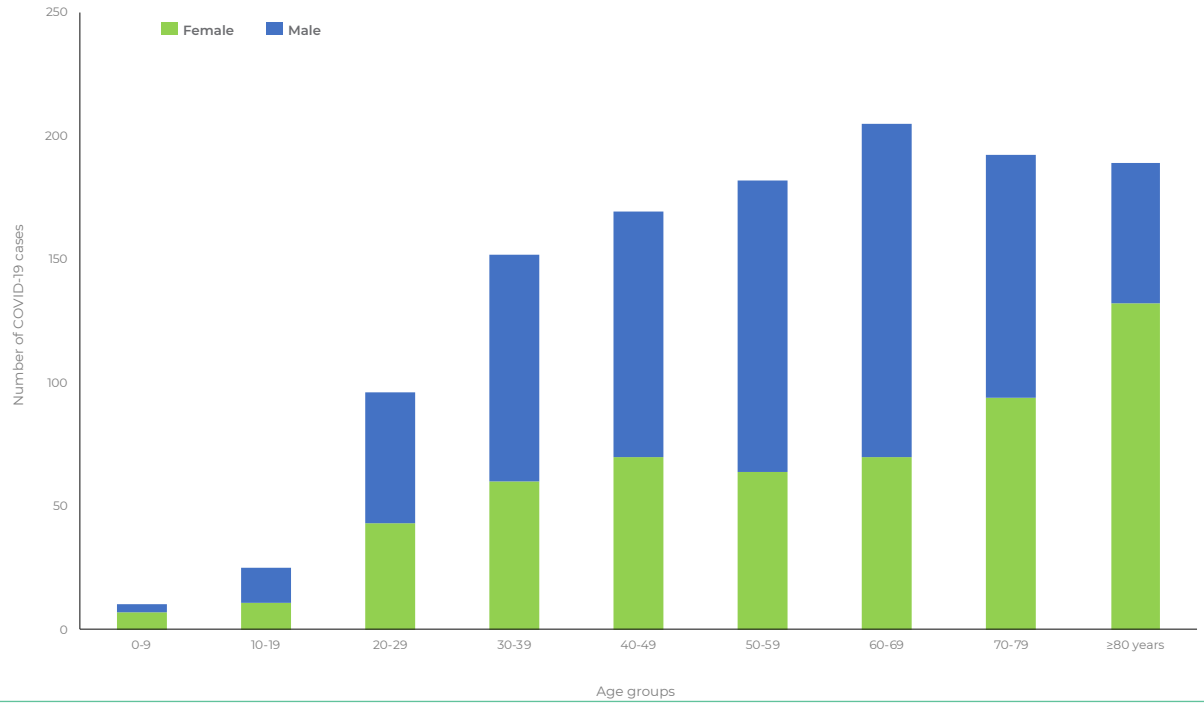

Figure 8. Numbers of reported SARS-CoV-2 cases among residents, by age and gender, South Africa, 5 March 2020– 12 March 2021, (n=1,220)

Among 1,191 (97.4%) residents for whom there were data on comorbidities, 285 (24%) had comorbid conditions. Of these, 200 (70.2%) had one comorbid condition, 64 (22.5%) had two and 21 (7.3%) had three or more comorbid conditions. The most common comorbid conditions among residents were hypertension (199, 16.7%), diabetes mellitus (66, 5.5%) and chronic cardiac disease (50, 17.5%) (Table 3).

Table 3. Comorbid diseases among SARS-CoV-2 positive residents reporting at least one condition, South Africa, 5 March 2020 –12 March 2021, (n=1,191).

Comorbid disease*	n	%
Hypertension	199	16.7
Diabetes mellitus	66	5.5
Chronic cardiac disease	50	4.2
Asthma	19	1.6
Chronic Pulmonary Disease	10	0.3
Chronic renal disease	8	0.7
Malignancy	11	0.9
HIV	29	2.3
Active TB	0	0
Previous history of TB	1	0.1
Obesity	10	0.3

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

Of the 1,210 SARS-CoV-2 positive residents with outcomes, 1,080 (89.3%) recovered, 4 (0.3%) were active cases and 126 (10.4%) had died, giving a case fatality ratio (CFR) of 10.4%. The CFR of closed cases amongst residents was 126/1,206 (10.5%).

