

# PRIVATE CONSULTATIONS EXCESS RESPIRATORY ENCOUNTERS REPORT

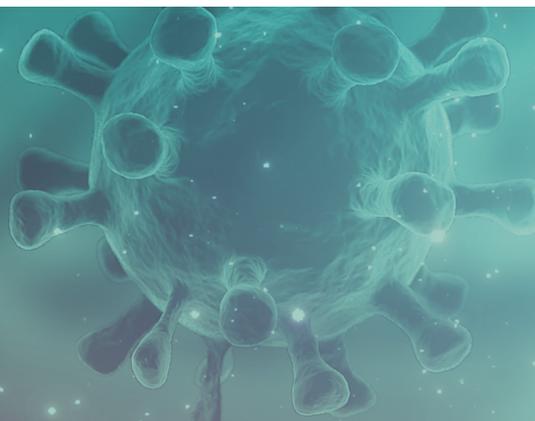
SOUTH AFRICA WEEK 15 2021

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## HIGHLIGHTS: WEEK 15

- During the last weeks of 2020 respiratory admissions increased to levels higher than those reached in the first wave in adult age groups and in several provinces, decreasing over the past months. Respiratory admissions in children <5 years have decreased over the past month.
- Respiratory outpatient general practitioner consultations increased in all provinces during the second wave, reaching or exceeding the projected numbers in all provinces with available data and exceeding projected numbers among individuals aged  $\geq 20$  years, decreasing over the past months. Consultations in children <5 years have decreased over the past month.
- Outpatient emergency department consultations increased in all provinces during the last weeks of 2020 exceeding levels seen in the first wave in KwaZulu-Natal and the Western Cape, and among individuals aged  $\geq 20$  years, but have decreased over the past months. Respiratory consultations in children (<20 years) increased over the past month.



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## INTRODUCTION

Worldwide, there have been significant challenges for accurately estimating coronavirus disease 2019 (COVID-19) cases and mortality. Assessing increases in syndromic activity through preexisting respiratory surveillance systems can provide broader insight concerning the impact of COVID-19, as well as inform public health decision-making and preparedness strategies. In this report, we use time series regression models, adjusted for influenza and respiratory syncytial virus (RSV) activity, to evaluate increases in respiratory outpatient consultations and hospital admissions relative to those expected in the absence of COVID-19. Measuring excess respiratory encounters can identify locations with heightened COVID-19 activity and vulnerable demographic groups.

## DATA SOURCES

### Virologic Surveillance Data:

We receive weekly counts of influenza positive samples and respiratory syncytial virus (RSV) positive samples from three syndromic respiratory illness surveillance programmes coordinated by the National Institute for Communicable Diseases (NICD): the Viral Watch Programme, the ILI Public Clinics Programme, and the Pneumonia Surveillance Programme. Viral Watch collects samples from a network of general practitioners, spread throughout eight of South Africa's nine provinces. Samples are collected from patients who present with acute respiratory illness, fever ( $> 38^{\circ}\text{C}$ ), and cough. ILI Public Clinics systematically collects samples from patients at public hospitals and clinics in KwaZulu-Natal, Western Cape, and North-West provinces, using the same eligibility criteria as the Viral Watch programme. The Pneumonia Surveillance Programme collects samples from hospitalized patients with severe respiratory illness, at sites located in KwaZulu-Natal, Mpumalanga, North-West, Gauteng, and Western Cape provinces. Samples are tested at NICD for influenza, RSV, and, more recently, SARS-CoV-2.

### Respiratory Medical Encounters Data:

We receive inpatient and outpatient data every week from a private hospital group and a network of general practitioners. Provinces with sufficient levels of reporting vary according to the type of consultation: inpatient (Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, North-West, Western Cape), outpatient-emergency department (Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Western Cape), outpatient-general practitioner (Eastern Cape, Gauteng, KwaZulu-Natal, Northern Cape, Western Cape). Consultations were coded based on discharge diagnosis using the International Classification of Diseases and Related Health Problems, 10th revision (ICD-10). Respiratory hospital admissions and outpatient consultations are calculated as all cause respiratory-coded encounters (J00-J99), including confirmed and suspected COVID-19 encounters (U07.1, U07.2). Weekly data were aggregated by age group (<5 years, 5-19 years, 20-49 years,  $\geq 50$  years) and by province, with the <5 age group removed for all provincial analyses..

