

PRIVATE CONSULTATIONS EXCESS RESPIRATORY ENCOUNTERS REPORT

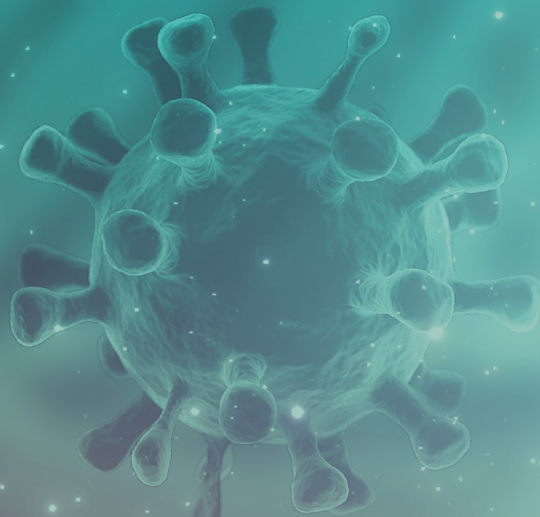
SOUTH AFRICA WEEK 47 2021

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HIGHLIGHTS: WEEK 47

- Respiratory admissions increased in the Western Cape, Free State, KwaZulu Natal and North West provinces and in children aged ≤ 19 years; markedly so in children below 5 years of age. COVID-19 admissions remained low in all provinces and age groups.
- Respiratory general practitioner visits have decreased in all provinces and age groups while COVID-19 general practitioner visits remained low in all provinces and age groups.
- Outpatient respiratory emergency department consultations have increased in individuals aged below 50 years. Outpatient COVID-19 emergency department consultations remained low in all provinces and in all age groups.



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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 ($\geq 38^{\circ}\text{C}$), 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 (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, ≥ 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 starting November 21, 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 November 21, 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

This report focuses on trends since December. For interpretation of trends prior to January 2021 please see the **Private Consultations Excess Respiratory Encounters Report - week 2 of 2021**.

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 during the last weeks of 2020 peaking in mid-January 2021, with levels in the second wave exceeding those reached in the first wave in all provinces (excluding the Free State). Respiratory admissions increased during the third wave, beginning in mid-May 2021 and peaking in late June/early July 2021, with Gauteng levels exceeding those reached in the second wave. In recent weeks, there has been an increase in respiratory admissions in the Western Cape, Free State, KwaZulu Natal and North West provinces, while COVID-19 admissions remained low in all provinces.

Respiratory hospitalizations in children aged <5 years have remained below projected levels since March 2020. From January 2021 these increased and then reduced, possibly related to changing circulation of RSV and/or other respiratory viruses. Respiratory hospitalizations in older children (5-19 years) have remained below projected levels since March 2020, recent increases may reflect increasing circulation of other respiratory viruses. Respiratory admissions for adult age groups (20-49 years, ≥50 years) peaked in mid-January 2021 with levels in the second wave and in late June/early July 2021 in the third wave exceeding those reached in the first wave. In recent weeks, respiratory admissions have continued to increase in children aged ≤ 19 years and markedly so in children below 5 years of age. COVID-19 admissions remain low in all age groups.

Outpatient - General Practitioner (Figures 3-4)

Following a spike in outpatient respiratory consultations in early March 2020, general practitioner visits have generally remained below projected levels across South African provinces and age groups until mid-May 2021, reflecting the impact of the lockdown and potential increased usage of telemedicine. General practitioner visits peaked in late June/early July 2021 in all provinces and age groups. In recent weeks, respiratory general practitioner consultations have decreased in all provinces and age groups, while COVID-19 general practitioner consultations remain low in all provinces and age groups.

Outpatient - Emergency department (Figures 5-6)

In all provinces, respiratory and COVID-19 emergency department consultations continue to decrease, in recent weeks to levels below projected respiratory consultations. Respiratory consultations in all age groups slightly increased in the first 2 weeks of April, then declined, before increasing and peaking in late June/early July 2021 for adults aged ≥20 years. Recently, respiratory emergency department consultations continued to increase in children aged ≤ 19 years and in adults aged 20-49 years. COVID-19 emergency department consultations remained low in all provinces and in all age groups.