Demographic and clinical characteristics of SARS-CoV-2 cases among care Home staff

The median age of COVID-19 admissions amongst staff was 42 years (IQR 34-51) and 653/756 (86.3%) were female (Figure 9). Of the 703 (93.0%) staff for whom race was known, 597 (85.0%) were Black African, 72 (10.2%) were Coloured, 7 (1.0%) were Indian and 27 (3.8%) were White.

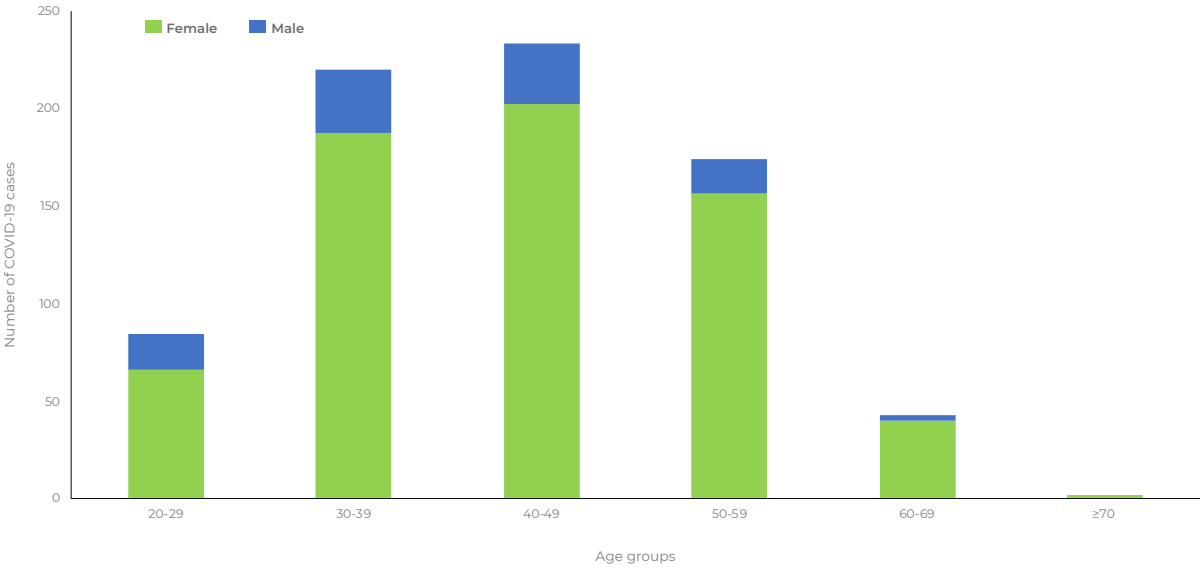

Figure 9. Numbers of reported SARS-CoV-2 cases among staff by age and gender, South Africa,5 March 2020 – 12 March 2021, (n=756).

Among 732 (96.8%) staff for whom there were data on comorbidities, 104 (14.2%) had comorbid conditions. Of these, 82 (78.8%) had one comorbid condition, 19 (18.2%) had two and three (2.9%) had 3 or more comorbid conditions. The most common comorbid conditions among staff were hypertension 68 (9.3%), diabetes mellitus 27 (3.7%), HIV 15 (2.0%) and asthma 14 (1.9%) (Table 4).

Table 4. Comorbid diseases among SARS-CoV-2 positive staff reporting at least one condition, South Africa, 5 March 2020 – 12 March 2021, (n=732).

Comorbid disease*	n	%
Hypertension	68	9.3
Diabetes mellitus	27	3.7
Chronic cardiac disease	1	0.1
Asthma	14	1.9
Chronic Pulmonary Disease	1	0.1
Chronic renal disease	0	0
Malignancy	3	0.4
HIV	15	2.0
Active TB	1	0.1
Previous history of TB	0	0
Obesity	1	0.1

Of the 756 SARS-CoV-2 positive staff with outcomes, 698 (92.3%) cases recovered, 54 (7.1%) were active cases and 4 (0.5%) had died, giving a case fatality ratio (CFR) of 0.5%. The CFR of closed cases amongst staff was 4/698 (0.6%).