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## METHODS

### Adjusting for Reporting Delays:

Depending on the province, the reporting delay for hospital admissions and outpatient consultations is typically 1-4 weeks. Thus, we used a Bayesian approach [1] to account for occurred-but-not-yet-reported all cause respiratory (J00-J99) and COVID-19 (U07) encounters from weekly data drawdowns. The reporting delay distribution was used to backfill age-specific and province-specific encounters and these backfill-adjusted time series were used in subsequent time series regression models. Time series were estimated through the week of April 11, 2021 (the last week of data available).

### Excess Respiratory Encounters:

We conducted a counterfactual analysis, in which observed respiratory consultations were compared to the baseline number of consultations expected in the absence of COVID-19. Age groups and provinces were analyzed separately for each data source (inpatient, outpatient- emergency department, outpatient-general practitioner). We fit dynamic regression models with ARIMA errors [2] to the weekly number of all cause respiratory consultations from the weeks of January 3, 2016 to February 23, 2020. Models were adjusted for seasonality and weekly influenza and RSV activity. For the model prediction period, observed weekly percentages of samples testing positive for influenza or RSV were replaced with values from the same epidemic week in 2019. The baseline number of respiratory consultations was projected for the weeks of March 1, 2020 to April 11, 2021 and compared to the observed number of all cause respiratory consultations (J00-J99), including confirmed and suspected COVID-19 (U07).

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## INTERPRETATION OF DATA PRESENTED

### Inpatient (Figures 1-2)

In provinces with sufficient levels of reporting (Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, North West and Western Cape), respiratory hospital admissions in all ages combined increased throughout the lockdown period and reducing subsequently. During the last weeks of 2020 respiratory admissions increased and has continued to decrease since mid-January. In all provinces (excluding the Free State) levels exceeded those reached in the first wave, and have been decreasing since mid-January. Since the initiation of lockdown measures in late March 2020, respiratory hospitalizations in young children (<5 years) have been substantially below those expected in the absence of COVID-19, likely due to diminished transmission of RSV, influenza, and other seasonal viruses. In December 2020 respiratory hospitalizations in children aged <5 years increased, possibly related to increased circulation of RSV and/or other respiratory viruses. Over the past month, numbers have decreased. Admissions in older children (5-19 years) have gradually increased with the easing of lockdown measures, possibly suggesting greater susceptibility to SARS-CoV-2 infection compared to younger children, recent increases may reflect increasing circulation of other respiratory viruses. Respiratory admissions for adult age groups (20-49 years, ≥50 years) increased during the lockdown period and reached numbers several times higher than those observed in past influenza seasons. Levels again increased higher than those reached during the first wave, but have been decreasing since mid-January. The risk of hospitalization for ICD coded COVID-19 increases with age, with older adults at the greatest risk for developing severe COVID-19 disease.

