

MONTHLY COVID-19 IN CHILDREN SURVEILLANCE REPORT

SOUTH AFRICA 13 NOVEMBER 2020

EPIDEMIOLOGY AND CLINICAL CHARACTERISTICS OF LABORATORY-CONFIRMED COVID-19 AMONG CHILDREN AND ADOLESCENTS AGED ≤ 18 YEARS, SOUTH AFRICA, 1 MARCH – 17 OCTOBER 2020

NICD COVID-19 and DATCOV teams

Summary

- As of 17 October, children and adolescents ≤ 18 years made up 8.0% of laboratory-confirmed COVID-19 cases and 3.4% of all COVID-19-associated admissions at sentinel hospitals.
- The cumulative incidence of laboratory-confirmed COVID-19 cases aged ≤ 18 years was 270.1 per 100 000 population, six times lower than that in adults (1611.9 per 100 000). The cumulative incidence was lowest in Limpopo province and highest in Free State province, was higher in females compared to males and increased with age among individuals aged ≥ 1 year.
- The weekly incidence of laboratory-confirmed COVID-19 cases aged ≤ 18 years and cases admitted to sentinel hospitals peaked during weeks 26-30 for all provinces except Free State and Northern Cape and has been declining since then. This mirrored trends among adults aged > 18 years.
- There were 3016 reported COVID-19-associated admissions among individuals aged ≤ 18 years; of these, 2296 (76.0%) had data on underlying conditions and of these 350 (15.3%) had ≥ 1 underlying conditions. Asthma and other chronic pulmonary conditions, diabetes mellitus, HIV and tuberculosis were the commonest underlying conditions.
- The median length of hospital stay among COVID-19-associated admissions aged ≤ 18 years was 4 days (interquartile range 2- 8 days) with 160 (5.3%) individuals admitted into intensive care units (ICU) at some point during admission and 74 (2.5%) having been ventilated.
- Data on in-hospital outcome were available for 2684 (90.0%) individuals aged ≤ 18 years. Among these, there were 71 in-hospital deaths giving a case fatality risk of 2.6% (71/2684). Among all deaths, 30 (42.3%) were among children/ adolescents 15-18 years and 18 (25.4%) were aged under one year. Among 50 (70.4%) in-hospital deaths who had available data on underlying conditions, 28 (56.0%) reported ≥ 1 underlying condition. Diabetes, cardiac disease and malignancy appeared to be the commonest underlying conditions among children who died. Additional data are being sought on individuals not reporting an underlying illness and those without available data.

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Background

In December 2019, a cluster of pneumonia cases of unknown aetiology was reported in Wuhan, Hubei Province China.(1) The cause of the outbreak has since been confirmed as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and the disease named coronavirus disease 2019 (COVID-19). Infections had been reported in 213 countries and territories with more than 39 million individuals infected and 1.1 million deaths reported to World Health Organization as of 17 October 2020. (1) The first case of COVID-19 in South Africa was reported on 5 March 2020 in KwaZulu- Natal Province.(2) On the 17 October 2020, the country reported 702 131 cases and 18 408 deaths. (2)

Published studies suggest that the clinical presentation of COVID-19 in children differs from that of adults. Disease in children is more likely to be asymptomatic or mildly symptomatic and less likely to result in hospital admission compared to that in adults.(3) However, there are concerns of possible limited testing in children and cases among children being missed.(4) There are concerns regarding increased transmission within and outside schools and other congregate settings. Individuals aged ≤ 18 years, constitute just over a third of the population of South Africa (20 892 853; 35.0 %), (5) and includes the entire compulsory school-going age – considered 7- 15 years (6).

In this report, the epidemiological characteristics of laboratory-confirmed COVID-19 cases aged ≤ 18 years notified through the laboratory based national notification system and COVID-19-associated admissions aged ≤ 18 years at sentinel hospitals in South Africa are presented.

Methods

Data collection procedures.

Laboratory results from public and private laboratories were submitted to the National Institute for Communicable Diseases (NICD). Limited demographic and epidemiological data were collected at the time of specimen collection. Data extraction for this report was done on 21 October 2020. Data on children and adults admitted to sentinel hospitals were collected on the DATCOV platform – an online data collection system. (7) Health care workers at the sentinel hospitals capture demographic and clinical information on admitted COVID-19 cases at admission, during admission and at discharge. As of the 17 October 2020, there were 544 hospitals submitting admissions data into DATCOV. This included 100% of the private hospitals in the country and 96% of public hospitals – with 100% coverage in the Western Cape.

Definition of outcomes

A laboratory-confirmed case of COVID-19 was defined as any person who tested positive for SARS-CoV-2 on real-time reverse-transcription polymerase chain reaction (rRT-PCR) on a respiratory sample obtained from a nasopharyngeal and/or oropharyngeal swab. A COVID-19-associated admission was defined as any person who tested SARS-CoV-2 positive and was admitted to a sentinel hospital regardless of the reason for admission.

Data analysis

Data from the national line list was exported into Stata14.2® for analysis of the national dataset. Descriptive statistics were used to describe the characteristics of cases aged ≤ 18 years. Incidence was

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determined as the number of cases in different age groups as a proportion of the population size as provided by the Statistics South Africa (Stats SA) mid-year population estimates for 2020, (5) and presented as cases per 100 000 persons by age, gender, province and week of diagnosis. Descriptive statistics were used to describe demographic and clinical characteristics among admissions ≤ 18 year at sentinel hospitals stratified by age groups: <7 days, 7- 28 days, 29 days – <1 year, 1- 4 years, 5- 9 years , 10- 14 years and 15- 18 years. Individuals for whom age data was missing were excluded from the analysis.

