REPORT ON WEEKLY DEATHS IN SOUTH AFRICA

1 JANUARY – 7 JULY 2020 (WEEK 27)

Debbie Bradshaw, Ria Laubscher,

Rob Dorrington, Pam Groenewald, Tom Moultrie

Burden of Disease Research Unit
South African Medical Research Council
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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.

New analysis

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 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]

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 function[2] 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 up until epidemiological **week 27** (i.e. the period from **1 January 2020** till **7 July 2020**) based on the data received on 13 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 5.9%.

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. To assess the effect of COVID-19, we have been tracking deaths from natural causes. 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. Using the predicted value as the base would understate the impact of the COVID-19 epidemic. It was therefore decided to identify the relative level that the 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 mortality drop 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 due to COVID-19 and related causes, a proportion could be due other natural causes associated with a relaxing of lockdown.

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

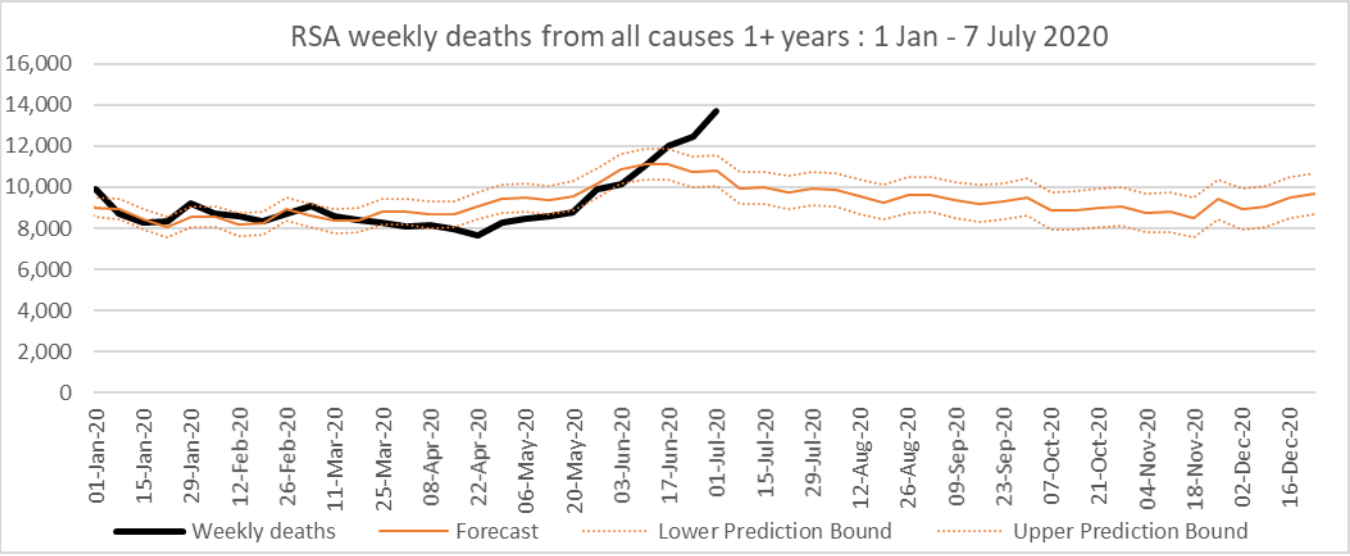
[1] Dorrington RE, Bradshaw D, Laubscher R, Nannan N (2020). Rapid mortality surveillance report 2018. Cape Town: South African Medical Research Council.

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

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 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 **13,684** and is **26.5%** higher than the predicted number based on historical data in the week ending **7 July 2020**. When compared with the predicted numbers, there was an excess of **2,868** deaths.
- 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 - 7 July 2020**, there has been an excess of **10,994** 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 **3,655** and **7,305** 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 (2,923), Nelson Mandela Bay (773), Johannesburg (1120), Ekurhuleni (780), Buffalo City (497)** and **City of Tshwane (326)** metros continued increasing in the week up to **7 July 2020.**
- The rate of increase in natural deaths in the **City of Cape Town** appears to have slowed down. There were **389** excess deaths in the week up to **3 July 2020**, compared with **424** during the previous week.
- **Western Cape**, **Eastern Cape**, **Gauteng** and **KwaZulu-Natal** are experiencing an excess number of natural deaths. There is a particularly sharp increase in **Gauteng** and the **Eastern Cape**. Compared with the predicted number of natural deaths from historical data in the week ending **3 July 2020**, the **Eastern Cape** had **90%** more, **Gauteng** had **71%** more, the **Western Cape** and **KwaZulu-Natal** had **17%** more.
- The number of deaths from unnatural causes (e.g. road traffic fatalities and homicides) was **28%** below the predicted number for the week ending **7 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 – 7 July	10,994
Province		
Eastern Cape	3 June – 7 July	3,299
Free State		-
Gauteng	10 June – 7 July	2,770
KwaZulu-Natal	6 May – 7 July	1,079
Limpopo		-
Mpumalanga		-
Northern Cape		-
North West		-
Western Cape	6 May – 7 July	3,694
Metropolitan Municipality		
Buffalo City	3 June – 7 July	497
City of Cape Town	6 May – 7 July	2,923
Ekhuruleni	10 June – 7 July	780
Ethikweni		-
Johannesburg	10 June – 7 July	1,120
Mangaung		-
Nelson Mandela Bay	3 June – 7 July	773
City of Tshwane	10 June – 7 July	326