### Outpatient - General Practitioner (Figures 3-4)

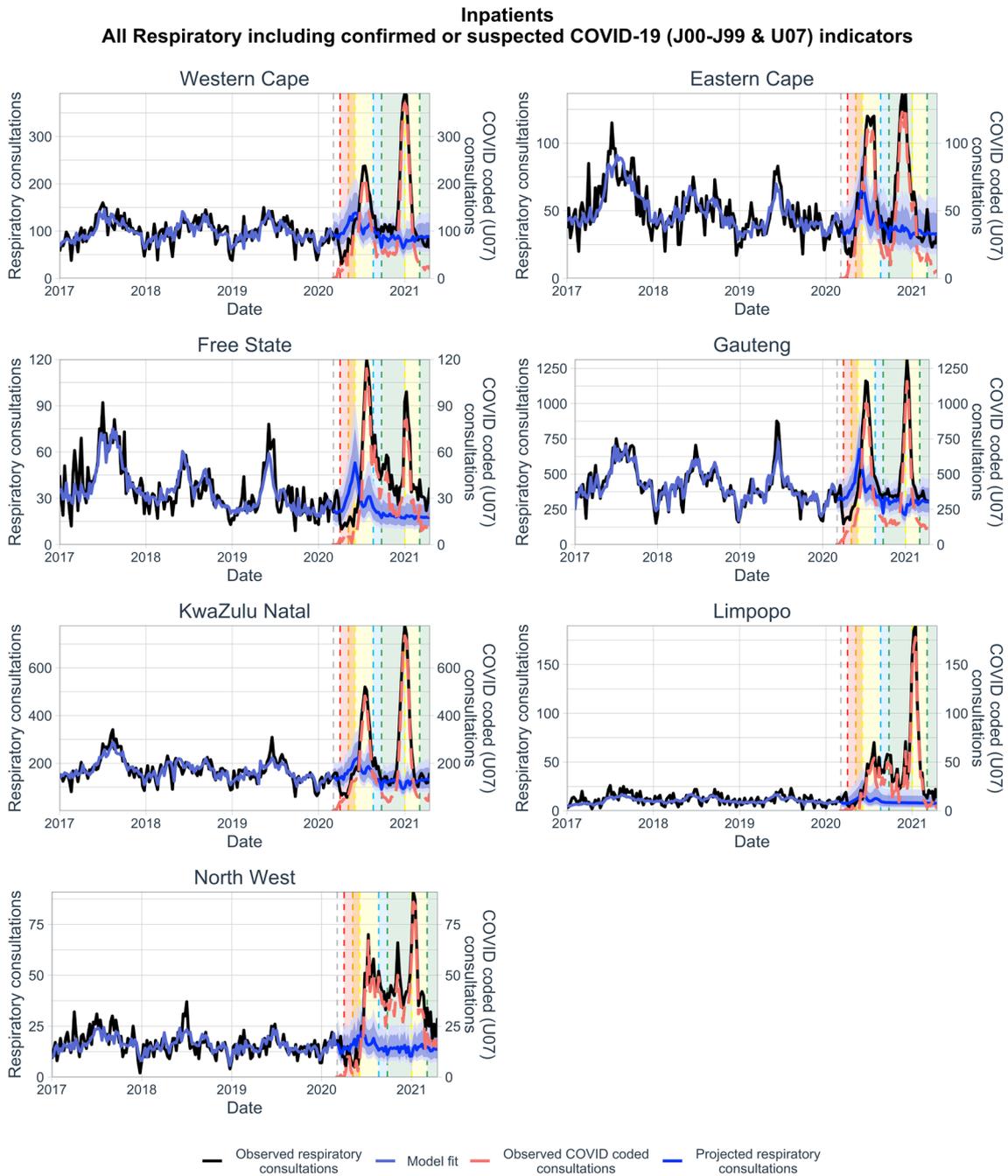
Outpatient respiratory consultations spiked in early March, consistent with “worried well” health-seeking behaviour. General practitioner visits then declined sharply across South African provinces and age groups, reflecting the impact of the lockdown and potential increased usage of telemedicine. Respiratory consultations in adults (20-49 years, ≥50 years) and provinces with sufficient levels of reporting (Eastern Cape, Gauteng, KwaZulu-Natal, Northern Cape, Western Cape) increased during Alert Level 3 but remain below numbers projected in the absence of COVID-19. Respiratory outpatient general practitioner consultations have increased in all provinces during the second wave reaching or exceeding the projected numbers in all provinces with available data and exceeding projected numbers among individuals aged ≥20 years, but declining over the past months. General practitioner consultations in children <5 years have decreased over the past month.

### Outpatient - Emergency department (Figures 5-6)

Outpatient emergency department consultations at private hospitals experienced a “worried well” spike in early March 2020, though to a lesser degree than observed for general practitioner providers. Since the initiation of lockdown measures in late March 2020, respiratory visits in children (<5 years, 5-19 years) have remained substantially below baseline numbers expected in the absence of COVID-19. In adults (20-49 years, ≥50 years), respiratory consultations increased after the transition to Alert Level 3 but then declined sharply to levels similar to those before the national lockdown. Respiratory consultations in Western Cape, Eastern Cape, Gauteng, and KwaZulu-Natal also increased during Level 3 but then declined. Since the last weeks of 2020, there has been an increase in the Eastern Cape, Gauteng, KwaZulu-Natal and the Western Cape, exceeding levels in the first wave in Western Cape and KwaZulu-Natal and among adults (20-49 years, ≥50 years), with levels declining over the past month. Respiratory consultations in children (<20 years) increased over the past month.