Care home deaths by epidemiologic week

The number of deaths and CFR in the various epidemic periods were 26/239 (10.8%) in pre-wave 1; 71/1,240 (5.7%) during wave 1; 5/137 (3.6%) during post-wave 1; 28/351 (8.0%) during wave 2, and 0 during post-wave 2. (Figure 10).

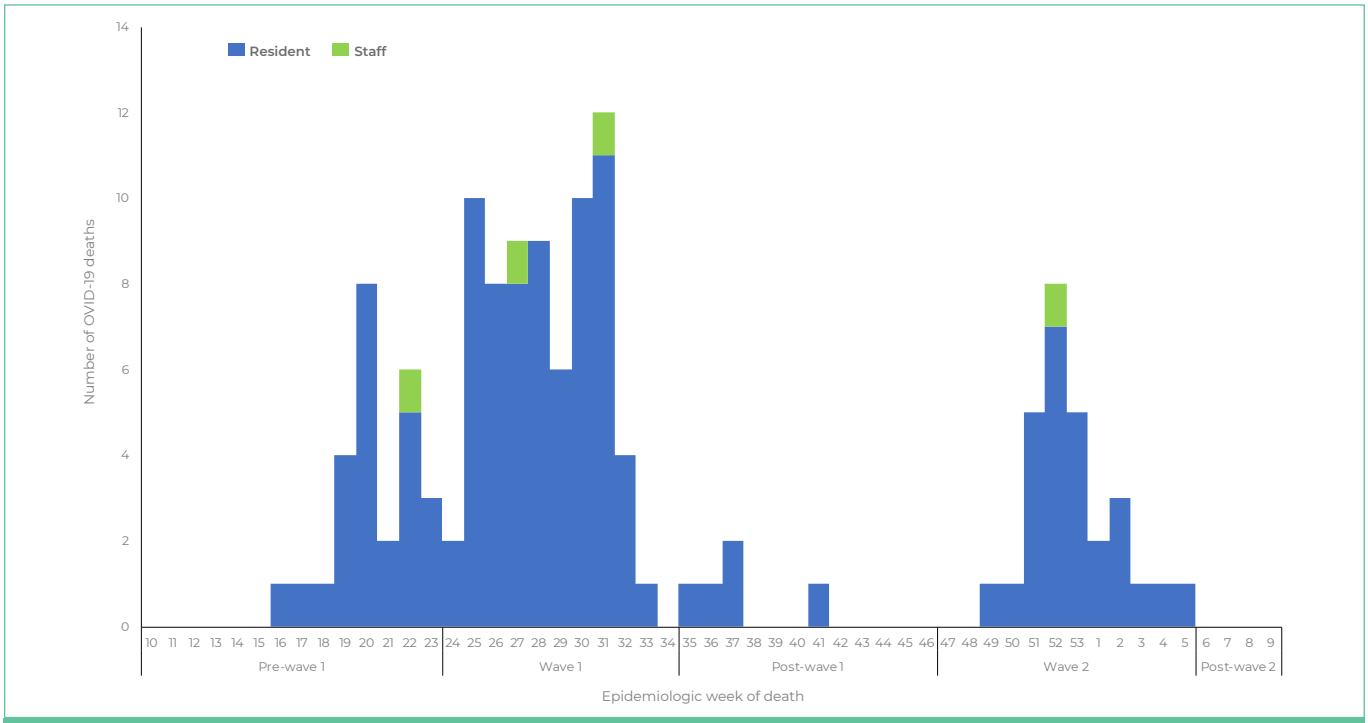

Figure 10. Numbers of COVID-19 deaths reported per week among residents and staff, by epidemiologic week, South Africa, 5 March 2020 – 12 March 2021, (n=130).

The median age of residents who died was 76 (IQR 61 – 88) years, and for those who recovered was 56 (IQR 39 – 70) years. The median age of staff who died was 50 (IQR 47-59) years, and for those who recovered was 42 (IQR 34-51) years.
Of 130 SARS-CoV-2 deaths in care homes, old age homes had the highest CFR 35/311 (11.3%), while the lowest CFR was in the substance abuse recovery centres, 9/275 (3.3%) (Table 5).