Results

Incidence of COVID-19 among children and adolescents aged ≤ 18 years

As of 17 October 703,793 laboratory-confirmed cases of COVID-19 had been reported to the NICD and captured on the national linelist. Of these 56,434 (8.0%) were aged ≤ 18 years with 23,092 (3.3%) missing a valid date of birth. The median age of the children was 13.3 years (interquartile range [IQR] 8.3 – 16.8 years) with 2378 (4.2%) aged <1 year, 21,787 (38.6%) aged ≥ 15 years. There were 24, 848 (44.0%) males with 1075 (1.9%) children missing information on gender. The majority of cases 47,521/56,434 (84.2%) were in five provinces – Eastern Cape (16.8%), Free State (10.0%), Gauteng Province (26.2%), KwaZulu Natal (20.7%) and Western Cape (10.5%). The cumulative incidence of laboratory-confirmed COVID-19 among individuals aged ≤ 18 years was 270.1 per 100 000 population compared to 1611.9 per 100 000 population in individuals aged >18 years. The cumulative incidence ranged from 68.6 per 100 000 in Limpopo province to 545.1 per 100 000 population in Free State province (Table 1). The national weekly incidence among individuals aged ≤ 18 years increased from <1 per 100 000 in week 9, peaking at 29.2 per 100 000 during week 28. Most provinces experienced peaks in incidence during the weeks 27-30 and thereafter showed declining weekly incidence – with the exception of Free State and Northern Cape (Figure 1).

Table 1. Cumulative incidence of laboratory-confirmed COVID-19 among children and adolescents aged ≤ 18 years, 1 March- 17 October 2020 (N=56,434)

Province	Total cases (n, %)	Population (≤ 18 years)	Cumulative incidence per 100 000
Eastern Cape	9475 (16.8)	2 711 070	349.5
Free State	5642 (10.0)	1 035 095	545.1
Gauteng	14782 (26.2)	4 482 682	329.8
KwaZulu Natal	11697 (20.7)	4 515 422	259.0
Limpopo	1655 (2.9)	2 413 152	68.6
Mpumalanga	2446 (4.3)	1 696 910	144.1
North West	2373 (4.2)	1 466 571	161.8
Northern Cape	2439 (4.3)	461 307	528.7
Western Cape	5925 (10.5)	2 110 644	280.7
All provinces	56 434 (100)	20 892 853	270.1

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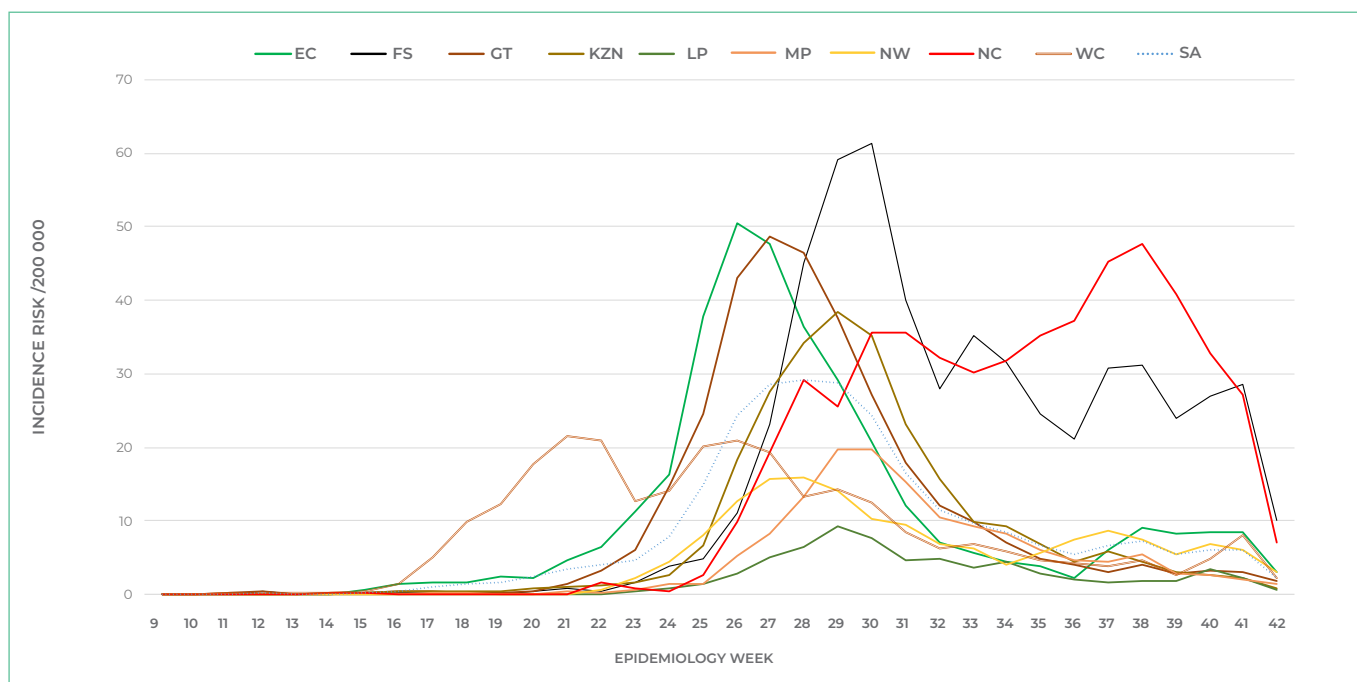


Figure 1. Weekly incidence of laboratory-confirmed COVID-19 among children aged ≤ 18 years by epidemiologic week, South Africa 1 March- 17 October (N=56,434)

EC= Eastern Cape, FS= Free State, GP= Gauteng Province, KZN= KwaZulu Natal, LP= Limpopo Province, MP = Mpumalanga province, NW= North West Province, NC= Northern Cape, WC= Western Cape.