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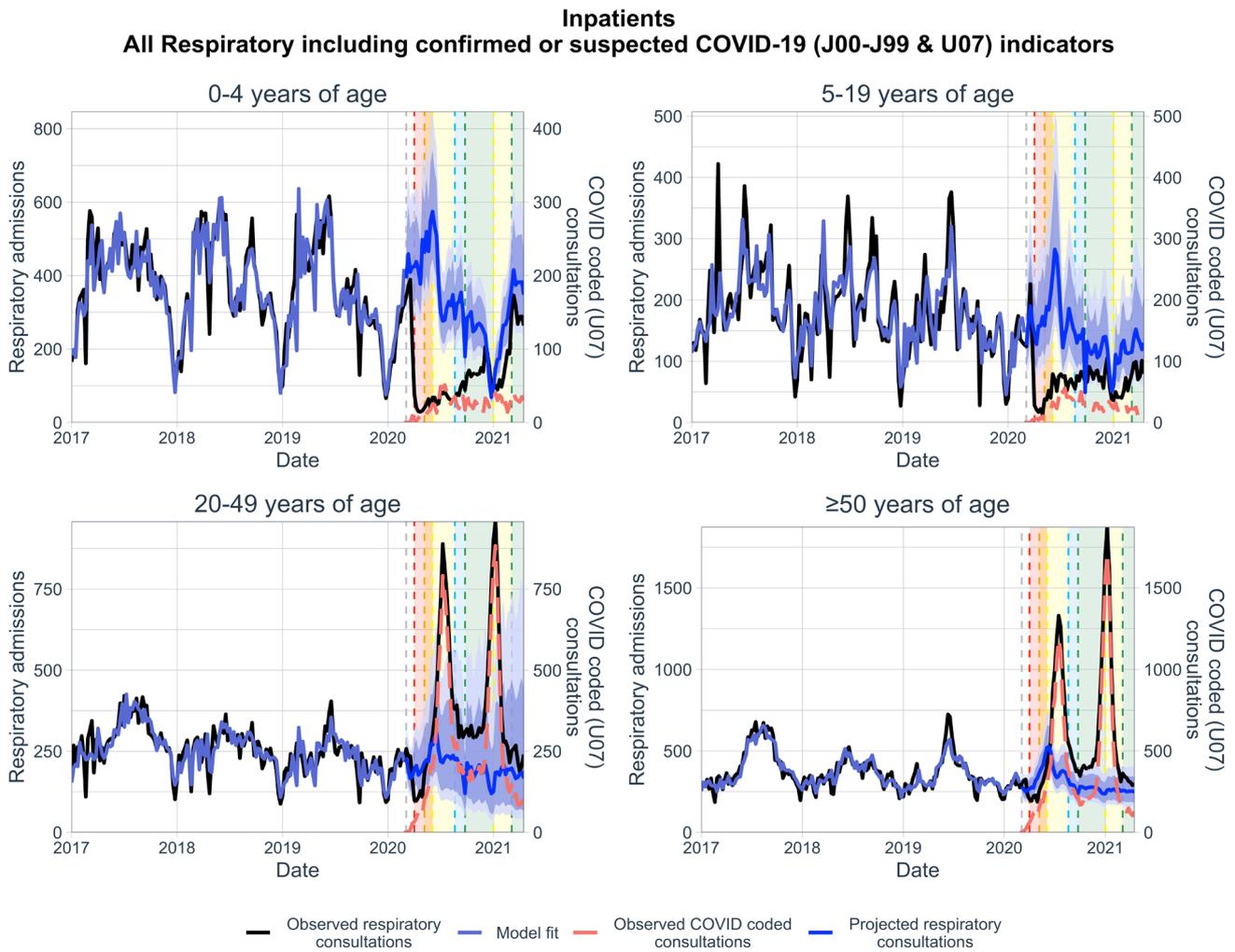
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**Figure 1. Weekly hospital admissions among individuals aged  $\geq 5$  years in six provinces (black), relative to admissions expected in the absence of COVID-19 (blue band).** The red line is the number of COVID-coded admissions (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – April 11, 2021), and panel colours indicate lockdown alert levels (Level 5: red, Level 4: orange, Level 3: yellow, Level 2: blue, Level 1: green). The left y-axis refers to all cause respiratory admissions (J00-J99 & U07), and the right y-axis refers to COVID-coded (U07) admissions.