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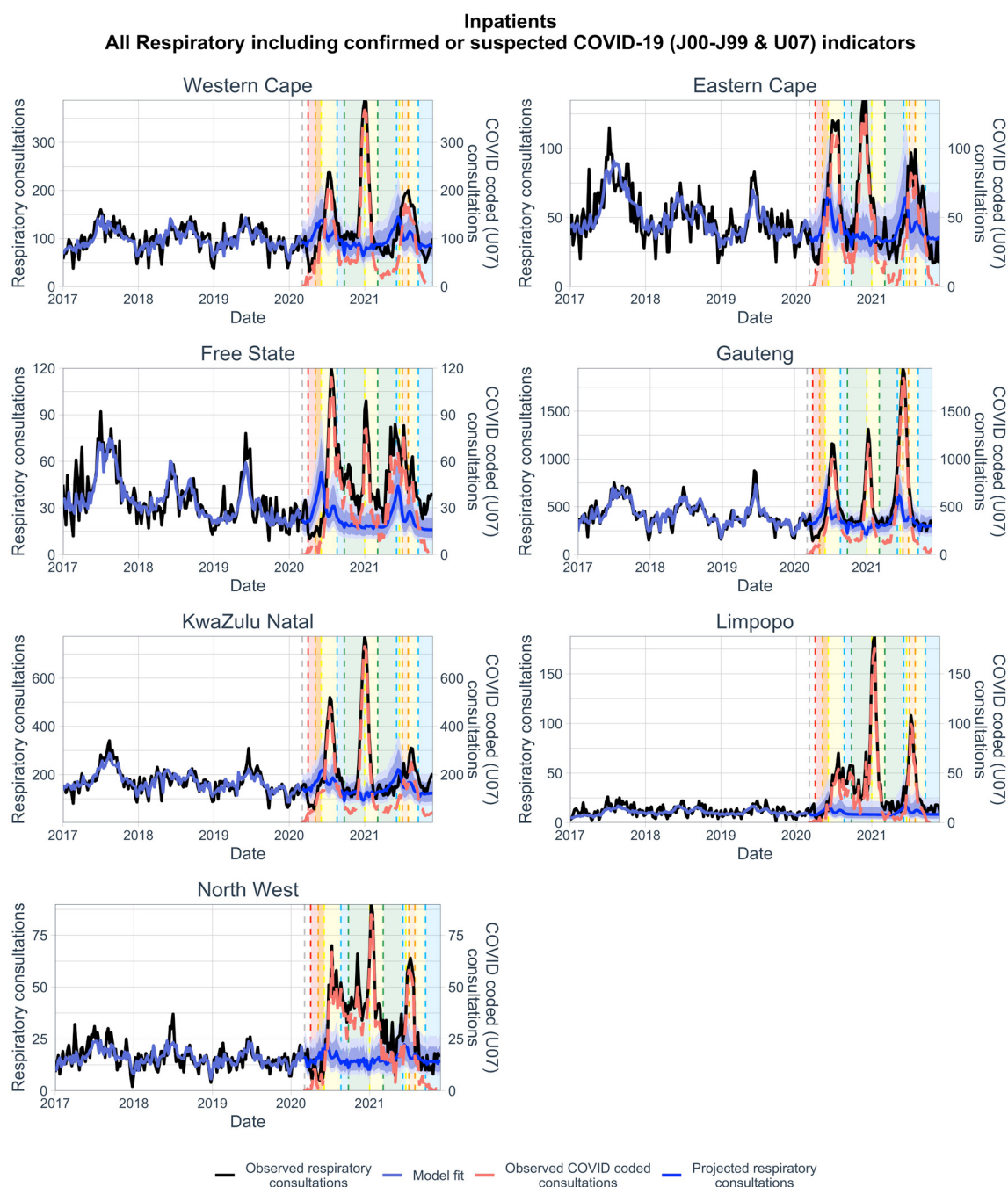