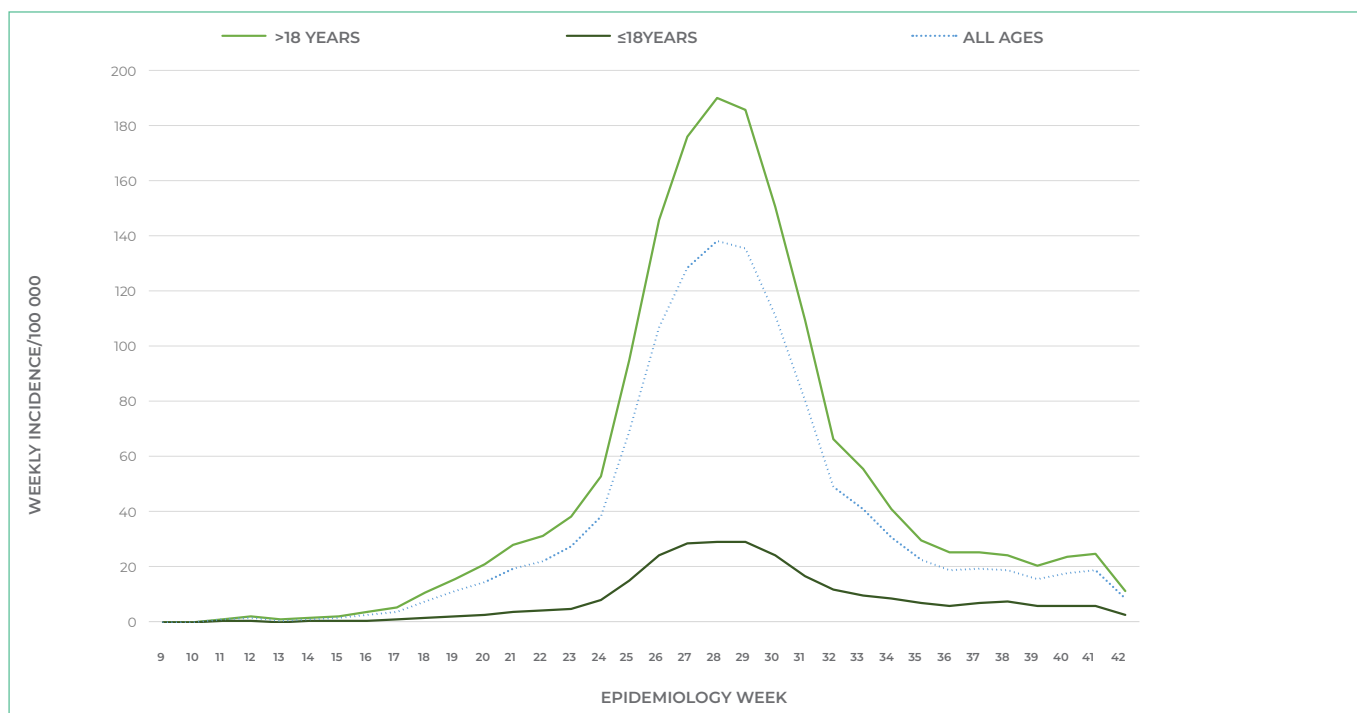


Figure 2. Weekly incidence of laboratory-confirmed COVID-19 in children aged ≤ 18 years and individuals aged >18 years, South Africa, 1 March – 17 October 2020 (N= 703,793)

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The overall weekly incidence trend for children aged ≤ 18 years was similar in shape to that of adults aged >18 years although the magnitude of the peak weekly incidence was much lower (Figure 2). Generally the cumulative incidence increased with age from 123.5 per 100 000 among children aged 1-4 years to 567.1 per 100 000 among adolescents aged 15-18 years. Overall, the cumulative incidence was higher among females compared to male (295.3 per 100 000 vs 235.3 per 100 000). Cumulative incidence was higher among males in the age groups <1 year and higher in females from age categories 5-9 years, 10-14 years and 15-18 years (Figure 3).



Figure 3. Cumulative incidence of laboratory-confirmed COVID-19 among children and adolescents by age and birth sex, South Africa, 1 March-17 October 2020 (N=56,434)

COVID-19-associated admissions in children and adolescents aged ≤ 18 years

As of 17 October 2020, data on 89,980 COVID-19-associated admissions had been captured on DATCOV. Of these admissions, 3,016 (3.4%) were among individuals aged ≤ 18 years with 1,621 (1.8%) had unknown age. The proportions of all COVID-19-associated admissions which were among individuals aged ≤ 18 years varied across provinces from 2.8% in Gauteng to 6.5% in Limpopo. The first admission among a COVID-19 positive child was during week 9 (Figure 4). The majority of the admissions were in five provinces; Gauteng (26.1%), Western Cape (22.5%), KwaZulu Natal (16.6%), Eastern Cape (11.2%) and North West (10.0%) provinces together accounting for 86.5% of all admissions (N=2,609). Overall, the number of admissions peaked during week 29 (Figure 4). Number of admissions were highest in children 15-18 years - 992 (32.9%), <1 year- 567 (18.8%), 10-14 years - 552 (18.3%), 1-4 years- 549 (18.2%) and least in children 5-9 years - 356 (11.8%). Admissions in the 15-18 year old group peaked in weeks 25-27 but have remained higher than the other age groups in the more recent weeks - weeks 35-41 (Table 5).