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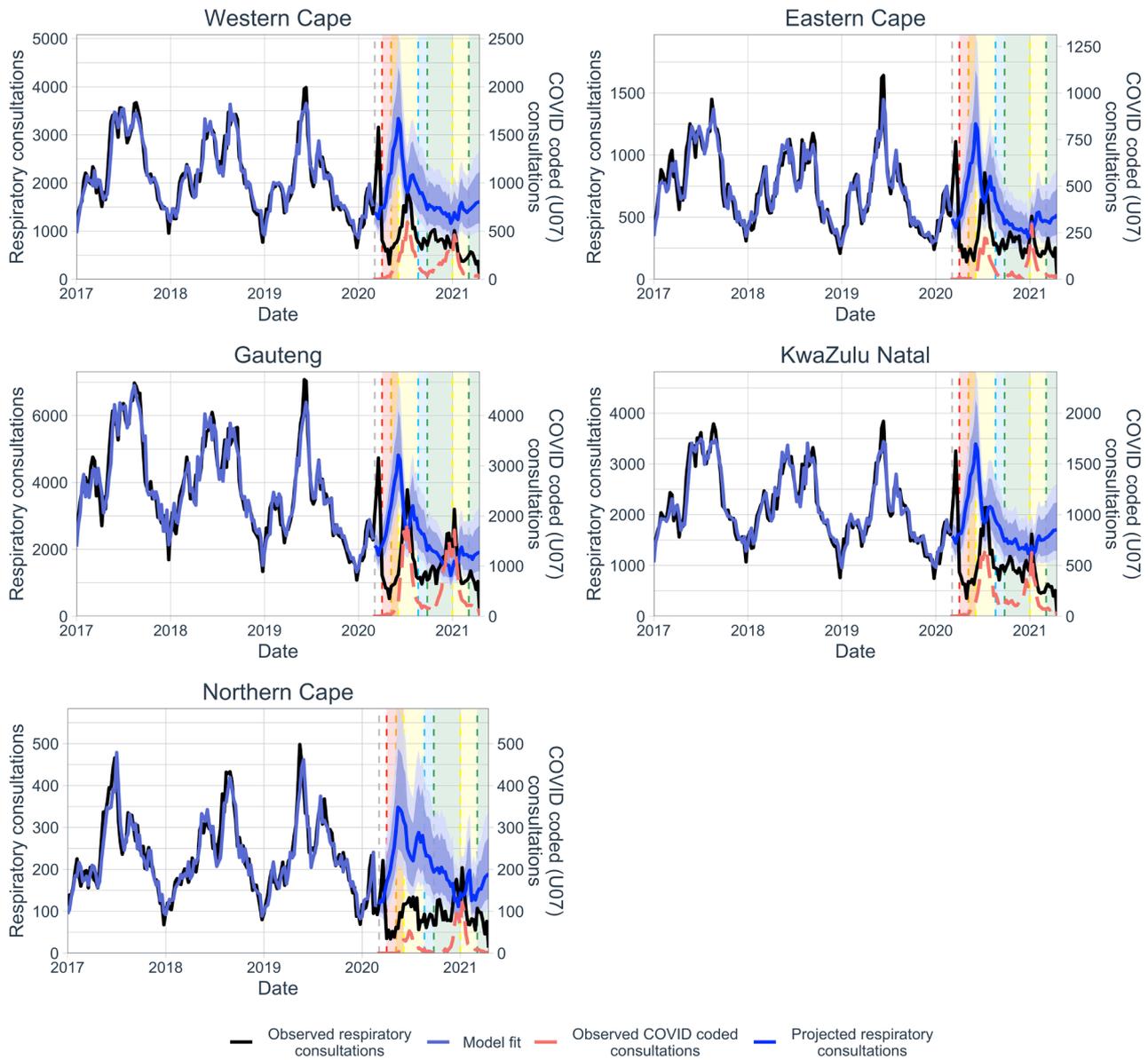


**Figure 2. Weekly hospital admissions by age group (black), relative to admissions expected in the absence of COVID-19 (blue band).** The red line is the number of COVID-coded admissions (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – April 11, 2021), and panel colours indicate lockdown alert levels (Level 5: red, Level 4: orange, Level 3: yellow, Level 2: blue, Level 1: green). The left y-axis refers to all cause respiratory admissions (J00-J99 & U07), and the right y-axis refers to COVID-coded (U07) admissions.

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## Outpatients - general practitioner All Respiratory including confirmed or suspected COVID-19 (J00-J99 & U07) indicators