Figure 1. Weekly hospital admissions among individuals aged ≥ 5 years in six provinces (black), relative to admissions expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded admissions (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – November 21, 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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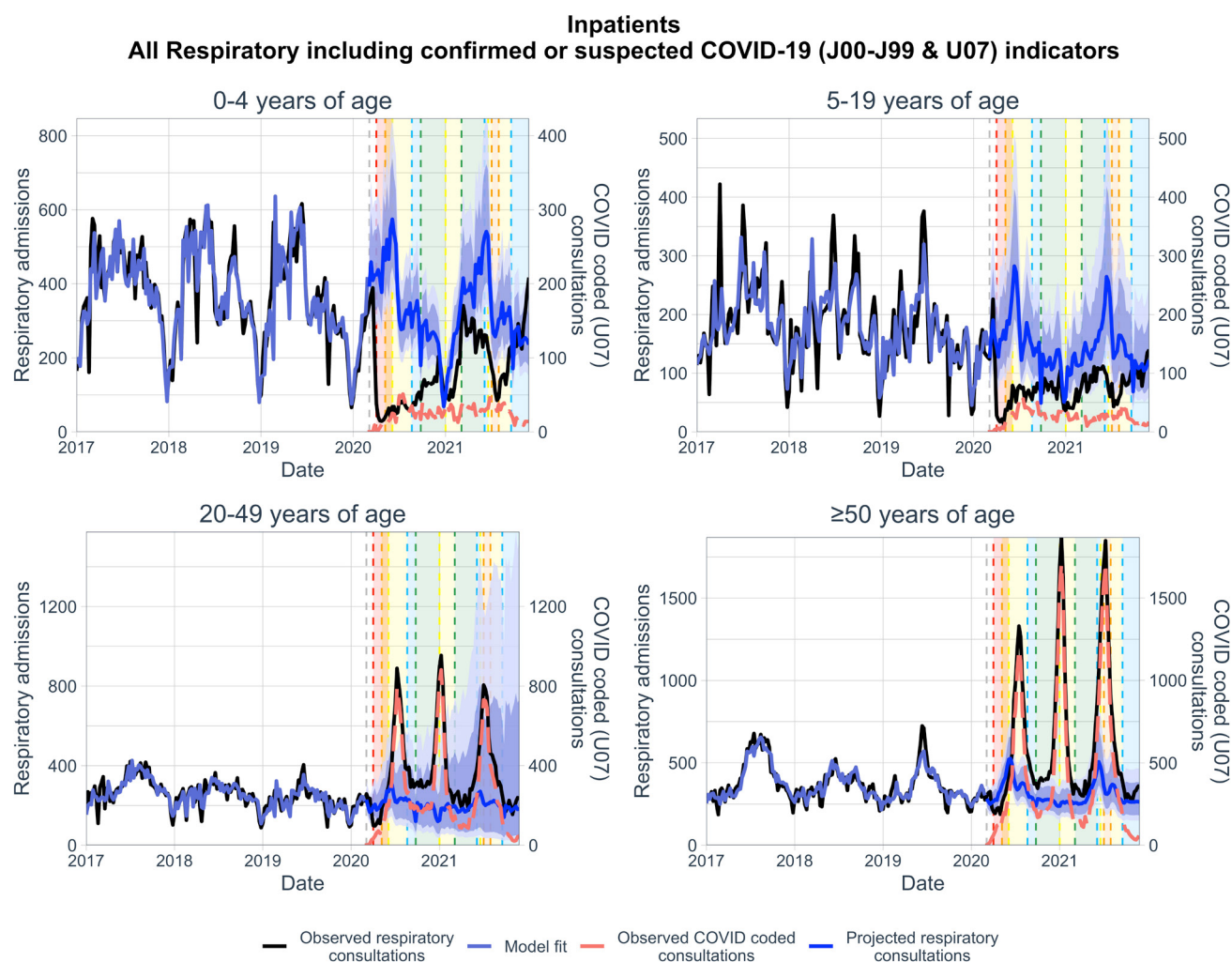