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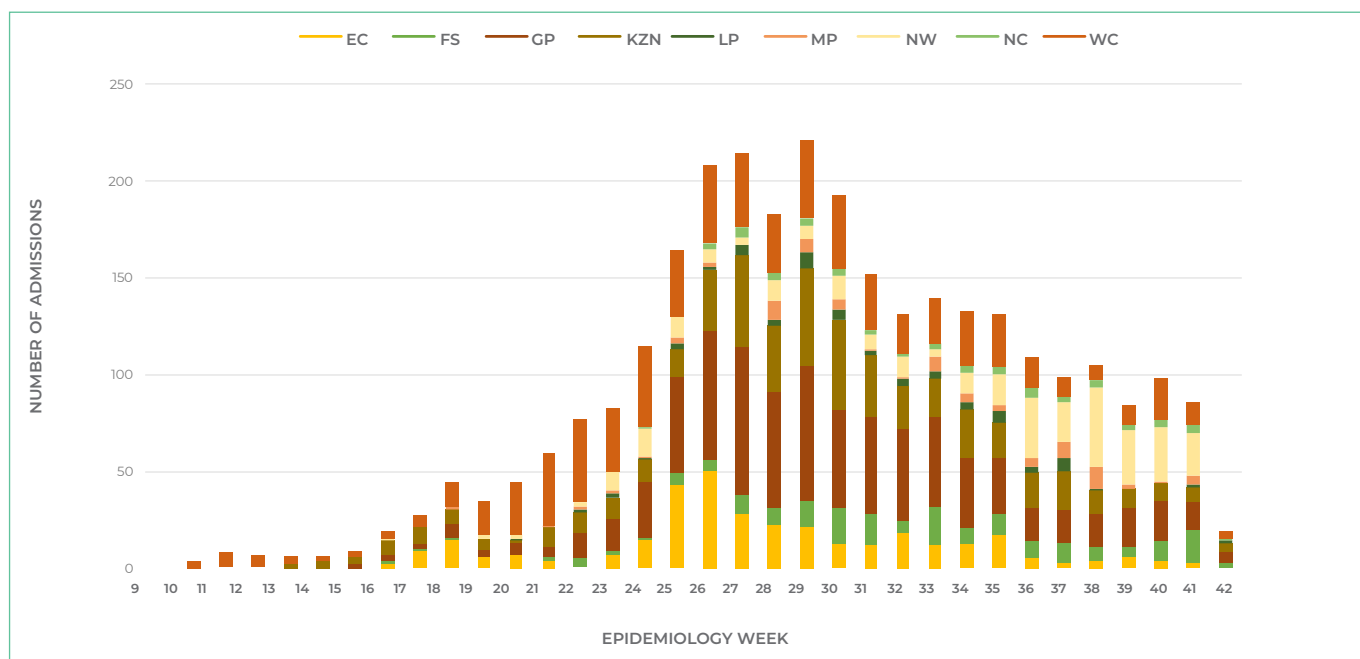


Figure 4. Number of COVID-19-associated admissions aged ≤18 years by epidemiologic week and province, South Africa, DATCOV, 1 March – 17 October 2020 (N=3,016)

EC= Eastern Cape, FS= Free State, GP= Gauteng Province, KZN= KwaZulu Natal, LP= Limpopo Province, MP = Mpumalanga province, NW= North West Province, NC= Northern Cape, WC= Western Cape.