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	5,432
Province	
Eastern Cape	2,964
Free State	69
Gauteng	2,290
KwaZulu-Natal	227
Limpopo	0
Mpumalanga	71
Northern Cape	49
North West	89
Western Cape	2,200
Metropolitan Municipality	
Buffalo City	290
City of Cape Town	1,811
Ekhuruleni	495
Ethikweni	51
Johannesburg	989
Mangaung	17
Nelson Mandela Bay	785
City of Tshwane	261

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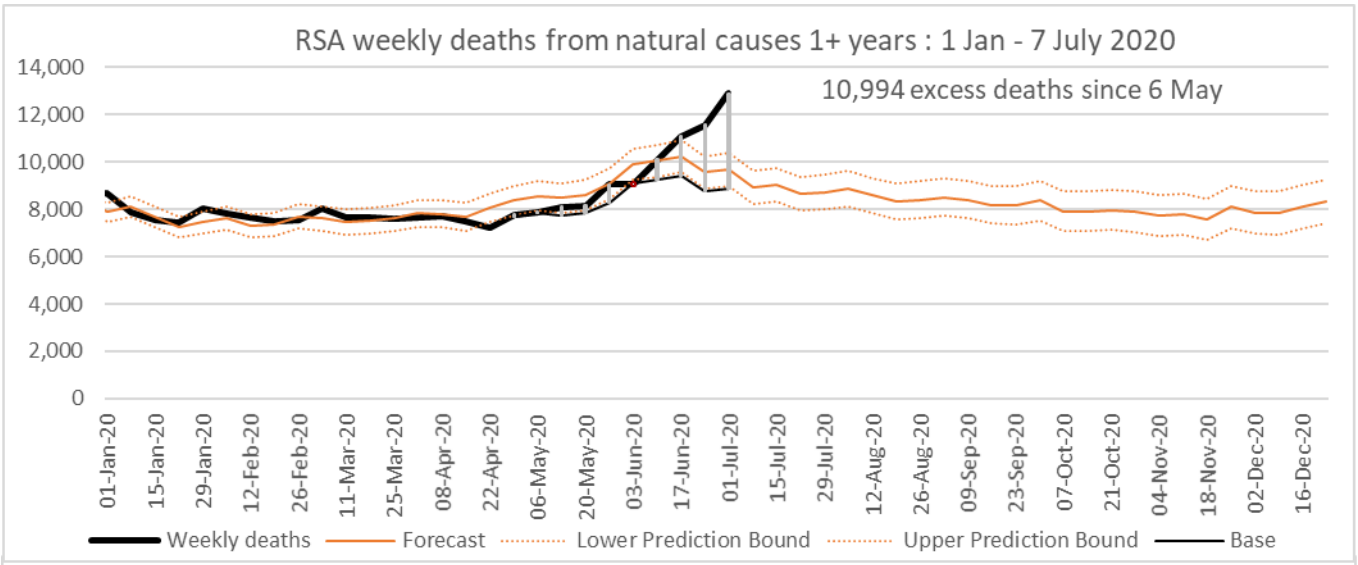
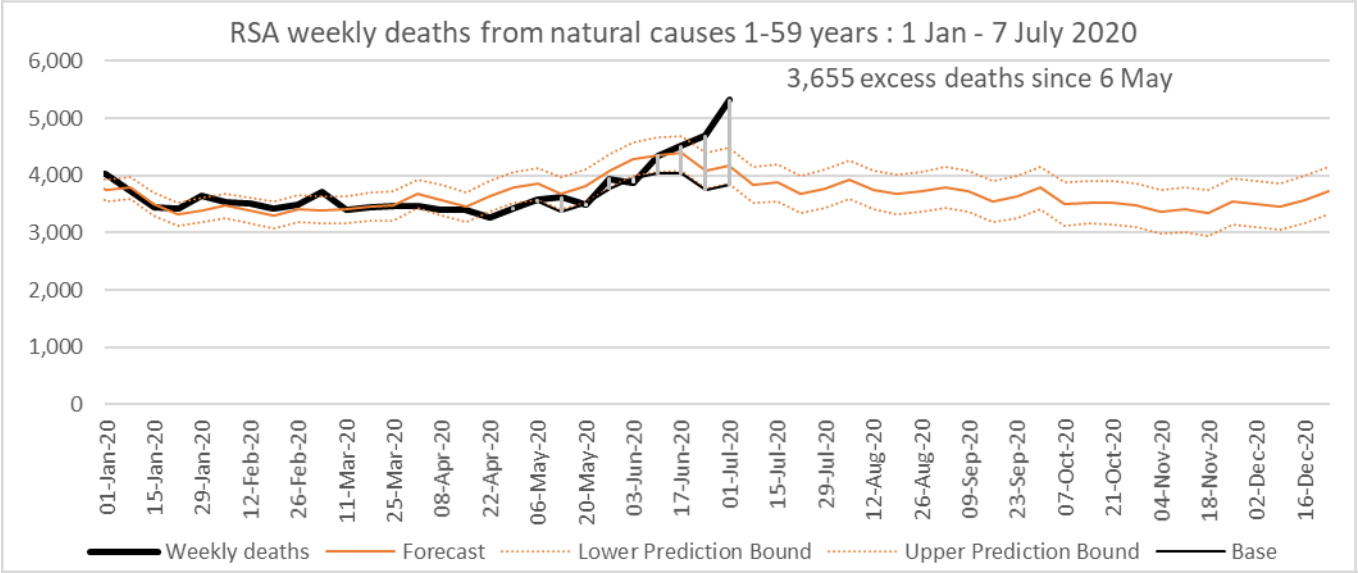

