

REPORT ON WEEKLY DEATHS IN SOUTH AFRICA

1 JANUARY – 14 JULY 2020
(WEEK 28)

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UCT Centre
for Actuarial
Research

Warning: The Department of Home Affairs has faced sporadic temporary office closures, particularly in areas that are more affected by COVID-19. This may affect our allocation of a death to a metro area. For example, a death that occurred in the City of Cape Town might have been registered at an office outside of the City because of a temporary closure. Closure may also cause a delay in the processing of the death registration which would result in an underestimate of the deaths in the most recent week. This accounts for the kinks in what should otherwise be a smooth increase in numbers of deaths in Cape Town and Buffalo, for example.

Actual number of deaths: The actual number of deaths in South Africa have been estimated from the numbers recorded on the National Population Register using weighting factors set to produce results consistent with those of the annual Rapid Mortality Surveillance Report to account for deaths of persons who are not on the National Population Register as well as those that have not been registered with the Department of Home Affairs. The estimated number of weekly deaths can be downloaded in excel with this report from the SAMRC website: <https://www.samrc.ac.za/reports/report-weekly-deaths-south-africa>

Excess Natural deaths: There is no universal definition of, or understanding of what is meant by, “excess mortality”. Generally, the number of excess deaths per week is calculated as the number of all-cause deaths in that week less the number that might be assumed to have occurred had there not been the epidemic (i.e. the counterfactual number). **However, this approach has generally only been applied to countries where deaths have been tracking the counterfactual before the onset of significant numbers of COVID-19 related deaths, and as can be seen from the numbers in Table 2, the method provides a poor estimate of the numbers of COVID-19 and related deaths in the early stages of the epidemic when this is not the case.**

Thus, we estimate the numbers of excess deaths, once a clear upward trend is evident, as the number of actual deaths less a baseline number determined as a proportion of the lower projection bound. The proportion is calculated such that the excess deaths in that week is equal to the confirmed number of COVID-19 deaths for that week. The cumulative number of excess deaths comprises the sum of the weekly excess plus the cumulative number of confirmed deaths prior to the establishment of the clear upward trend. Where there is no clear indication of an upward trend, we have not calculated excess deaths. It is important to note that this estimate of the number of excess deaths is an estimate of the number of deaths in excess of expectation, due to the Covid-19 epidemic and not of those infected with the SARS-CoV-2 virus alone (i.e. it includes incidental deaths resulting from such things as shortage of health care and medications due to either the demands on the health systems by the virus or strategies to combat the epidemic).

Data Source

Basic demographic information for all deaths registered on the National Population Register are provided to the SAMRC on a weekly basis. Since the number of deaths has a seasonal trend, historical data from 2018 and 2019 have been used to predict the number of deaths that could be expected during 2020. Before this was done, the deaths were weighted to account for incomplete registration of deaths and those that do not have a South African ID number. The weights were calculated by age, sex, metro/non-metro and natural/unnatural cause to be consistent with the weights applied in the annual Rapid Mortality Surveillance Reports.¹

¹ Dorrington RE, Bradshaw D, Laubscher R, Nannan N (2020). Rapid mortality surveillance report 2018. Cape Town: South African Medical Research Council.

While we have built up a good sense of the adjustment at a national level through the annual RMS reports and the National Burden of Disease Study, estimating completeness of registration of deaths below national level is challenging, particularly given limitations of data available to inform such an exercise, and has required numerous assumptions. Thus, the resulting estimates need to be treated with a degree of caution.

The excel forecast function² has been used to predict values for each week of 2020 based on a linear annual trend, allowing for a seasonal effect over the year. In addition, 95% prediction intervals have been estimated for the predicted weekly number of deaths for 2020 to give a basis to assess fluctuations. The forecasts have been applied to the estimated actual number of deaths.

Graphs of the estimated weekly number of deaths, classified by date of occurrence, not reporting, up until epidemiological **week 28** (i.e. the period from **1 January 2020** till **14 July 2020**) based on the data received on 20 July 2020 are shown below. *The figures plot the estimated numbers of deaths at the start date of each week.* Data for the most recent week has been scaled up to account for the lag in processing registrations. Based on previous data, the numbers at the national level have been increased by 5.6%.

Sub-national statistics have been compiled for the provinces and metros by allocating the deaths according to the Home Affairs office where the death was registered. It is assumed that most of the deaths within an area are registered at an office in the same area. The numbers of deaths from **natural causes** are reported for each province and each of the metros.

Estimating excess deaths is not straight-forward. Excess deaths are generally measured for all-cause mortality. Some suggest that the expected number of deaths based on historical data be used as the counterfactual. Alternatively, others propose that the upper confidence bound from historical data should be used. During lockdown in South Africa, it was observed that the number of natural deaths was much lower than predicted value than in other countries and the weekly numbers were tracking the predicted trend at a level between the lower prediction bound and the predicted value, probably due to the impact of lockdown and non-pharmaceutical interventions (NPIs). Using the predicted value as the base would understate the impact of the COVID-19 epidemic. It was therefore decided to focus on the deaths from natural causes and identify the relative level that the natural deaths were tracking during the lockdown, prior to the emergence of the COVID-19 deaths. The estimated number of deaths in the week prior to a clear rapid increase in numbers (e.g. the week starting on 6 May for Cape Town, Western Cape and nationally) was taken as a proportion of the lower prediction bound and the base was calculated to track the lower bound. The proportion was set to produce the numbers of reported COVID-19 deaths in that week. The estimated numbers of excess natural deaths are reported in **Table 1**, calculated in excess of the revised base to account for the drop in mortality experienced during lockdown. These numbers are indicated on the graphs. It is important to point out that although the bulk of these estimates of the 'excess deaths' are likely to be due to COVID-19 and related causes, an unknown proportion may be due other natural causes associated with a relaxing of lockdown.

Although apparently inadequate as a measure at this early stage of the epidemic, we have included, in **Table 2**, estimates of 'excess mortality' using the measure employed more generally.