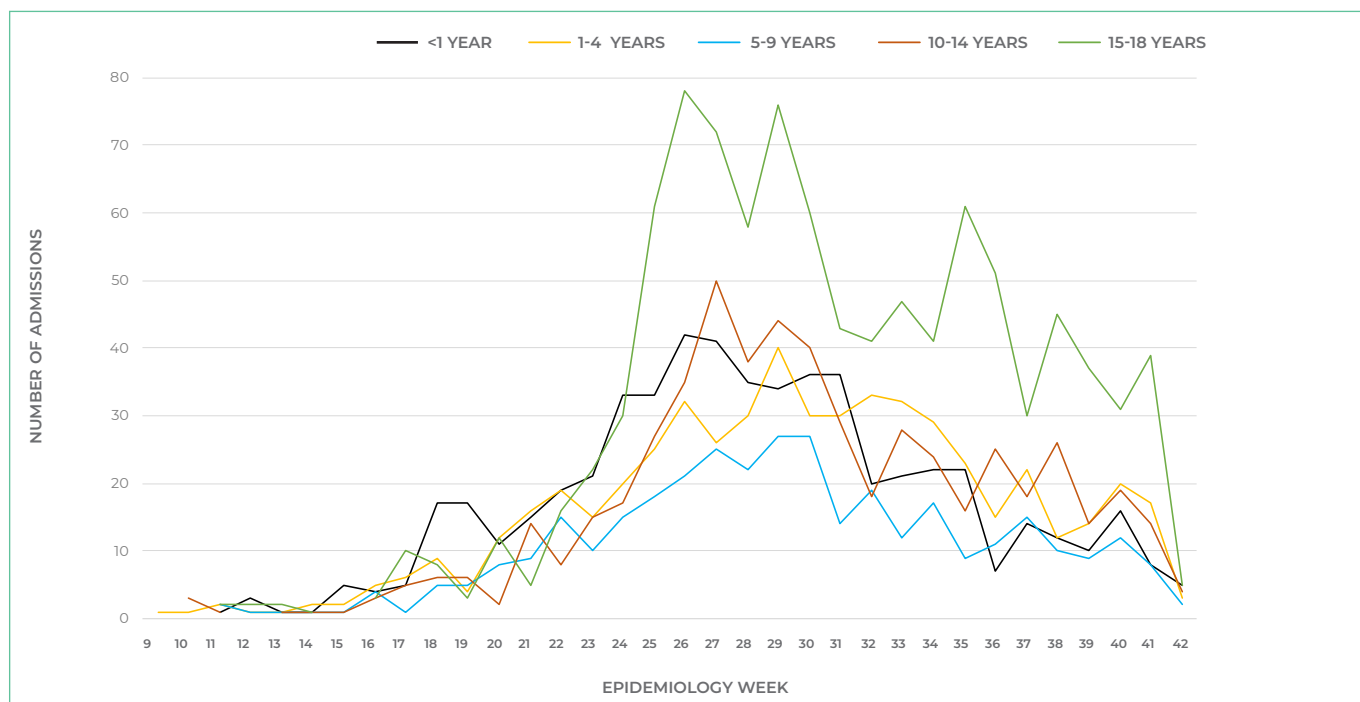


Figure 5. Number of COVID-19-associated admissions among individuals aged ≤18 years at sentinel hospitals by epidemiologic week and age group, South Africa, DATCOV, 1 March - 17 October 2020 (N=3,016)

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Of the 3,016 admitted individuals included in the analysis, the median age was 10.4 years (IQR 1.7-16.3 years) and 1,442 (47.9%) were male. Figure 6 shows the distribution of the admissions by age and sex. The majority of children were admitted at hospitals in the public sector (1,708, 56.6%). Table 3 shows the demographic and clinical characteristics of COVID-19-associated admissions among children and adolescents aged ≤ 18 years at sentinel hospitals overall and stratified by age group. Overall 2,296 (76.1%) had data on underlying conditions available. Of these 350 (15.2%) had one or more underlying conditions. Among the 350 who had one or more underlying conditions reported, 85 (24.3%) had ≥ 2 underlying conditions. Asthma or chronic pulmonary diseases were the most frequently reported underlying conditions followed by diabetes, HIV and tuberculosis - current or active (Figure 7).

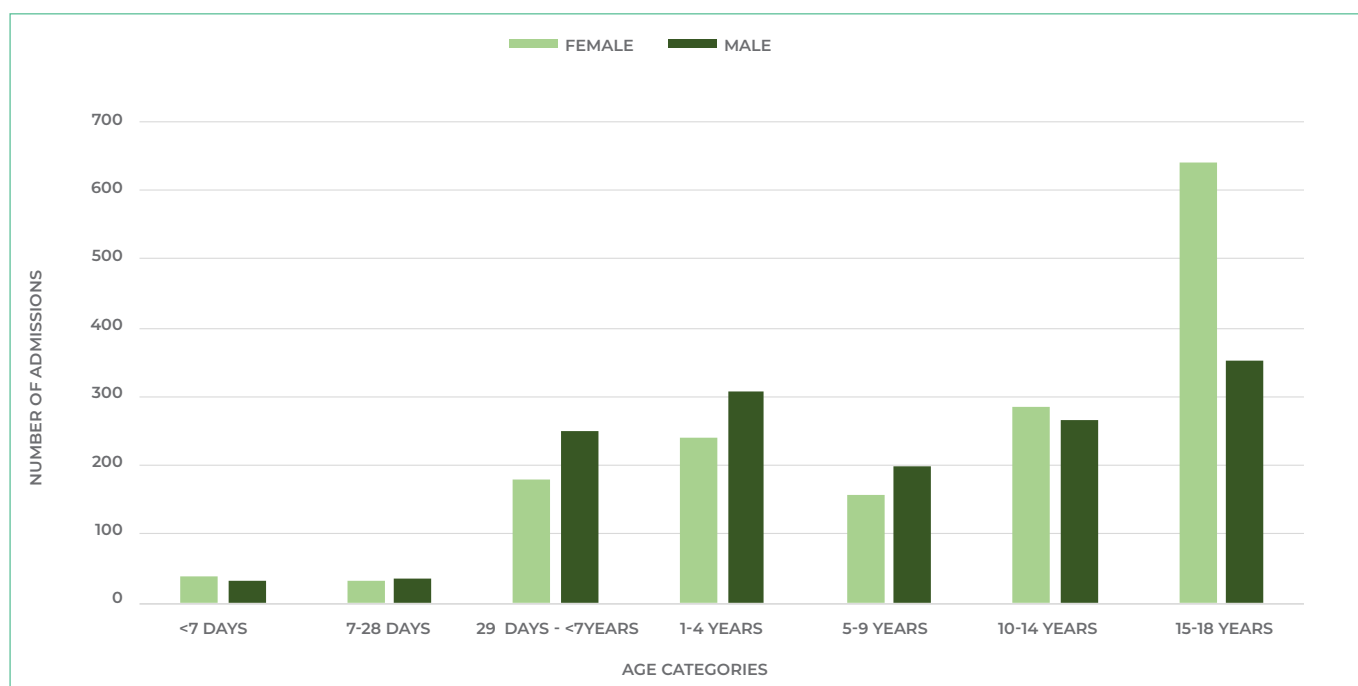


Figure 6. Number of COVID-19-associated admissions aged ≤ 18 years by age group and sex, South Africa, DATCOV, 1 March – 17 October 2020 (N=3,016)