RSA weekly deaths from natural causes 1+ years : 1 Jan - 7 July 2020
10,994 excess deaths since 6 May
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
01-Jan-20
15-Jan-20
29-Jan-20
12-Feb-20
26-Feb-20
11-Mar-20
25-Mar-20
08-Apr-20
22-Apr-20
06-May-20
20-May-20
03-Jun-20
17-Jun-20
01-Jul-20
15-Jul-20
29-Jul-20
12-Aug-20
26-Aug-20
09-Sep-20
23-Sep-20
07-Oct-20
21-Oct-20
04-Nov-20
18-Nov-20
02-Dec-20
16-Dec-20
Weekly deaths
Forecast
Lower Prediction Bound
Upper Prediction Bound
Base


RSA weekly deaths from natural causes 1-59 years : 1 Jan - 7 July 2020
3,655 excess deaths since 6 May
6,000
5,000
4,000
3,000
2,000
1,000
0
01-Jan-20
15-Jan-20
29-Jan-20
12-Feb-20
26-Feb-20
11-Mar-20
25-Mar-20
08-Apr-20
22-Apr-20
06-May-20
20-May-20
03-Jun-20
17-Jun-20
01-Jul-20
15-Jul-20
29-Jul-20
12-Aug-20
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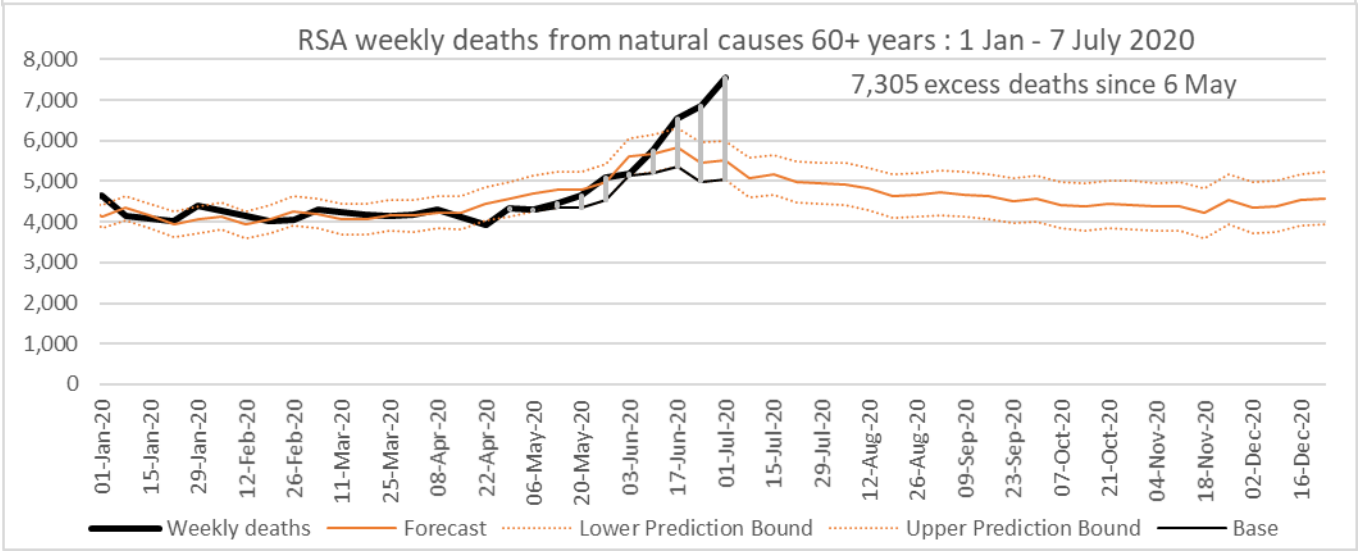
RSA weekly deaths from natural causes 60+ years : 1 Jan - 7 July 2020
7,305 excess deaths since 6 May
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
01-Jan-20
15-Jan-20
29-Jan-20
12-Feb-20
26-Feb-20
11-Mar-20
25-Mar-20
08-Apr-20
22-Apr-20
06-May-20
20-May-20
03-Jun-20
17-Jun-20
01-Jul-20
15-Jul-20
29-Jul-20
12-Aug-20
26-Aug-20
09-Sep-20
23-Sep-20
07-Oct-20
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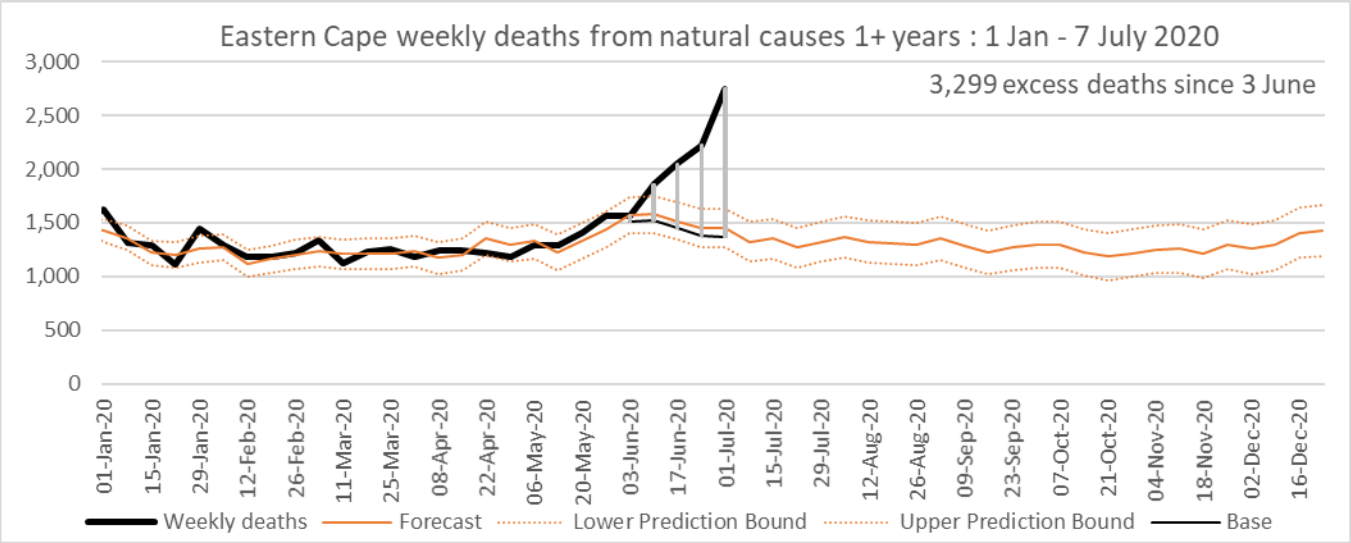