Figure 2. Weekly hospital admissions by age group (black), relative to admissions expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded admissions (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – November 21, 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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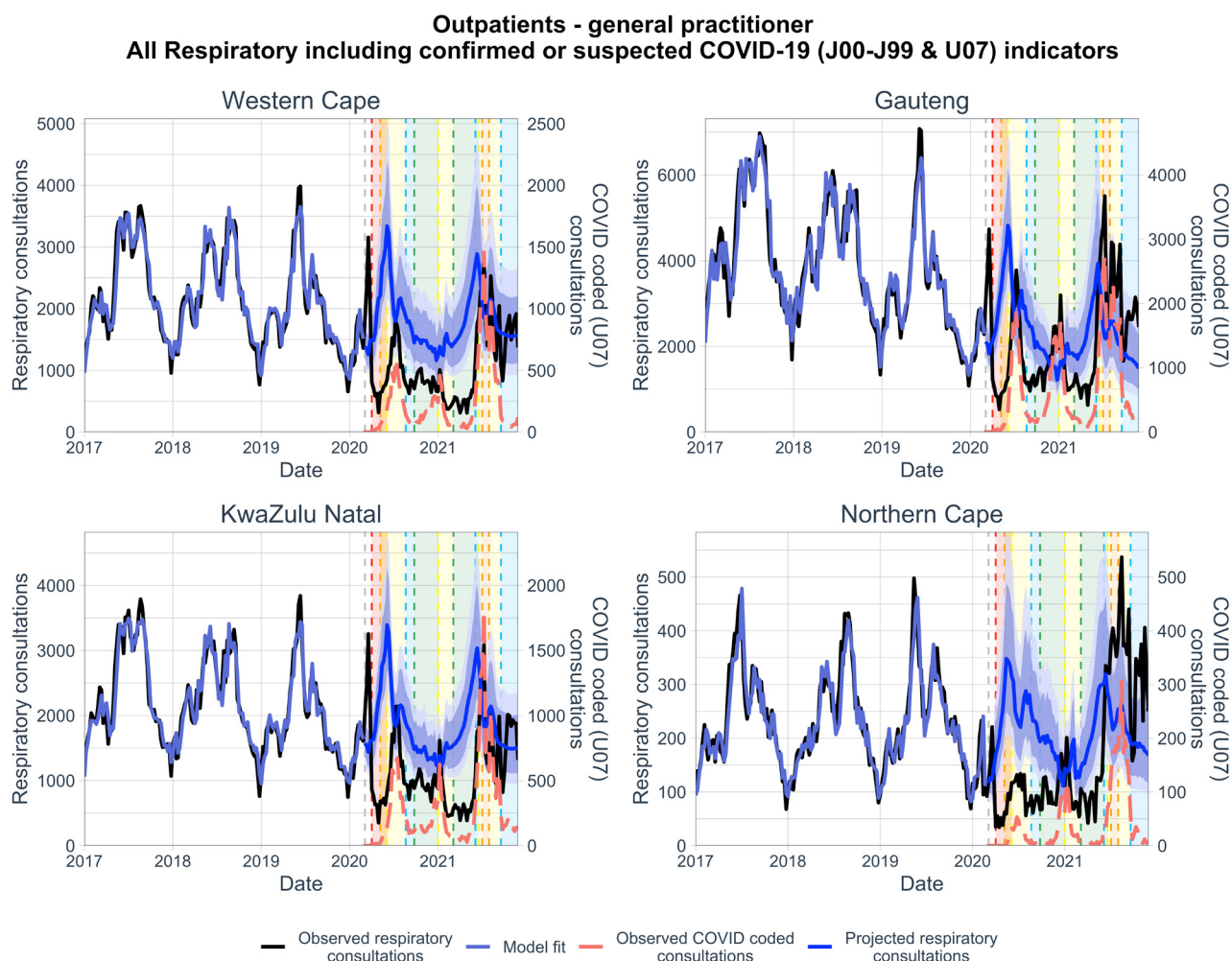


Figure 3. Weekly general practitioner consultations among individuals aged ≥ 5 years in five provinces (black), relative to consultations expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – November 21, 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