Table 5. SARS-CoV-2 case fatality ratio (CFR) by care home type, South Africa, 5 March 2020 - 12 March 2021, n=130.

Facility Type	Case fatality ratio n/N (%)
Old age home	35/311 (11.3)
Frail care	19/81 (10.5)
Retirement Village	24/336 (7.1)
Psychiatric/Mental	43/805 (5.3)
Substance abuse recovery centres	9/275 (3.3)

Factors associated with SARS-CoV-2 mortality: Residents
On multivariable analysis, factors associated with SARS-Cov-2 mortality among care home residents were age 60-79 years (54/391, 13.8%; aOR 5.7, 95% CI 2.5-12.7) and ≥80 years (43/184, 23.4%; aOR 10.7, 95% CI 4.6-24.5) compared to <40 years; chronic kidney disease (4/8, 50%; aOR 5.8, 95%CI 1.5-27.0) and pre-wave 1 (25/118, 21.2%; aOR 2.1, 95% CI 1.2-3.6) compared to wave 1 (Table 6).

Table 6. Univariate and multivariable analysis of factors associated with SARS-CoV-2 mortality among care home residents, South Africa, 5 March 2020– 12 March 2021, (n=1,207).

Characteristics	Case fatality ratio n/N (%)	Unadjusted odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
Age group					
0-39 years	7/284 (2.5)	Reference)		Reference	
40-59 years	22/348 (6.3)	2.7 (1.1-6.3)	0.027	2.4 (1.0-5.9)	0.057
60-79 years	54/391 (13.8)	6.3 (2.8-14.1)	≤0.001	5.7 (2.5-12.7)	≤0.001
≥ 80 years	43/184 (23.4)	12.0 (5.3-27.4)	≤0.001	10.7 (4.6-24.5)	≤0.001
Sex					
Female	54/544 (9.3)	Reference			
Male	72/663 (10.9)	1.1 (0.8-1.6)	0.605		
Ethnicity					
Black	44/595 (7.4)	Reference			
Coloured	9/85 (10.6)	1.5 (0.7-3.2)	0.309		
White	63/477 (13.2)	1.9 (1.2-2.9)	0.002		
Indian	9/47 (19.2)	3.0 (1.3-6.5)	0.007		
Type of Care Home					
Substance Abuse Re-covery	8/151 (5.3)	Reference			
Frail Care Centre	19/114 (16.7)	3.5 (1.5-8.4)	0.004		
Old age home	34/209 (16.3)	3.5 (1.5-7.7))	0.002		
Psychiatric/Mental	42/568 (7.4)	1.4 (0.6-3.1)	0.370		
Retirement village	23/164 (14.0)	2.9 (1.2-6.7)	0.012		
Waves					
Pre-wave 1	25/118 (21.2)	2.8 (1.7-4.6)	≤0.001	2.1 (1.2-3.6)	0.007
Wave 1	69/783 (8.8)	Reference		Reference	
Post-wave 1	5/59 (8.5)	0.9 (0.4-2.5)	0.930	0.8 (0.3-2.4)	0.826
Wave 2	27/240 (11.3)	1.3 (0.8-2.1)	0.258	1.2 (0.7-1.9)	0.480
Post-wave 2	0 (0)	1		1	
Comorbid condition					
1 comorbid condition	26/199 (13.1)	Reference			
2 comorbid conditions	13/64 (20.3)	1.7 (0.8-3.5)	0.159		
≥ 3 comorbid conditions	5/18 (27.8)	2.6 (0.8-7.8)	0.097		
Hypertension					
No	91/981 (9.3)	Reference			
Yes	31/195 (15.9)	1.8 (1.2-2.9)	0.006		
Diabetes mellitus					
No	107/1,111 (9.6)	Reference			
Yes	15/65 (23.1)	2.8 (1.5-5.2)	0.001		
Chronic cardiac disease					
No	110/1,127 (9.8)	Reference			
Yes	12/49 (24.5)	03.0 (1.5-5.9)	0.002		