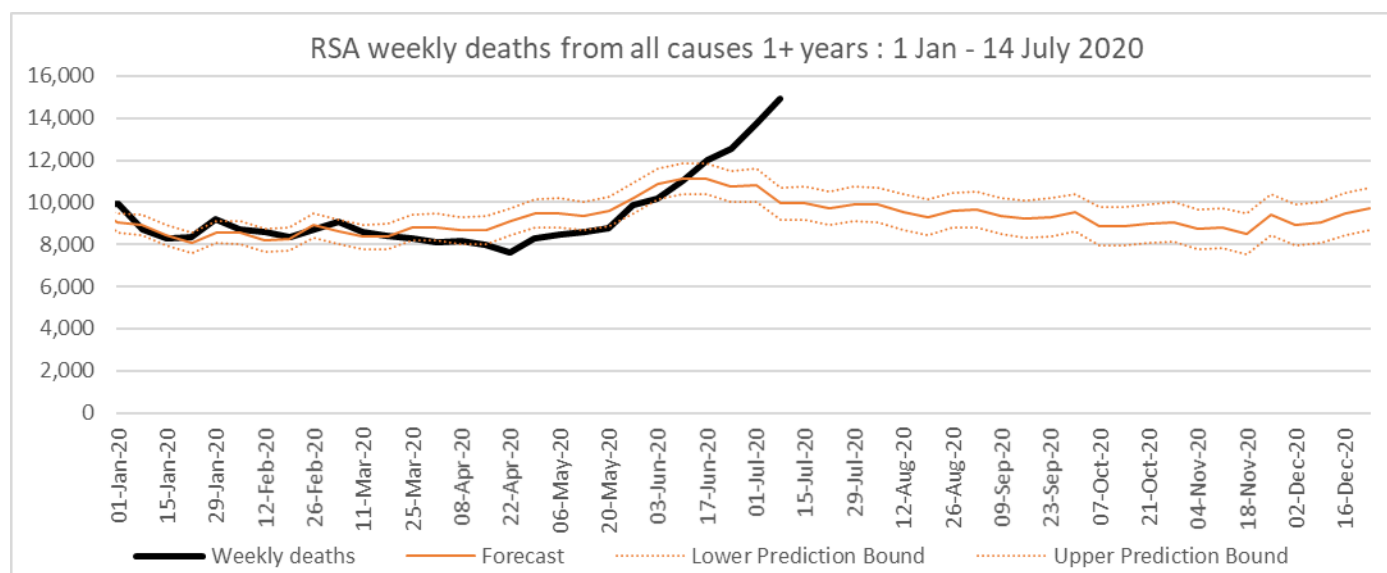
Births were not registered by the Department of Home Affairs during lockdown stage 5. This means any that die before the backlog is processed will not be placed on the National Population Register and thus that the deaths of these births will not be captured. **This report presents the estimated weekly deaths of persons 1 year and older.** Registered births are again being added to the population register, but either there remains a backlog in processing

² The Excel function implements is the Holt-Winters triple exponential smoothing (the AAA sub-method).

or a lower proportion of births are being registered since lockdown. Once we have confidence that registration of deaths is back to previous levels we will include deaths under age 1.

Trends

- The all-cause national number of deaths of persons 1+ years of age per week has risen to **14,958** and is **51%** higher than the predicted number based on historical data in the week ending **14 July 2020**. When compared with the predicted numbers, there was an excess of **5,022** deaths in the latest week.
- The number of deaths from natural causes is also significantly higher than the predicted number, for persons 1-59 years and 60+ years.
- In the period, **6 May - 14 July 2020**, there has been an excess of **17,090** deaths from natural causes of persons 1+ year old when using a revised base accounting for lower mortality during lockdown. For people 1-59 years the excess is **5,889** and **11,175** for people 60+ years.
- **Table 1** shows the estimated excess number of natural deaths in metro areas and the provinces. Deaths from natural causes in the **City of Cape Town (3,341)**, **Johannesburg (1,863)**, **Ekurhuleni (1,402)**, **Nelson Mandela Bay (1,027)**, **Buffalo City (658)** and **City of Tshwane (607)** metros continued increasing in the week up to **14 July 2020**.
- **Western Cape, Eastern Cape, Gauteng** and **KwaZulu-Natal** are experiencing an excess number of natural deaths. The sharp increase noted in the previous report in **Gauteng** and the **Eastern Cape** have continued. Compared with the predicted number of natural deaths from historical data in the week ending **14 July 2020**, the **Eastern Cape** had **116%** more, **Gauteng** had **117%** more, the **Western Cape** had **57%** more and **KwaZulu-Natal** had **49%** more.
- Of the provinces without metropolitan areas, **Mpumalanga, Free State, Limpopo** and **North West** have also started experiencing an increase in the excess number of natural deaths ranging from **238** to **331**.
- The number of deaths from unnatural causes (e.g. road traffic fatalities and homicides) was **20%** below the predicted number for the week ending **14 July 2020**.



Numbers have been scaled to the estimated actual number of death and for the last week has been adjusted for delayed registrations

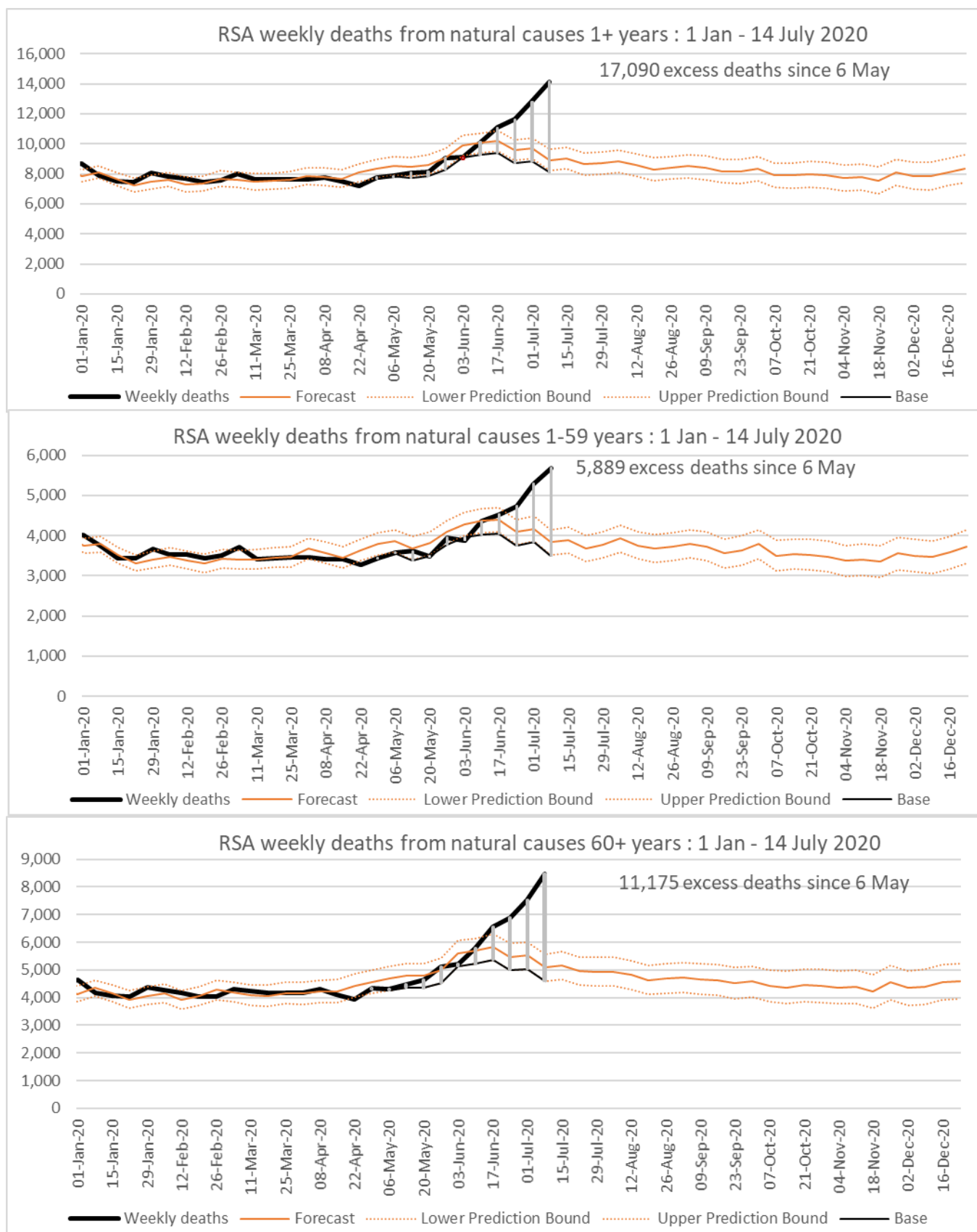
Table 1: Number of excess natural deaths of persons 1+ years by province and metro relative to revised predicted number based on the observed drop during lockdown, South Africa 2020