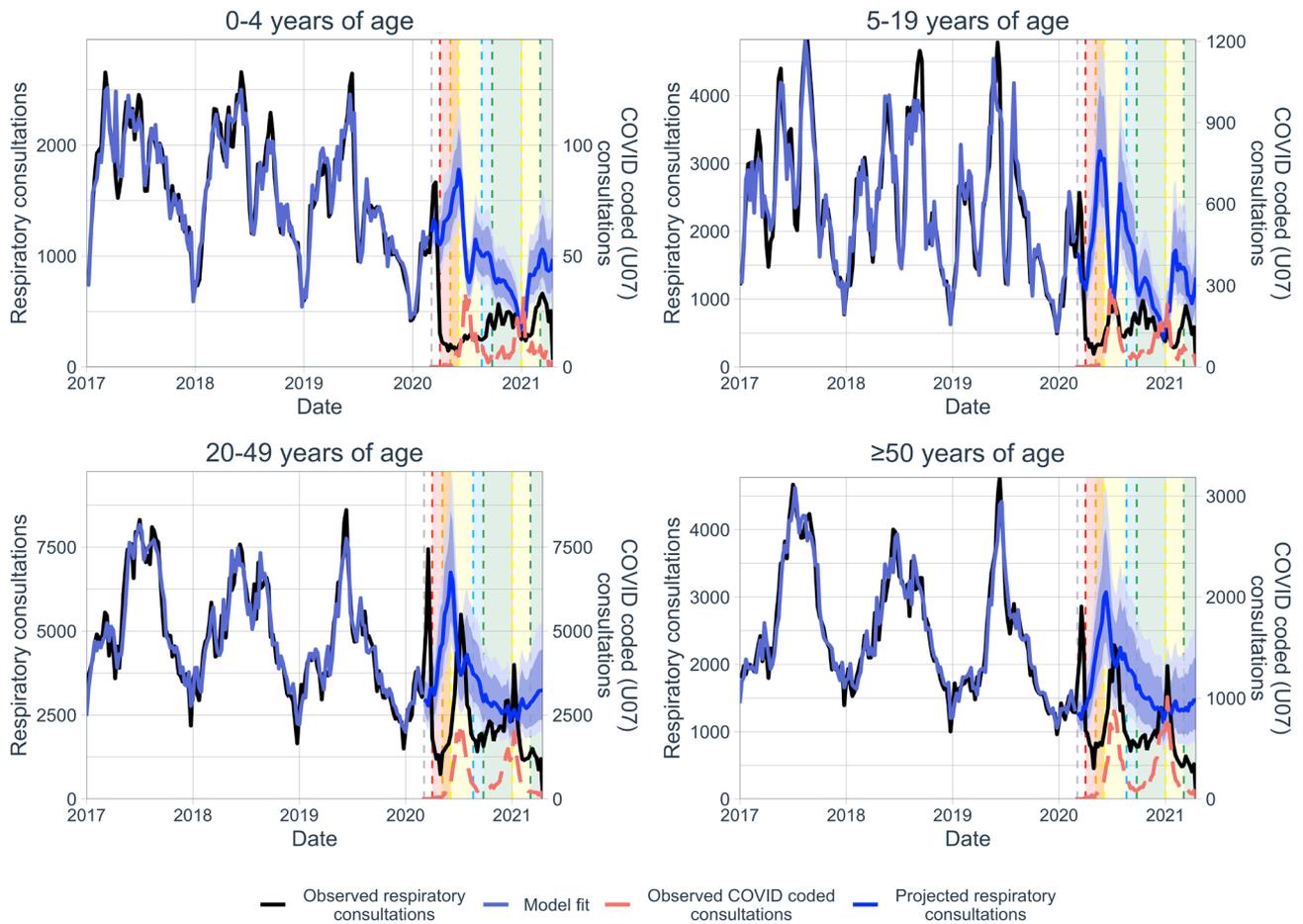


**Figure 3. Weekly general practitioner consultations among individuals aged  $\geq 5$  years in five provinces (black), relative to consultations expected in the absence of COVID-19 (blue band).** The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – April 11, 2021), and panel colours indicate lockdown alert levels (Level 5: red, Level 4: orange, Level 3: yellow, Level 2: blue, Level 1: green). The left y-axis refers to all cause respiratory consultations (J00-J99 & U07), and the right y-axis refers to COVID-coded (U07) consultations.

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## Outpatients - general practitioner All Respiratory including confirmed or suspected COVID-19 (J00-J99 & U07) indicators