Asthma/Chronic pulmonary disease					
No	121/1,158 (10.5)	Reference			
Yes	1/18 (5.6)	0.5 (0.1-3.8)	0.507		
Chronic renal disease					
No	118/1,168 (10.1)	Reference		Reference	
Yes	4/8 (50.0)	8.8 (2.2-36.0)	0.002	5.8 (1.3-27.0)	0.025
Malignancy					
No	120/1,165 (10.3)	Reference			
Yes	2/11 (18.2)	1.9 (0.4-9.0)	0.403		
HIV					
No	120/1,148 (10.5)	Reference			
Yes	2/28 (7.1)	0.6 (0.2-2.8)	0.572		
Active Tuberculosis					
No	122/1,176 (10.4)	Reference			
Yes	0	1	-		
Past Tuberculosis					
No	122/1,175 (6.8)	Reference			
Yes	0	1	-		
Smoking					
Current smoker	2/132 (1.5)	Reference			
Former smoker	8/66 (12.1)	0.1 (0.03-0.5)	0.005		
Never smoked	35/329 (10.6)	1.1 (0.5-2.6)	0.730		
Province					
Western Cape	16/66 (24.2)	Reference			
Eastern Cape	14/129 (10.9)	0.4 (0.2-0.8)	0.017		
Free State	15/143 (10.5)	0.4 (0.2-0.8)	0.011		
Gauteng	29/278 (9.5)	0.3 (0.2-0.8)	0.001		
KwaZulu-Natal	28/307 (9.5)	0.3 0.2-0.7)	0.001		
Limpopo	2/35 (5.7)	0.2 (0.04-0.9)	0.034		
Mpumalanga	8/72 (11.1)	0.4 (0.2-0.9)	0.047		
North West	14/160 (8.8)	0.3 (0.1-0.7)	0.003		

Staff deaths

Of 756 staff positive for SARS-CoV-2 four (0.5%) died - two (50%) were female and two (50%) were male. The median age was 48.5 years (IQR 44.5-57.0). One female had hypertension and diabetes mellitus. The remaining three individuals who died did not have any reported comorbidities. Each death occurred in one of four provinces (Eastern Cape, Free State, Gauteng and KwaZulu-Natal).

DISCUSSION

The DATCOV sentinel surveillance system has provided data on the pattern of SARS-CoV-2 outbreaks among 42 care homes in South Africa. From April 2020 to March 2021, 23% of care homes reported one outbreak and 60% reported two or more outbreaks; of those that reported an outbreak, 18 (49%) reported small outbreaks and 19 (51%) reported large outbreaks of 20 or more cases. This analysis has revealed a decreasing trend in SARS-CoV-2 cases in care homes over the course of the epidemic, with the highest CFR occurring in the very early weeks of the epidemic.

Outbreaks were more frequently reported during the first COVID-19 wave, and the number of cases among care homes was lower in the second wave. This is notable given that the second wave in South Africa was associated with more cases and deaths than the first wave. Other countries have similarly reported fewer cases and deaths in care homes in the second wave, and the CFR during the second wave in these countries also decreased.[9,10] This is ascribed to improved control measures and shielding of vulnerable people: Firstly, there was greater awareness of fatality risks among the vulnerable care home residents; Secondly, vigilant efforts were put in place to protect care homes as learned from experience during the first wave of COVID-19 in nursing homes; Thirdly, improved routine hygiene measures, infection control, testing of personnel and residents, and avoidance of staff working across multiple nursing homes were implemented during the second wave.[11]

The CFR amongst residents with highest risk in old age homes (11%), frail care centres (10%) and retirement villages (7%), was similar to those reported in other studies, which were reported to be as high as 13%.[12] The residents in these settings were likely older and had comorbidities which are known risk factors for COVID-19 mortality. In a population-based analysis in the United Kingdom, more than 900 confirmed cases of SARS-CoV-2 infections were recorded between March and August 2020, with 432 COVID-19-related deaths giving an overall case fatality ratio of 48%.[9,11] The size of nursing homes for older people was strongly associated with a COVID-19 outbreak.[11]