Region	Period	Excess deaths vs revised base
South Africa	6 May – 14 July	17,090
Province		
Eastern Cape	3 June – 14 July	4,903
Free State	24 June – 14 July	329
Gauteng	10 June – 14 July	4,708
KwaZulu-Natal	6 May – 14 July	2,074
Limpopo	24 June – 14 July	299
Mpumalanga	24 June – 14 July	331
Northern Cape		-
North West	1 July – 14 July	238
Western Cape	6 May – 14 July	4,022
Metropolitan Municipality		
Buffalo City	3 June – 14 July	658
City of Cape Town	6 May – 14 July	3,341
Ekhuruleni	10 June – 14 July	1,402
Ethikweni	17 June – 14 July	452
Johannesburg	10 June – 14 July	1,863
Mangaung		-
Nelson Mandela Bay	3 June – 14 July	1,027
City of Tshwane	10 June – 14 July	607

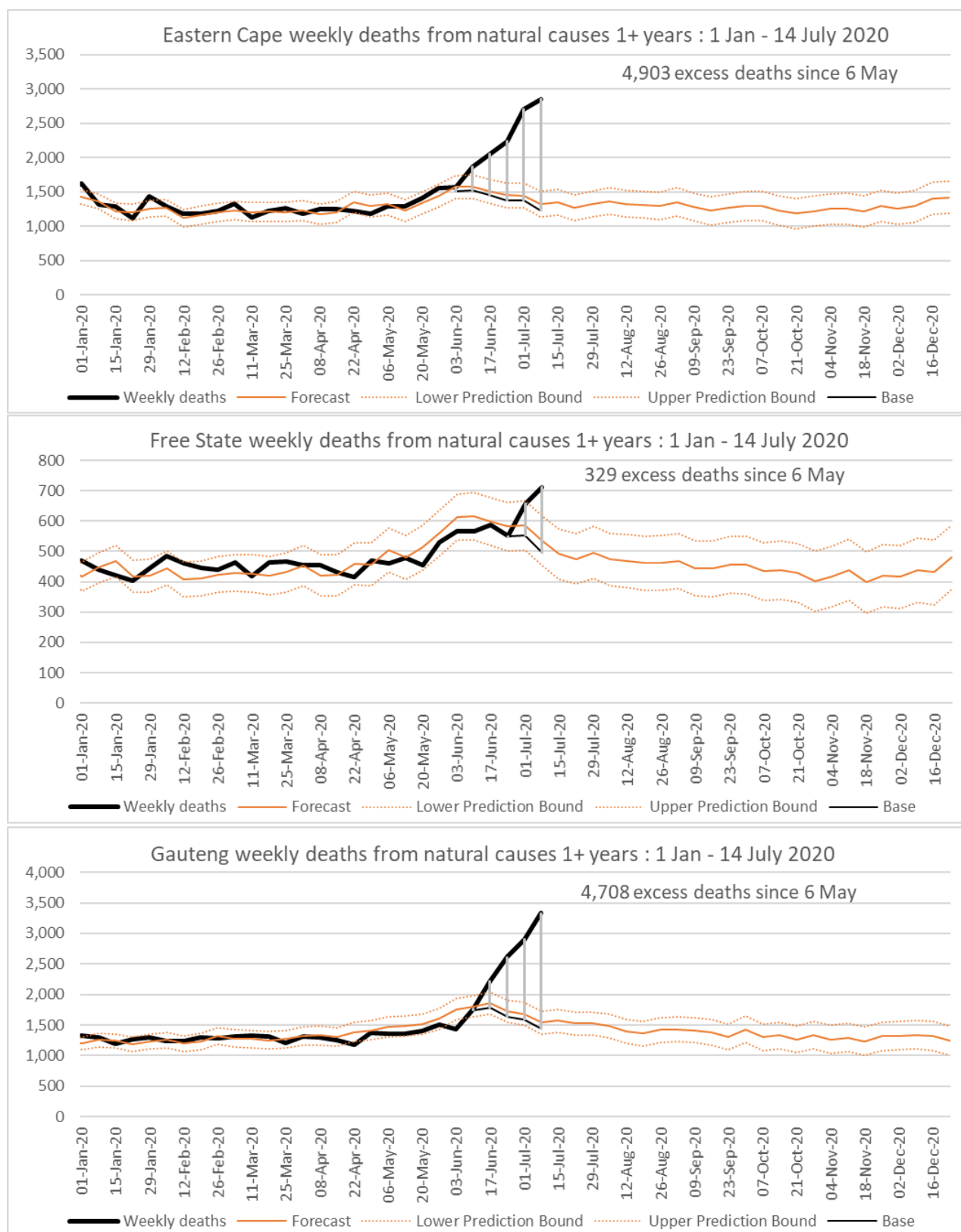
Note: Period has been determined based on when an upturn in the number of natural deaths became apparent. Parts do not sum to the whole because office closures due to Covid-19 may have led to registration of deaths at other offices which may not be in the same area, and random fluctuation at the point at which the baseline is determined.

Table 2: Number of excess deaths from all causes of persons 1+ years by province and metro relative to predicted number based on historical trend, South Africa 2020