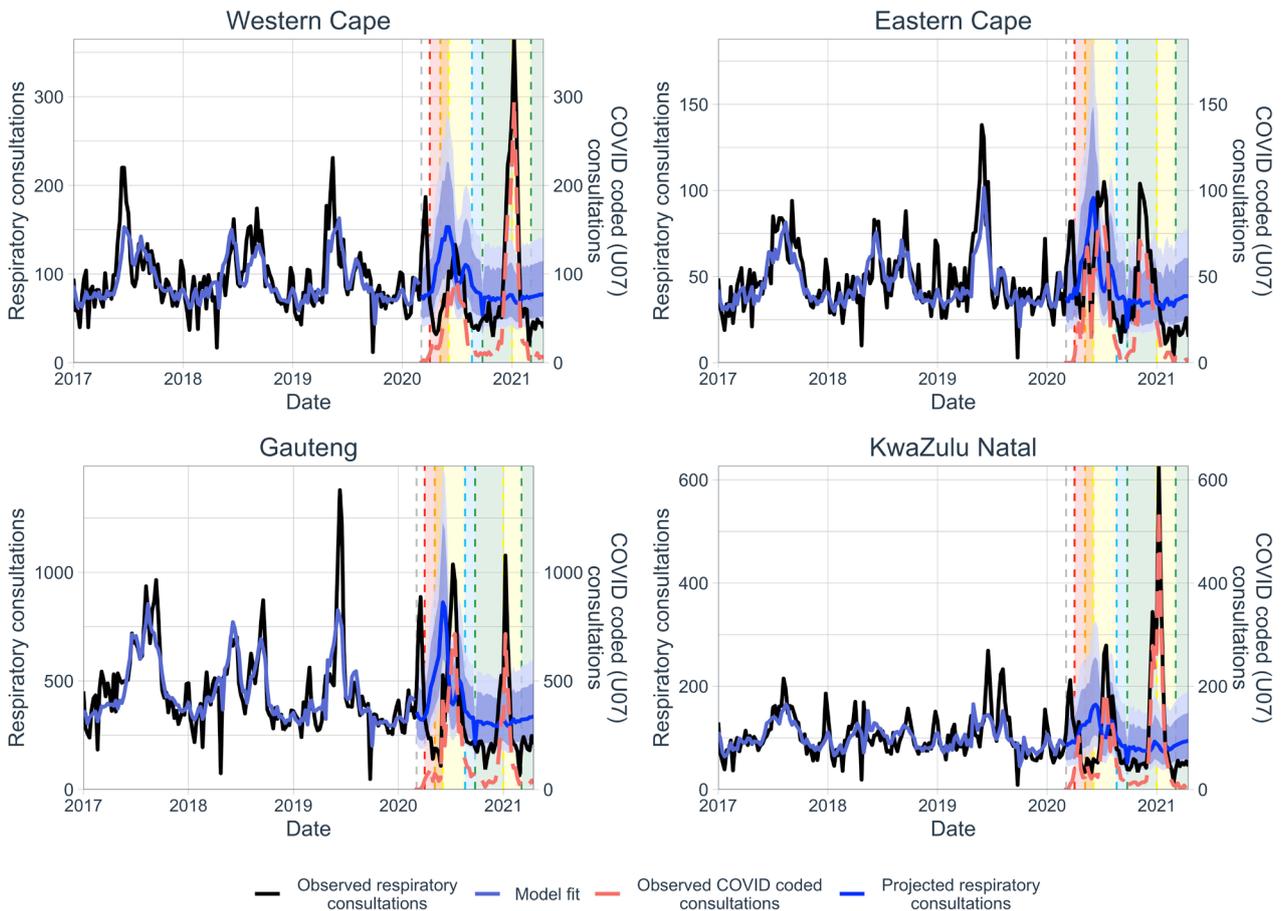


**Figure 4. Weekly general practitioner consultations by age group (black), relative to consultations expected in the absence of COVID-19 (blue band).** The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – April 11, 2021), and panel colours indicate lockdown alert levels (Level 5: red, Level 4: orange, Level 3: yellow, Level 2: blue, Level 1: green). The left y-axis refers to all cause respiratory consultations (J00-J99 & U07), and the right y-axis refers to COVID-coded (U07) consultations.

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## Outpatients - emergency department All Respiratory including confirmed or suspected COVID-19 (J00-J99 & U07) indicators