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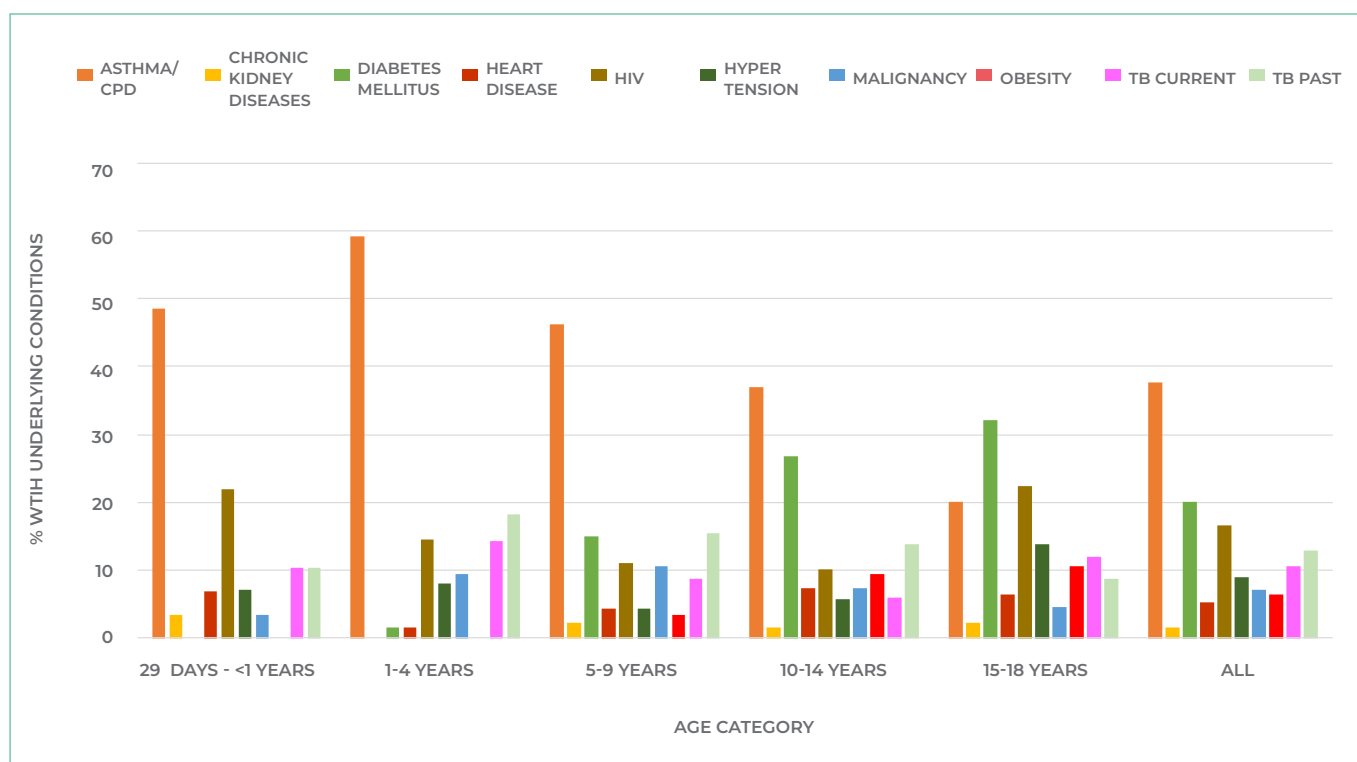


Figure 7. Distribution of underlying conditions among COVID-19-associated admissions aged ≤18 years with ≥1 underlying conditions, South Africa, DATCOV, 1 March – 17 October 2020 (N=350)*

CPD= chronic pulmonary disease; TB= tuberculosis

Outcomes of COVID-19-associated admissions among children aged ≤18 years

Of the 3,016 COVID-19-associated admissions among children aged ≤18 years, 160 (5.3%) were admitted into ICU and 74 (2.5%) were ventilated at some point during admission. At analysis, 2,613 (86.6%) had been discharged, 285 (9.5%) were still admitted, 47 (1.6%) had been transferred to other facilities and 71 (2.4%) had died during admission. Among individuals with outcome data available, the in-hospital case fatality risk was 2.6% (71/2,684). The overall median length of hospital stay was 4 days (IQR 2- 8 days) and was 8 days (IQR 2- 15 days) for those who died. Of the 71 COVID-19 associated in-hospital deaths, 50 (70.4%) individuals had data on underlying conditions available. Of these 28 (56.0%) reported ≥1 underlying condition. Diabetes mellitus and heart disease were the most frequently reported among those who had underlying conditions and died in-hospital. Table 3 includes descriptions of these outcomes by age categories while Table 4 describes the 71 children or adolescents who died in hospital. Males, children aged <1 year and those aged 15-18 years were overrepresented among those who died compared to those who did not die, as were children with one or more underlying conditions. Males made up 60.6% of in-hospital deaths vs 47.9% of all admissions; children <1 made up 25.4% of deaths vs 18.8% of admissions while adolescents 15- 18 years made up 42.3% of deaths vs 32.9% of admissions.