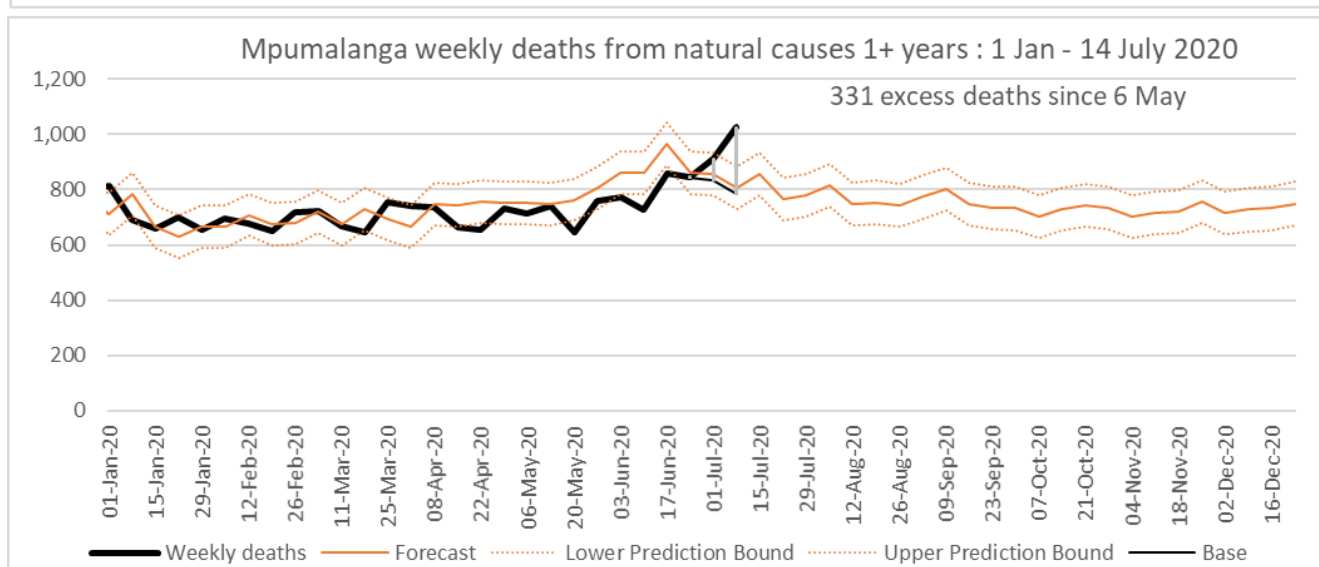
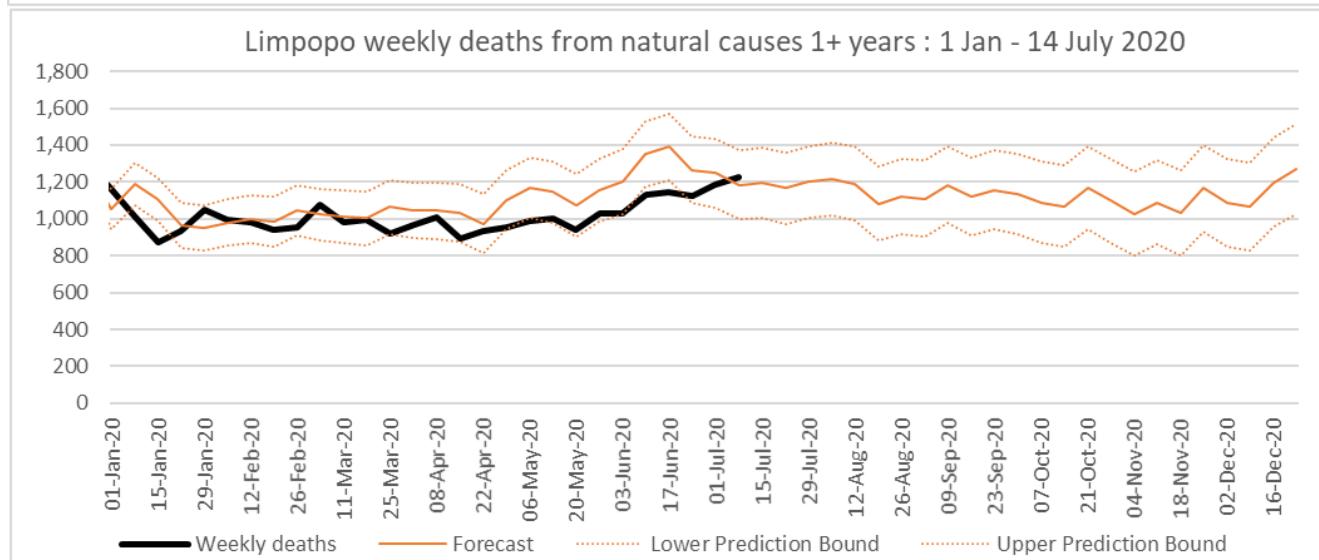
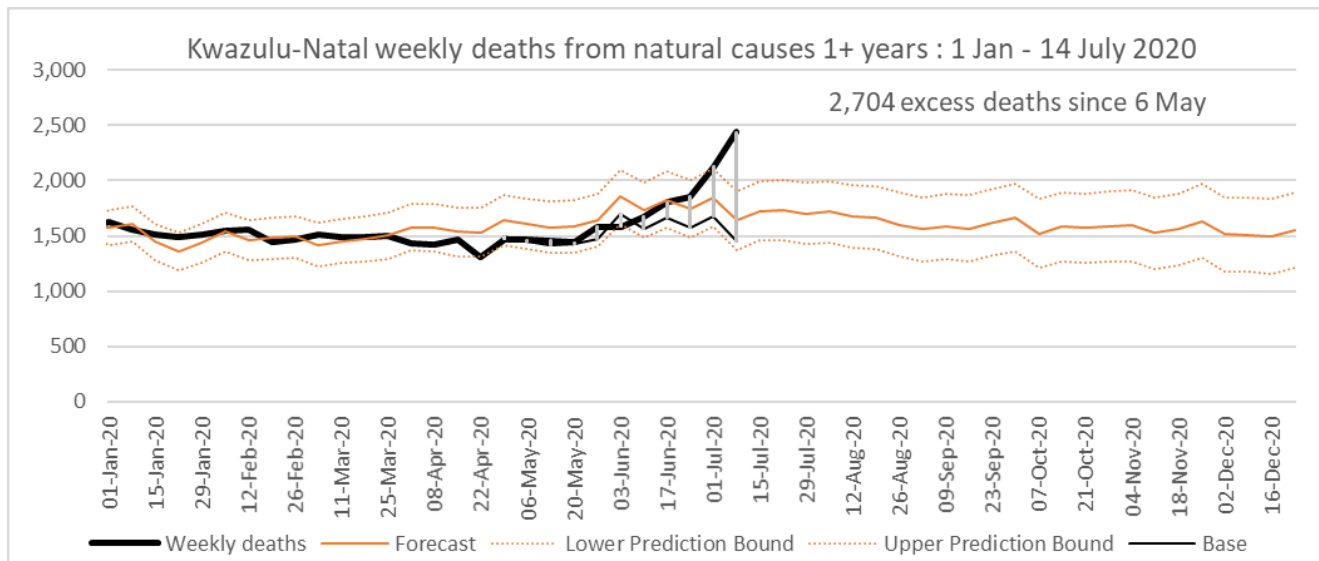
Region	Excess deaths vs forecast
South Africa	10,620
Province	
Eastern Cape	4,460
Free State	264
Gauteng	4,089
KwaZulu-Natal	978
Limpopo	18
Mpumalanga	258
Northern Cape	65
North West	269
Western Cape	2,698
Metropolitan Municipality	
Buffalo City	410
City of Cape Town	2,126
Ekhuruleni	1,035
Ethikweni	205
Johannesburg	1,680
Mangaung	61
Nelson Mandela Bay	1,025
City of Tshwane	521