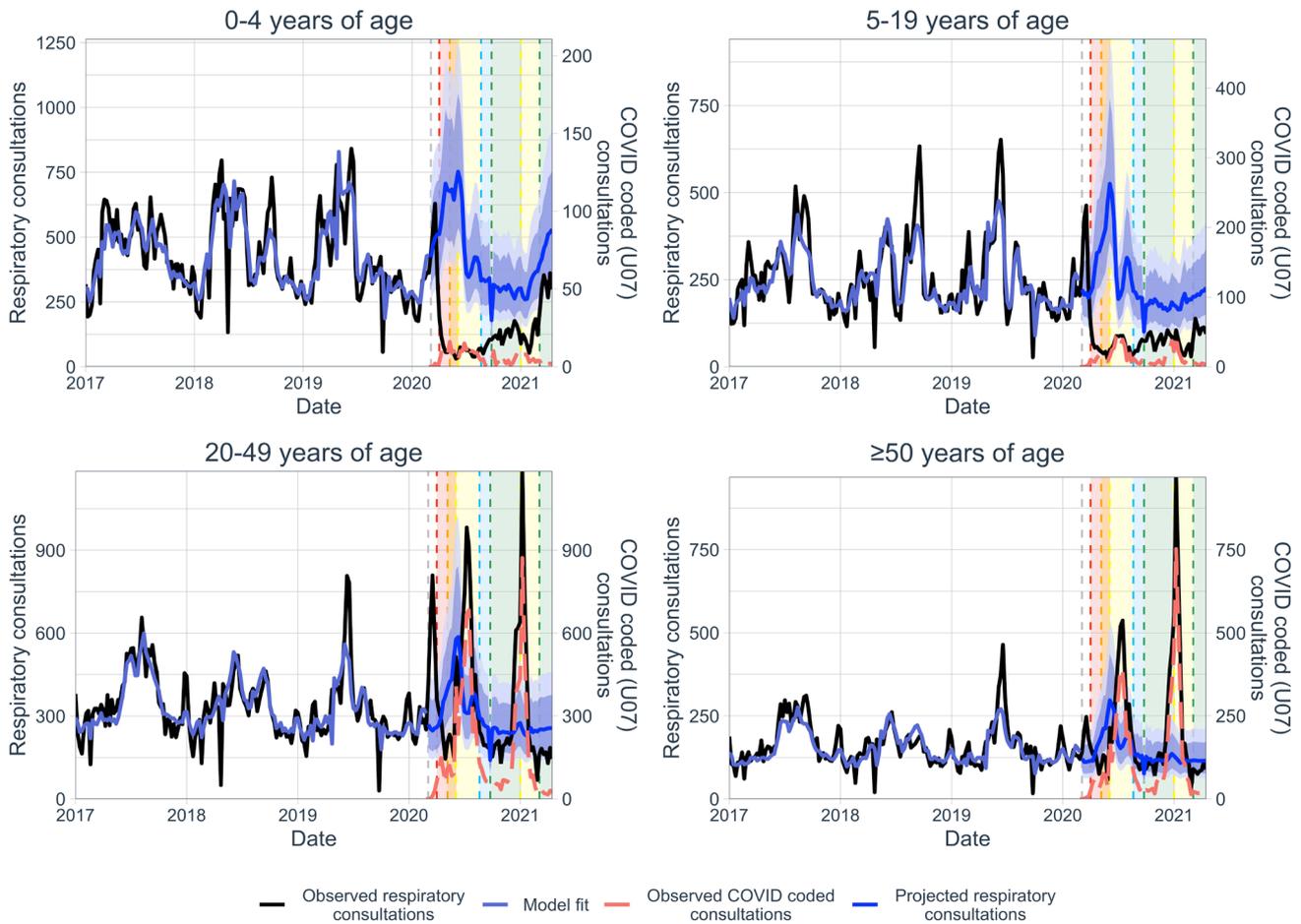


**Figure 5. Weekly outpatient emergency department consultations among individuals aged  $\geq 5$  years in six provinces (black), relative to consultations expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – April 11, 2021), and panel colours indicate lockdown alert levels (Level 5: red, Level 4: orange, Level 3: yellow, Level 2: blue, Level 1: green). The left y-axis refers to all respiratory consultations (J00-J99 & U07), and the right y-axis refers to COVID-coded consultations alone (U07).**

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## Outpatients - emergency department All Respiratory including confirmed or suspected COVID-19 (J00-J99 & U07) indicators



**Figure 6. Weekly outpatient emergency department consultations by age group (black), relative to consultations expected in the absence of COVID-19 (blue band).** The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – April 11, 2021), and panel colours indicate lockdown alert levels (Level 5: red, Level 4: orange, Level 3: yellow, Level 2: blue, Level 1: green). The left y-axis refers to all respiratory consultations (J00-J99 & U07), and the right y-axis refers to COVID-coded consultations alone (U07).

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1. McGough SF, Johansson MA, Lipsitch M, Menzies NA. 2020 Nowcasting by Bayesian Smoothing: A flexible, generalizable model for real-time epidemic tracking. PLoS Comput. Biol. , 663823. (doi:10.1101/663823)
2. Rob J. Hyndman, Yeasmin Khandakar. 2008 Automatic Time Series Forecasting: The forecast Package for R. J. Stat. Softw. 27, 22.

## ACKNOWLEDGEMENT

We would like to acknowledge the contribution of the following individuals: Dr Anchen Laubscher, Group Medical Director Netcare; Dr Caroline Maslo, Head of Infection Control Netcare; Mande Toubkin, General Manager Emergency, Trauma, Transplant CSI and Disaster Management Netcare