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Table 3. Characteristics of COVID-19-associated admissions aged ≤18 years, South Africa, DATCOV, 1 March– 17 October 2020 (N=3,016)

Variable	<7days (n=72) (2.4%)	7- 28 days (n=65) (2.2%)	29days- <1yr (n=430) (14.3%)	1- 4 years (n=549) (18.2%)	5- 9 years (n=356) (11.8%)	10- 14 years (n=552) (18.3%)	15- 18 years (n=992) (32.9%)	Overall (n=3016)
Age (median, IQR)	0 days (0- 1 days)	14.0 days (12- 21days)	4.7 mons (2.3- 7.8mons)	2.2 yrs. (1.5- 3.3yrs)	7.7 yrs. (6.4- 8.8yrs)	12.9 yrs. (11.6- 14.0yrs)	17.5 yrs. (16.3- 18.2yrs)	10.4 yrs. (1.7-16.3 yrs.)
Male (n, %)	33 (46.5)	34 (52.3)	250 (58.3)	309 (56.3)	199 (55.9)	266 (48.2)	351 (35.4)	1442 (47.9)
Province								
Eastern Cape	4 (5.6)	4 (6.2)	19 (4.4)	36 (6.6)	30 (8.4)	59 (10.7)	187 (18.9)	339 (11.2)
Free State	0	2 (3.1)	17 (4.0)	39 (7.1)	21 (5.9)	37 (6.7)	83 (8.4)	199 (6.6)
Gauteng	31 (43.1)	14 (21.5)	119 (27.7)	143 (26.1)	115 (32.3)	151 (27.4)	213 (31.5)	786 (26.1)
KwaZulu Natal	10 (13.9)	10 (15.4)	73 (17.0)	95 (17.3)	58 (16.3)	106 (19.2)	149 (15.0)	501 (16.1)
Limpopo	4 (5.6)	2 (3.1)	10 (2.3)	5 (0.9)	12 (3.4)	12 (2.2)	21 (2.1)	66 (2.2)
Mpumalanga	4 (5.6)	1 (1.5)	8 (1.9)	15 (2.7)	10 (2.8)	13 (2.4)	31 (3.1)	82 (2.7)
North West	3 (4.2)	1 (1.5)	10 (2.3)	21 (3.8)	21 (5.9)	75 (13.6)	172 (17.3)	303 (10.1)
Northern Cape	1 (1.4)	0	7 (1.6)	15 (2.7)	8 (2.3)	15 (2.7)	14 (1.4)	60 (2.0)
Western Cape	15 (20.8)	31 (47.7)	167 (38.8)	180 (32.8)	81 (22.8)	84 (15.2)	122 (12.3)	680 (22.6)
Admitted at a public hospital, (n, %)	33 (45.8)	47 (72.3)	245 (57.0)	245 (46.3)	185 (52.0)	328 (59.4)	616 (62.1)	1708 (56.6)
Data on underlying conditions available, (n, %)	47 (65.3)	53 (81.5)	319 (74.2)	427 (77.8)	267 (75.0)	409 (74.1)	774 (78.0)	2296 (76.1)
Has ≥1 underlying conditions, (n/N, %)*	0/47 (0)	0/53 (0)	35/319 (11.0)	66/427 (15.5)	52/267 (18.5)	73/409 (17.9)	124/774 (16.0)	350/2296 (15.0)
Length of stay (median, IQR)**	12 (4-40)	5 (3-11)	4 (2-8)	3 (1-5)	3 (1-9)	5 (2-9)	5 (2-9)	4 (2-8)
ICU admission	16 (22.2)	10 (15.4)	32 (7.4)	24 (4.4)	25 (7.0)	26 (4.7)	27 (2.7)	160 (5.3)
Ventilation	12 (16.7)	4 (6.2)	9 (2.1)	7 (1.3)	14 (3.9)	17 (3.1)	11 (1.1)	74 (2.5)
Died	2 (2.8)	3 (4.6)	13 (3.0)	5 (0.9)	7 (2.0)	11 (2.0)	30 (3.0)	71 (2.4)
Discharged alive	62 (86.1)	53 (81.5)	382 (88.8)	504 (91.8)	319 (89.0)	470 (85.1)	823 (83.0)	2613 (86.6)
Transferred to another hospital	0 (0.0)	2 (3.1)	3 (0.7)	4 (0.7)	1 (0.3)	13 (2.4)	24 (2.4)	47 (1.6)
Still admitted	8 (11.1)	7 (10.8)	32 (7.4)	36 (6.6)	29 (8.2)	58 (10.5)	115 (11.6)	285 (9.4)

Mons= months; Yrs. = years; IQR= interquartile range; ICU = intensive care unit; *Individual can have more than one comorbidity and denominator is those with available data on underlying conditions;** among those who died, transferred or discharged ***

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Table 4. Characteristics of COVID-19-associated admissions aged ≤18years who died in hospital, South Africa, DATCOV, 1 March – 17 October 2020 (N=71)