Risk factors for mortality among care home residents were age over 60 years and chronic kidney disease. Older age, male sex and the presence of comorbidities such as hypertension, diabetes, chronic cardiac and renal diseases, malignancy, HIV and TB, as well as obesity, have been described as risk factors for COVID-19 mortality in meta-analyses and from a large national surveillance system in South Africa.[13,14]

An additional risk factor for mortality was pre-wave 1 compared to wave 1 while there was no increased mortality observed in the other wave periods. This suggests that there was highest mortality amongst care homes in the early weeks of the epidemic. One contributing factor may be improved treatment and better case management over time, including the use of Dexamethasone and high flow oxygen.[15]

Increased in-hospital mortality in the second wave compared to the first wave in South Africa has been reported, and is possibly related to the circulation of the new Beta lineage (501Y.V2) which predominated during the second wave.[16] However, an increased risk of mortality was not observed in the care home setting in the second wave.

CONCLUSIONS

The analysis of SARS-CoV-2 cases in sentinel care homes in South Africa points to an encouraging trend of decreasing cases from the first to the second wave, and decreasing risk of mortality. Care homes are likely to have learnt from international experience and adopted protocols issued by the Departments of Health and Social Development, which include improved measures to limit transmission and administer appropriate clinical care.

STRENGTHS AND LIMITATIONS

DATCOV is a sentinel surveillance system that has only a small number of reporting sites for care homes, but it does include sites in most provinces and across all care home types. There is some incomplete data in the surveillance system, particularly that of smoking (1167/1976, 58.7%). These variables have therefore been excluded from the multivariable analysis.

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Supplementary Table 1. Number of residents and staff who tested positive for SARS-CoV-2 in 42 care homes across South Africa, 5 March 2020 – 12 March 2021, n=1,976.

	Resident			Staff		
	Cases n	Total residents	% infected	Cases N	Total staff	% infected
Facility						
WCRV2	4	16	25.0	25	27	92.6
ECRV4	2	45	4.4	8	36	22.2
MPRV4	0	267	0	10	19	52.6
NWOAH1	0	29	0	1	33	3.0
KZNPSYCH1	103	580	17.7	62	339	18.3
MPRV2	1	24	4.2	0	0	0
FSPsychMen	128	685	18.6	141	903	15.6
WCOAH1	34	157	21.7	55	250	22.0
FSOAH1	2	50	4.0	0	31	0
MPOAH	2	46	0	0	43	0
MPRV3	24	67	35.8	0	63	0
WCRV1	9	202	4.5	7	54	13.0
GPRV	20	146	13.7	5	131	3.8
ECRV1	22	215	10.2	35	184	19.0
ECRV2	46	465	9.9	64	294	21.8
ECPSYCH	70	648	10.8	48	224	21.4
GPSARC3	4	350	1.1	17	155	11.0
LPPSYCHMEN	35	160	21.9	34	154	22.1
MPSARC	24	250	9.6	24	143	16.8
GPSARC1	113	510	22.2	65	233	27.9
ECRV3	35	120	29.2	23	100	23.0
GPSARC2	10	220	4.5	19	106	17.9
MPRV	2	57	3.6	0	20	0
GPFCC	121	269	45.0	65	234	27.8
FSOAH2	13	78	16.7	10	31	32.3
MPOAH1	1	58	1.7	14	70	20.0
MPFCC1	0	46	0	2	43	4.7
MPOAH2	1	105	1.0	9	49	18.4
WCOAH2	18	27	66.7	11	21	53.4
MPOAH10	19	50	38.0	1	42	2.4
KZNOAH1	39	609	6.4	30	43	69.8
KZNOAH2	4	77	5.2	0	7	0
KZNOAH4	8	70	11.4	1	51	2.0
KZNOAH5	10	172	5.8	5	57	8.8
KZAOAH6	6	217	2.8	0	11	0
KZNOAH7	13	185	7.0	2	22	9.1
KZNOAH8	43	140	30.7	6	152	3.9
KZNPSYCHMEN	73	304	24.0	16	343	4.7
MPOAH9	0	36	0	1	32	3.1
NWPSYCHMEN	160	573	29.5	0	1059	0
WCOAH3	1	80	1.3	1	48	2.1
Total	1,220	8,405	14.5	756	5,856	12.9