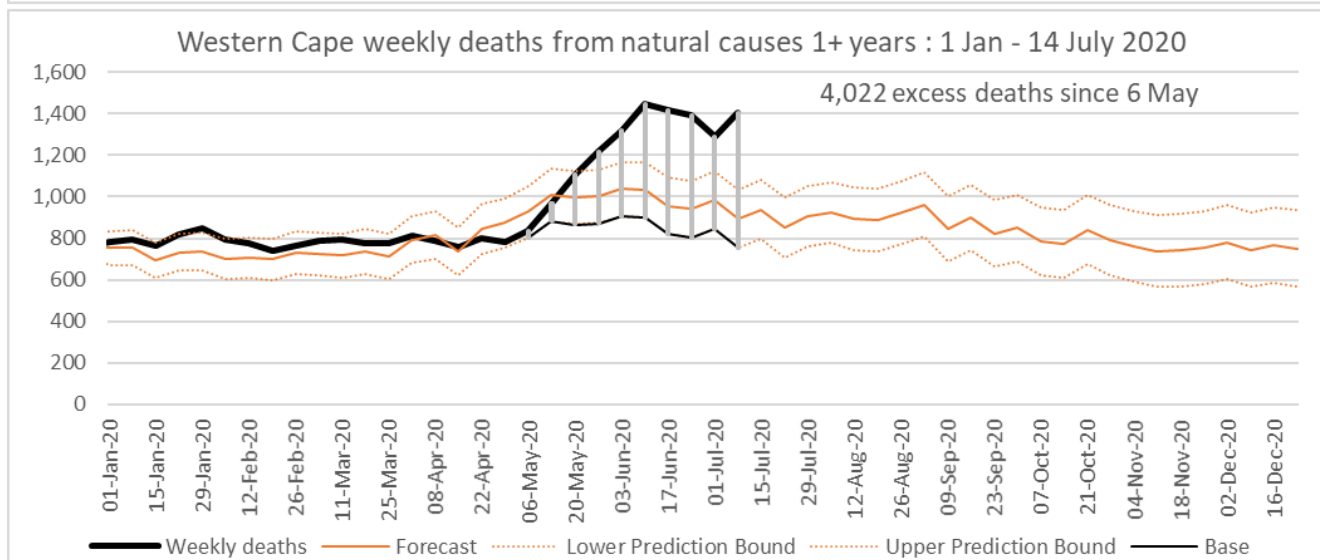
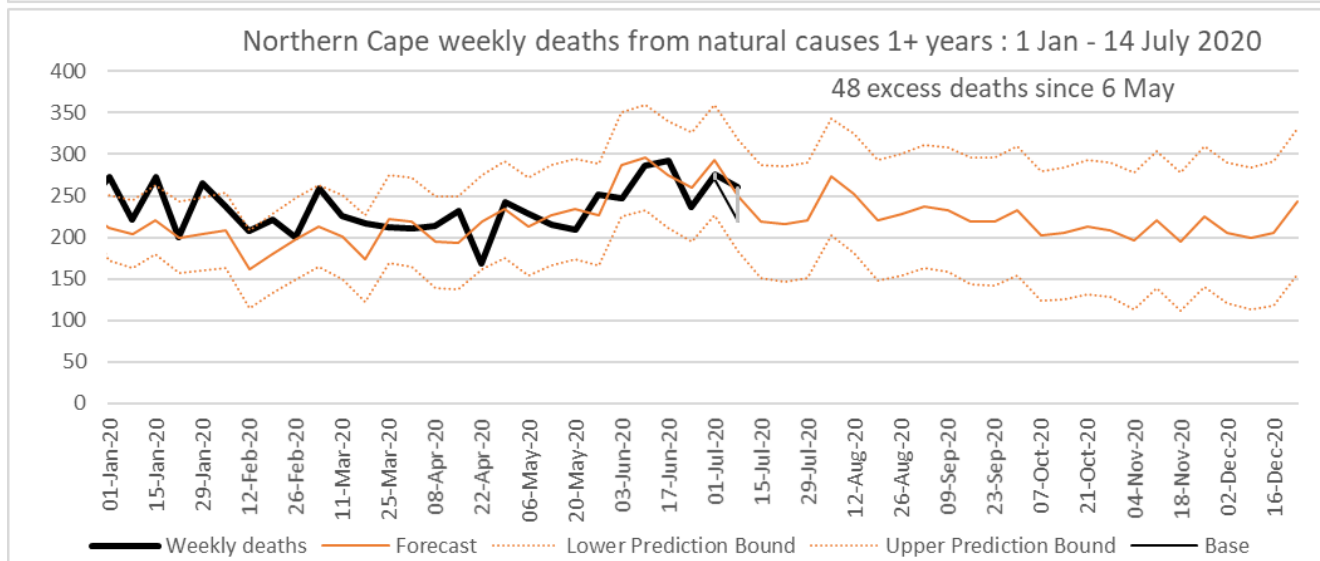
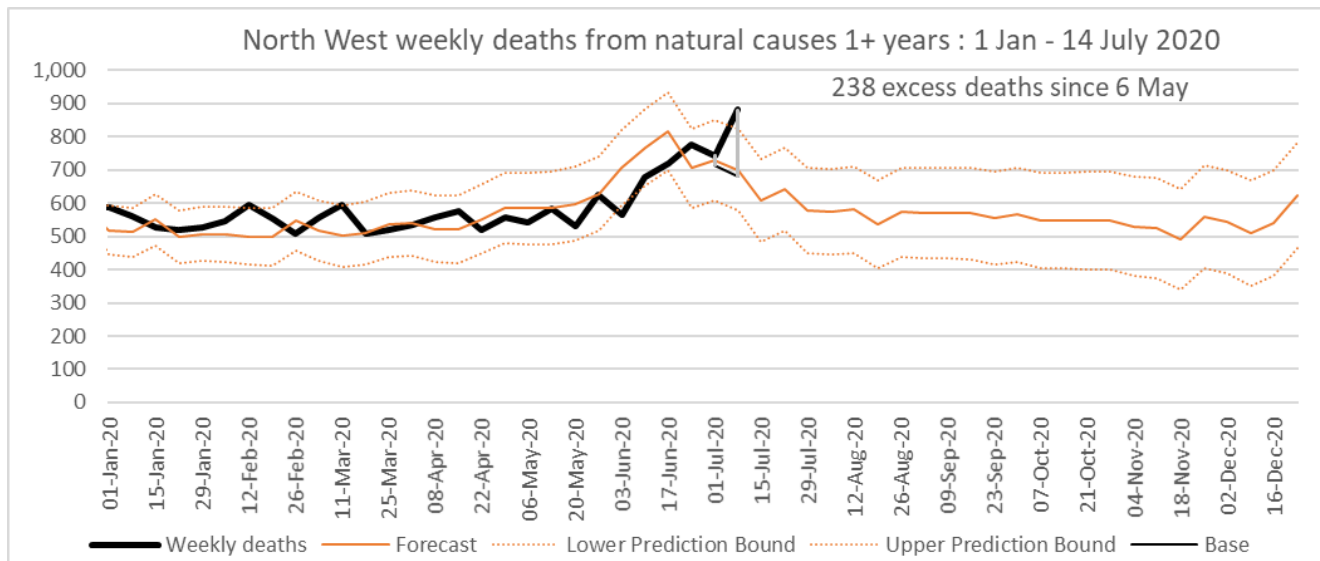
Numbers have been scaled to the estimated actual number of death and for the last week has been adjusted for delayed registrations