Characteristic	n (%)
Age (median, IQR*)	13.9 years (8.7 months – 16.9 years)
Age < 1 year	18 (25.4)
Age ≥15	30 (42.3)
Male	43 (60.6)
Province	
Eastern Cape	15 (21.3)
Free State	7 (9.9)
Gauteng	19 (26.8)
KwaZulu-Natal	10 (14.1)
Limpopo	2 (2.8)
Mpumalanga	2 (2.8)
North West	0 (0.0)
Northern Cape	0 (0.0)
Western Cape	16 (22.5)
Intensive care unit admission	29 (40.8)
Data on underlying conditions available	50 (70.4)
Underlying conditions Yes	28/50 (56.0)
Underlying conditions	
Asthma/ Chronic Pulmonary Disease	0/28 (0.0)
Chronic Kidney Disease	2/28 (7.1)
Diabetes mellitus	5/28 (17.9)
HIV	4/28 (14.3)
Heart Disease	5/28 (17.9)
Hypertension	3/28 (10.7)
Malignancy	5/28 (17.9)
Obesity	4/28 (14.3)
Tuberculosis past	4/28 (14.3)
Tuberculosis current	3/28 (10.7)
Other (<i>Acute appendicitis, Biliary atresia, Hypokalaemia, Hypocalcemia, pneumonia, ileus, HIV-exposure, substance abuse</i>)	9/28 (32.1)

IQR=interquartile range

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Discussion

This report presents data, on the epidemiology and clinical features of laboratory-confirmed COVID-19 among individuals aged ≤ 18 years using data from two surveillance systems established for monitoring the COVID-19 pandemic in South Africa. The data presented showed that children made up 8.0% of all laboratory-confirmed COVID-19 cases reported in South Africa and around 3.4% of COVID-19 associated admissions, despite comprising just over a third of the population. The cumulative incidence among children was six times lower compared to that of adults (1612 per 100 000) during the same period. The data showed much higher cumulative incidence among older females aged 15- 18 years (696/100 000 population) compared to other age groups in children (123- 453 per 100 000). This higher incidence among females observed from age 10- 14 years is apparent until the age of 60 years, (8) and may be due to some unknown biological factor, differential exposures to COVID-19 through care work or other frontline roles or from better health seeking behaviour and subsequent testing in women.

The data also showed stable trends in new laboratory confirmed COVID-19 cases and COVID-19-associated admissions among children and adolescents in most provinces in the past recent weeks, reflecting national trends and trends among older individuals. However, weekly incidence in the Free State and Northern Cape remained higher than the rest of the provinces indicating on-going community transmission, similar to trends in all age groups (8). The median age of children admitted to hospital was lower than that among all diagnosed cases aged ≤ 18 years (10.4 years vs 13.2 years), which suggests that severe disease may be more common among younger children or that clinicians are more likely to admit younger children as a precaution. Some of the COVID-19 associated admissions younger than one year were new-borns and may have been admitted for birth-related complications rather than the COVID-19-related illness.

The overall in-hospital case fatality risk was 2.6% among those with available data on in-hospital outcome, which is somewhat higher than has been reported in smaller hospital cohorts elsewhere – on average 0.2% in studies from Europe and China. (9-13) Infants aged <1 years were over-represented among deaths in our dataset. Although infants made up 18% of admissions, they made up 27% of deaths. This is consistent with what has been described in China, United States and Europe. (14-17) In China – 11% of infants <1 year had severe or critical illness compared 4.8% among the rest of the children. (13) In the United States infants made up 15% of all childhood cases and 40% of hospitalizations in a cohort reported during February to April. (15) In a report on deaths among children and adolescents aged <21 years in the United States, infants made up 10% of these deaths. (16) In a multicentre study of COVID-19 hospitalizations among children in Europe during April 2020, infants <1 year were five times more likely to be admitted into intensive care units, although overall mortality was low at 0.7%. (17) Respiratory underlying conditions – asthma and chronic pulmonary disease – were the most common underlying conditions documented among admitted children and adolescents but were not associated with any deaths. On the other hand, diabetes mellitus, heart disease and obesity appeared to be the most commonly documented underlying conditions among children who died and had data on underlying conditions available. There is a need to ensure high compliance with respect to non-pharmaceutical interventions within families and schools of children and adolescents with underlying conditions in general and in particular among children with underlying conditions, their families and communities. Approximately 44% of children who died and had data on underlying medical conditions available did not have any reported underlying medical conditions. Additional data are being sought on individuals not reporting an underlying illness to further characterise the nature of the underlying condition and on those without available data.

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Limitations

This analysis was subject to several limitations:

- Both surveillance systems included only SARS-CoV-2-confirmed or tested COVID-19 cases or admissions and therefore, asymptomatic cases would have been missed as well as individuals who were not tested. Testing approaches in South Africa have changed as the epidemic progressed, potentially biasing characteristics of detected cases.
- The national laboratory based reporting system lacks complete information on symptoms or contact history to determine source of infection.
- Information on underlying medical conditions is incomplete in the two surveillance systems. Additional information on underlying conditions among admitted children is always being sought from reporting hospitals.
- The indications or reasons for admission are mostly not provided. These would allow determination of whether admission was due to COVID-19 disease, for isolation purposes or other diseases

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MONTHLY COVID-19 IN CHILDREN SURVEILLANCE REPORT



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09 OCTOBER 2020

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