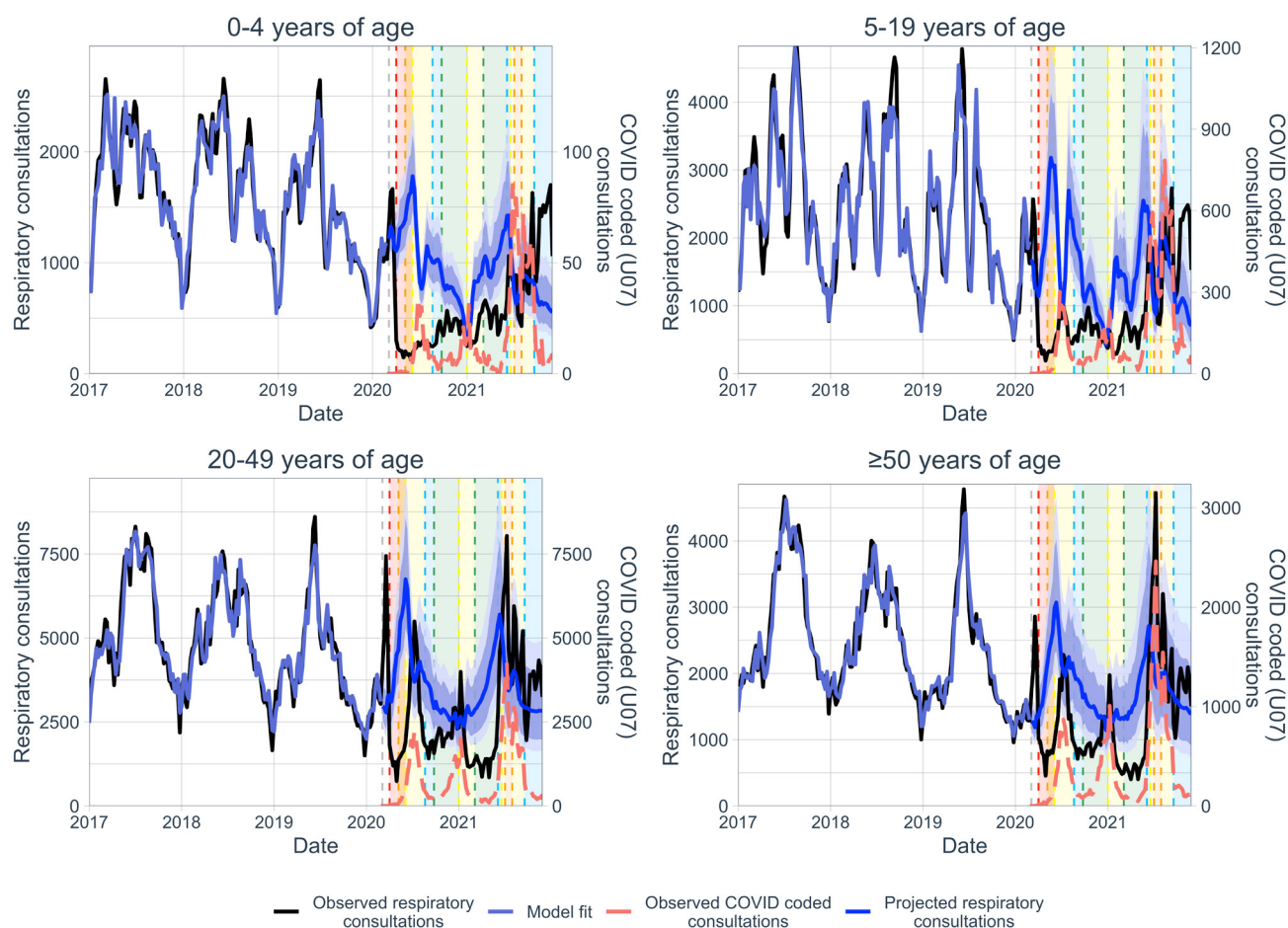


Figure 4. Weekly general practitioner consultations by age group (black), relative to consultations expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – November 21, 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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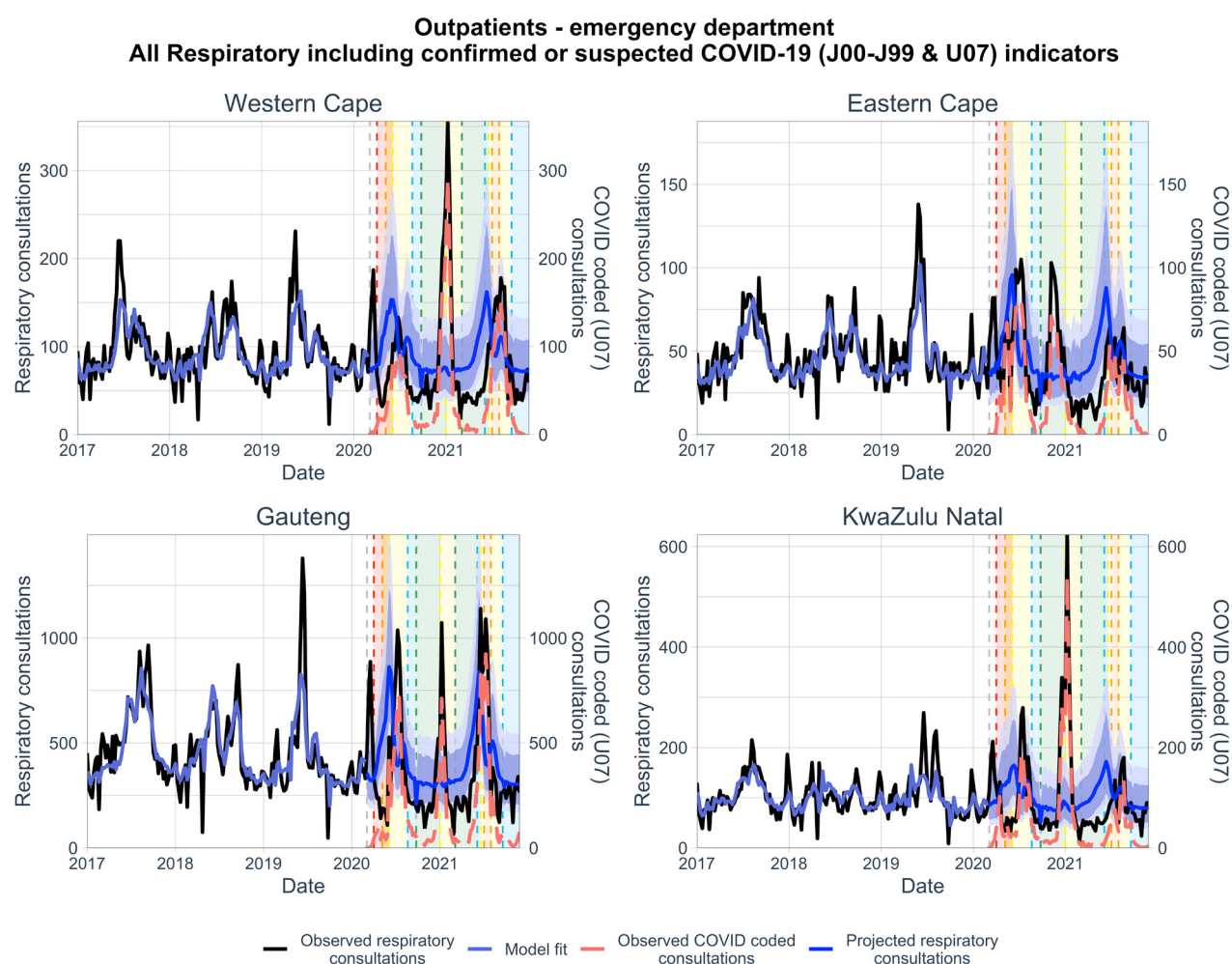