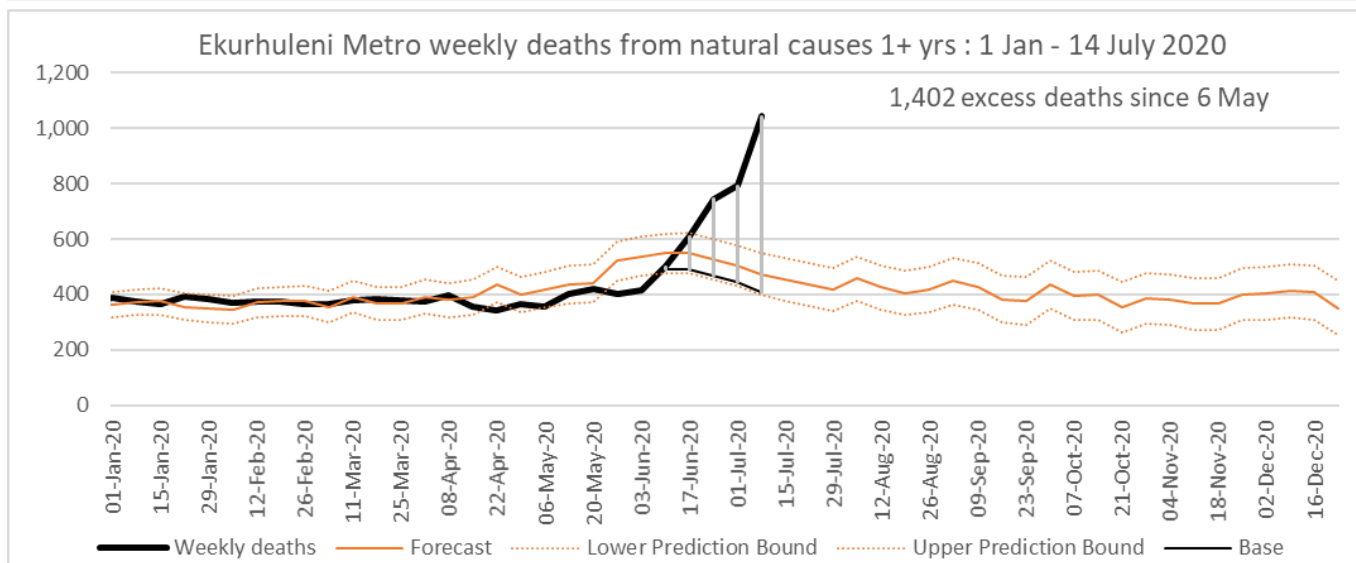
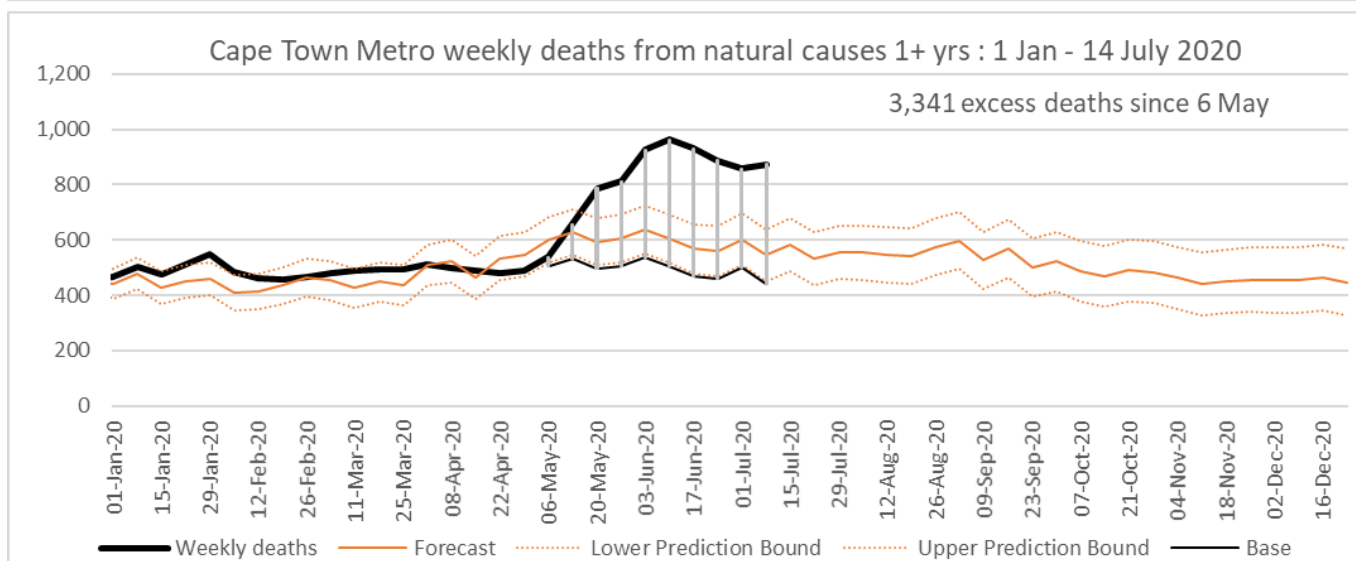
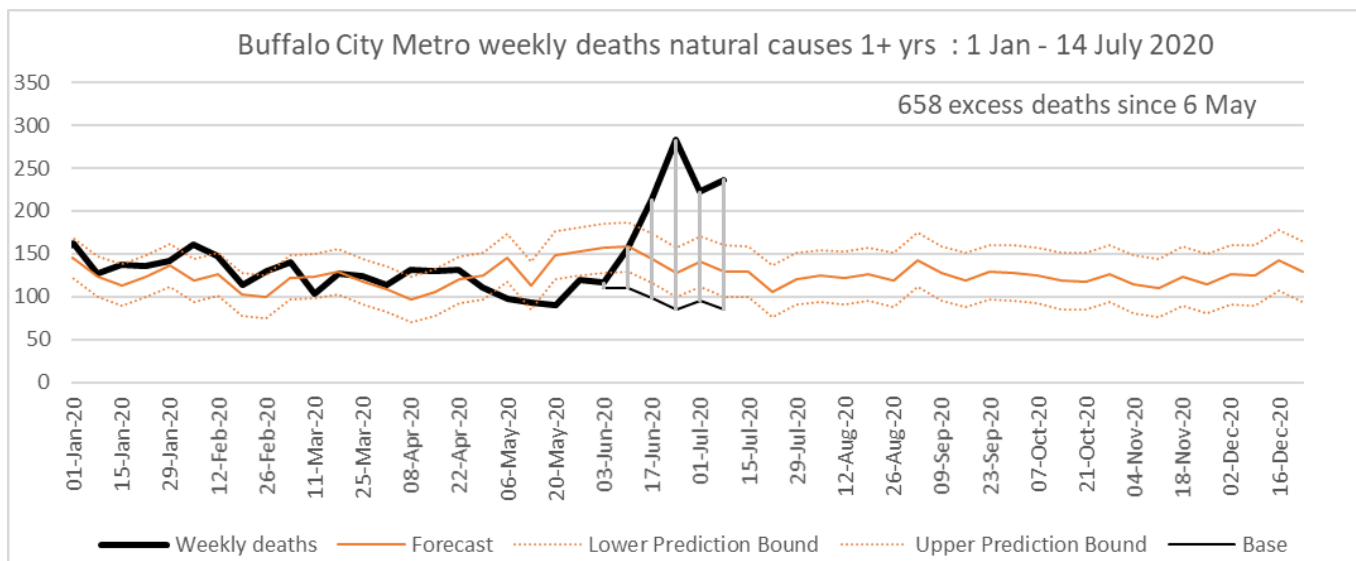
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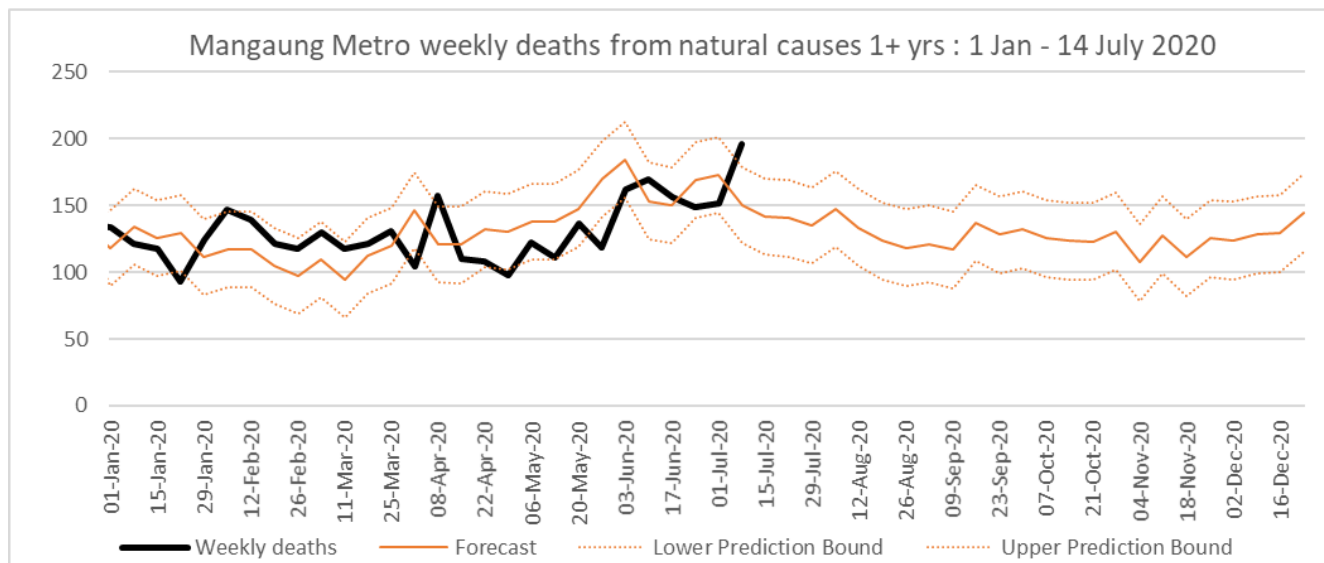
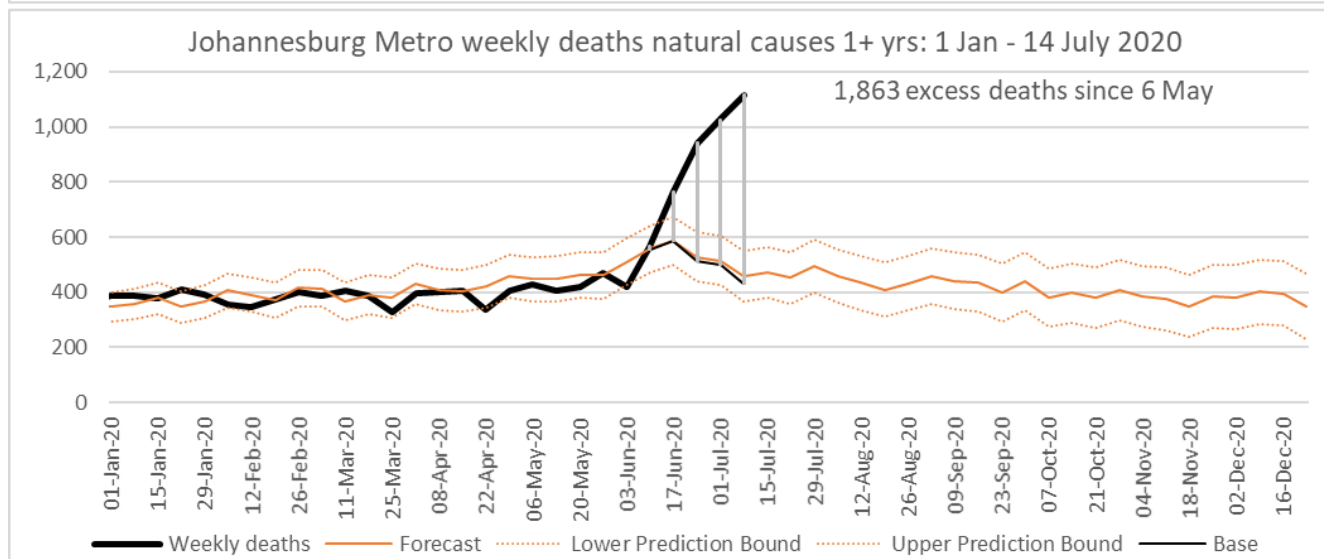
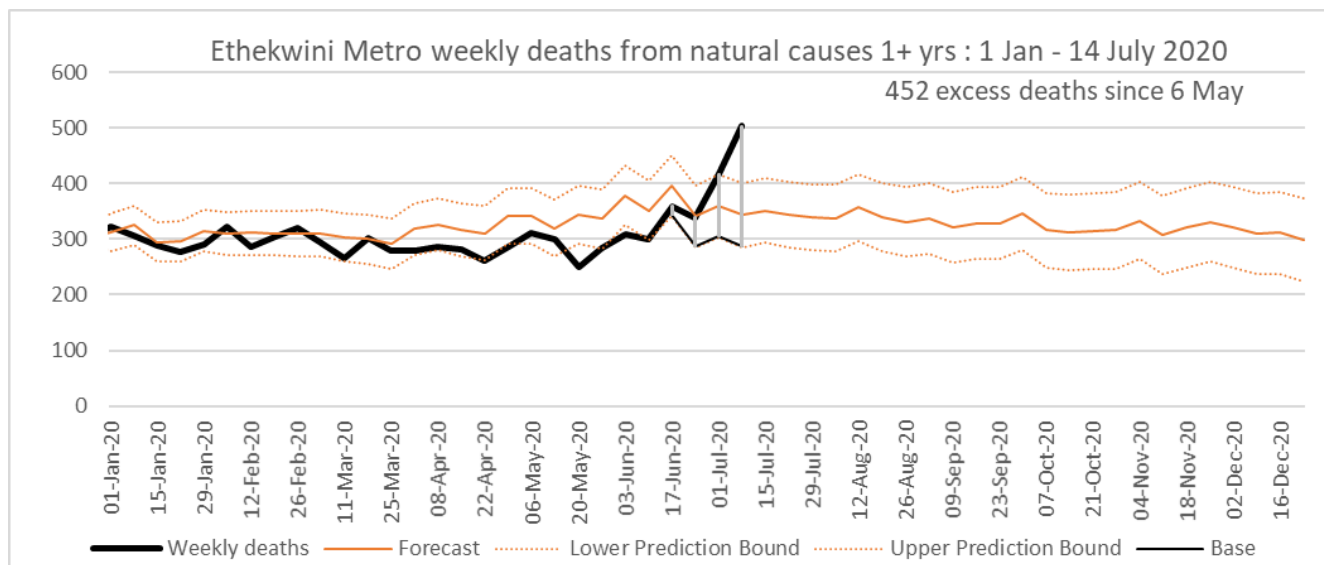
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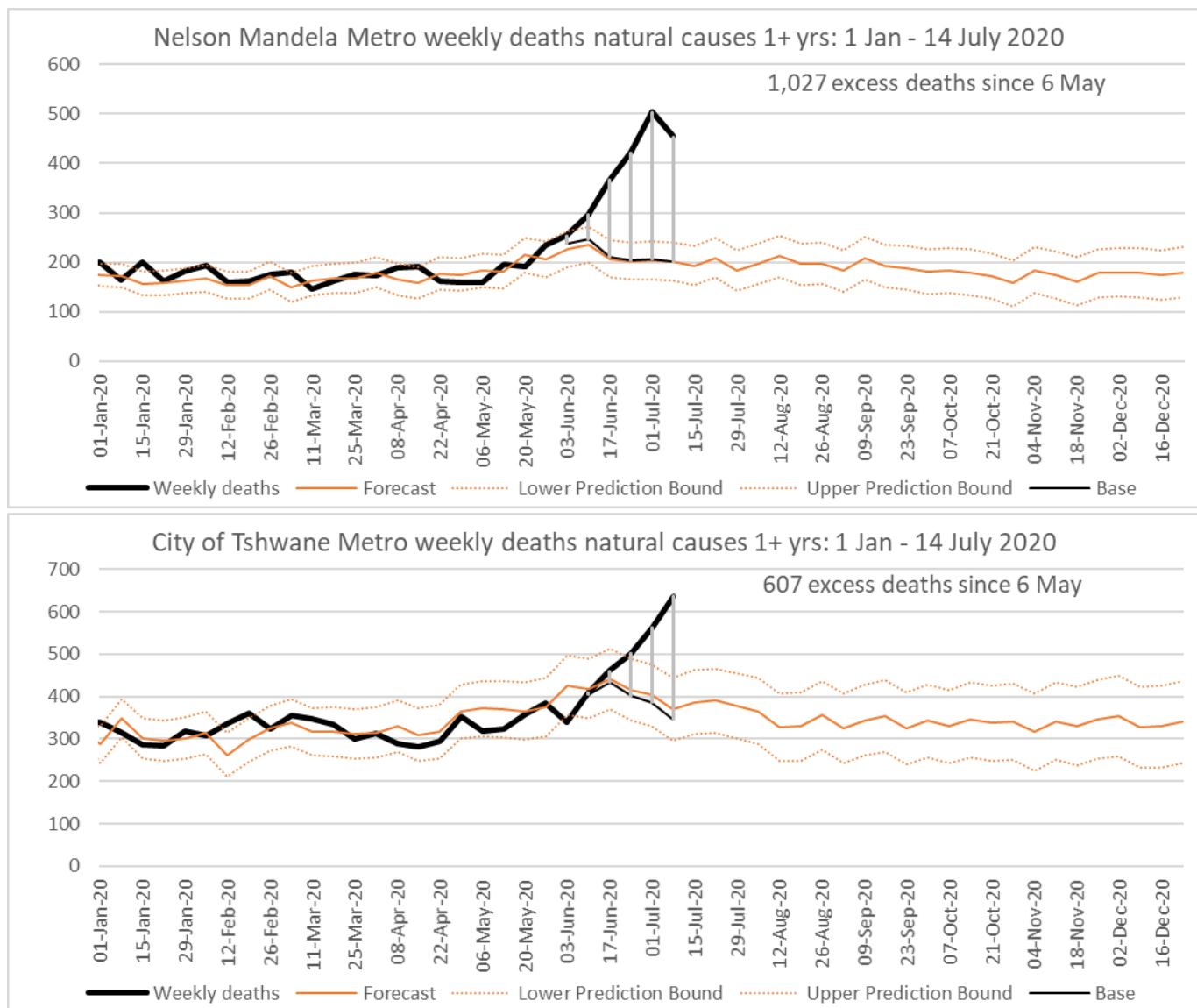
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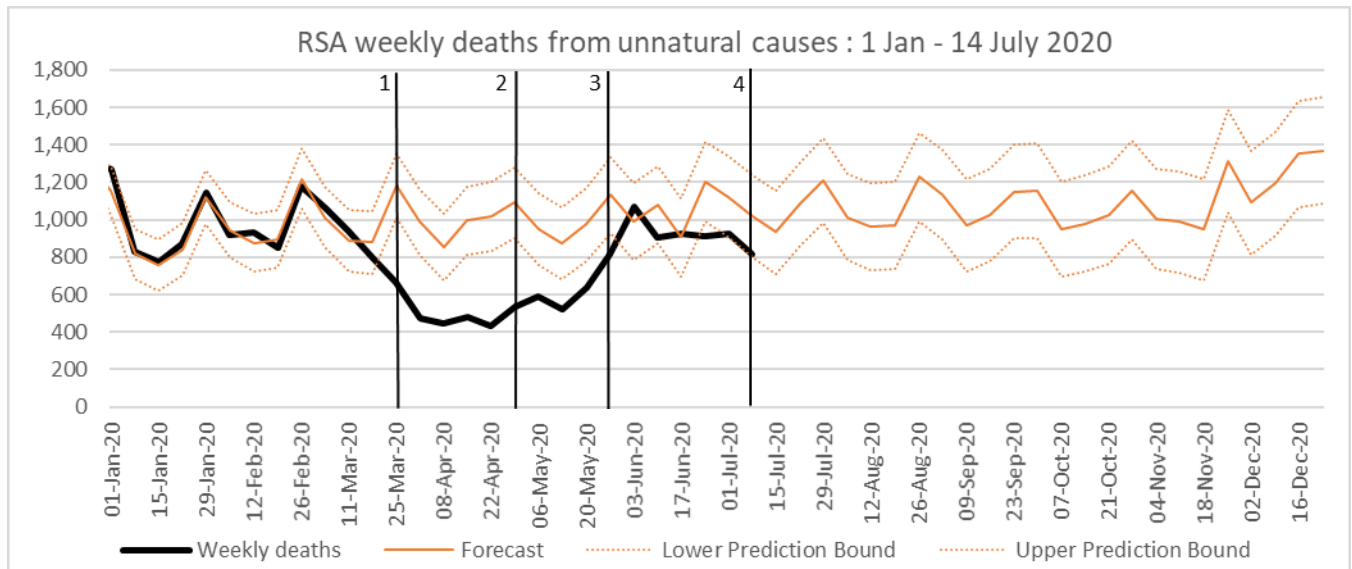
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Vertical time lines:

1. Week lockdown level 5 introduced
2. Week lockdown changed to level 4 with curfew
3. Week lockdown changed to level 3 including unbanning sale of alcohol
4. Week sale of alcohol re-banned and curfew re-introduced