Figure 5. Weekly outpatient emergency department consultations among individuals aged ≥ 5 years in six provinces (black), relative to consultations expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – November 21, 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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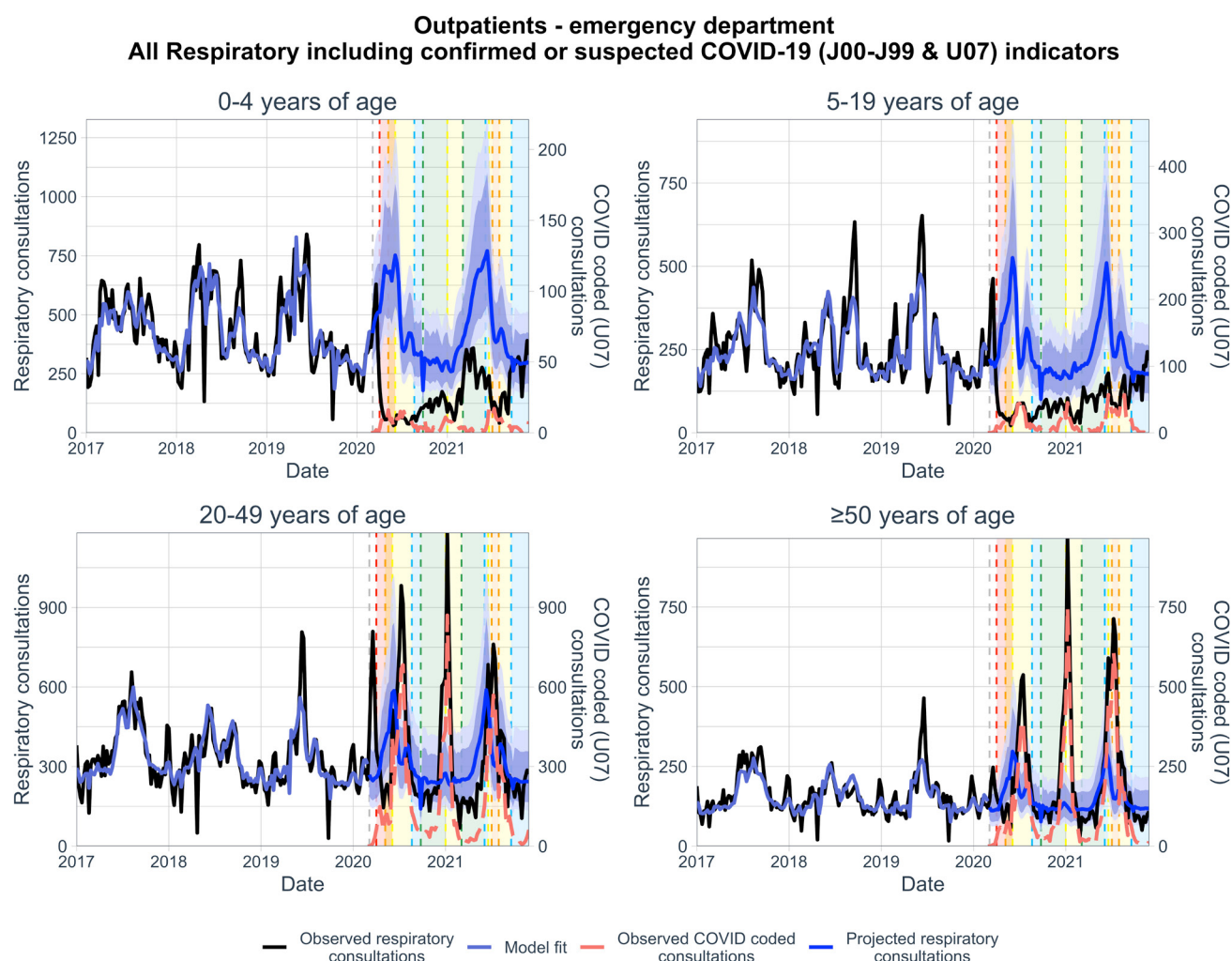


Figure 6. Weekly outpatient emergency department consultations by age group (black), relative to consultations expected in the absence of COVID-19 (blue band). The red line is the number of COVID-coded consultations (U07). The grey vertical dashed line indicates the start of the model prediction period (March 1, 2020 – November 21, 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.

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