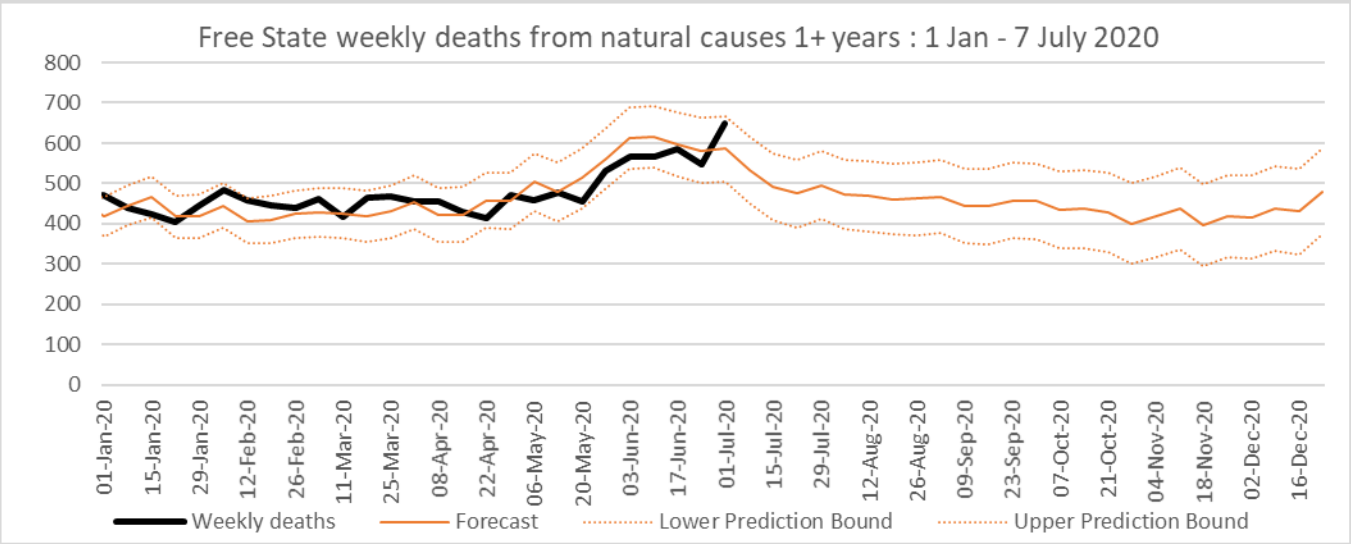

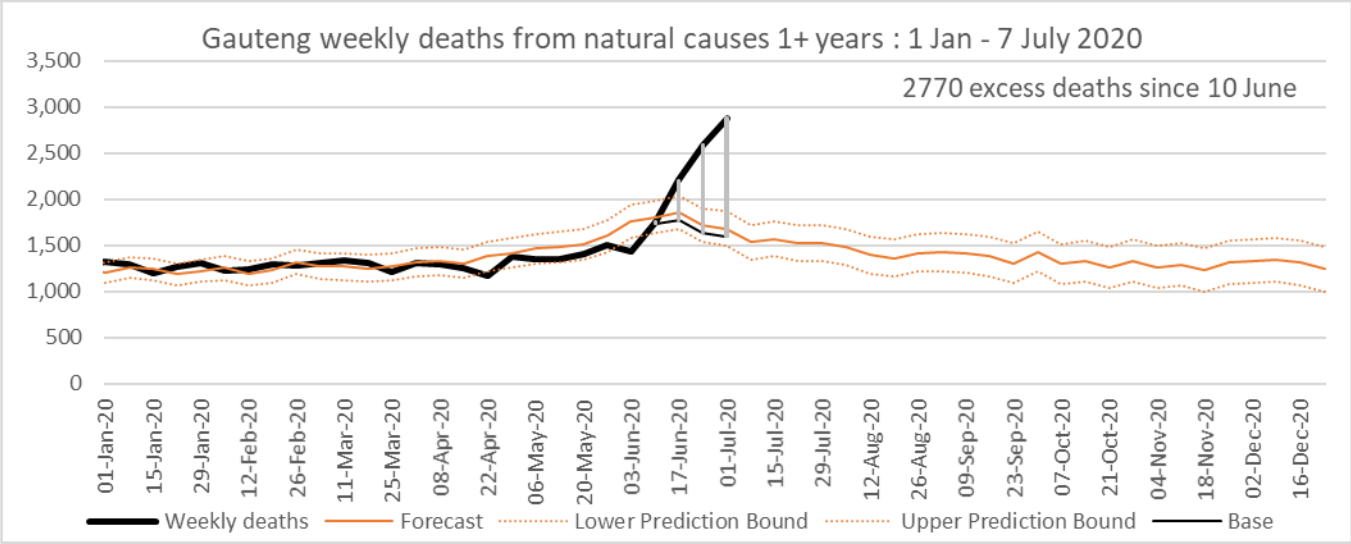

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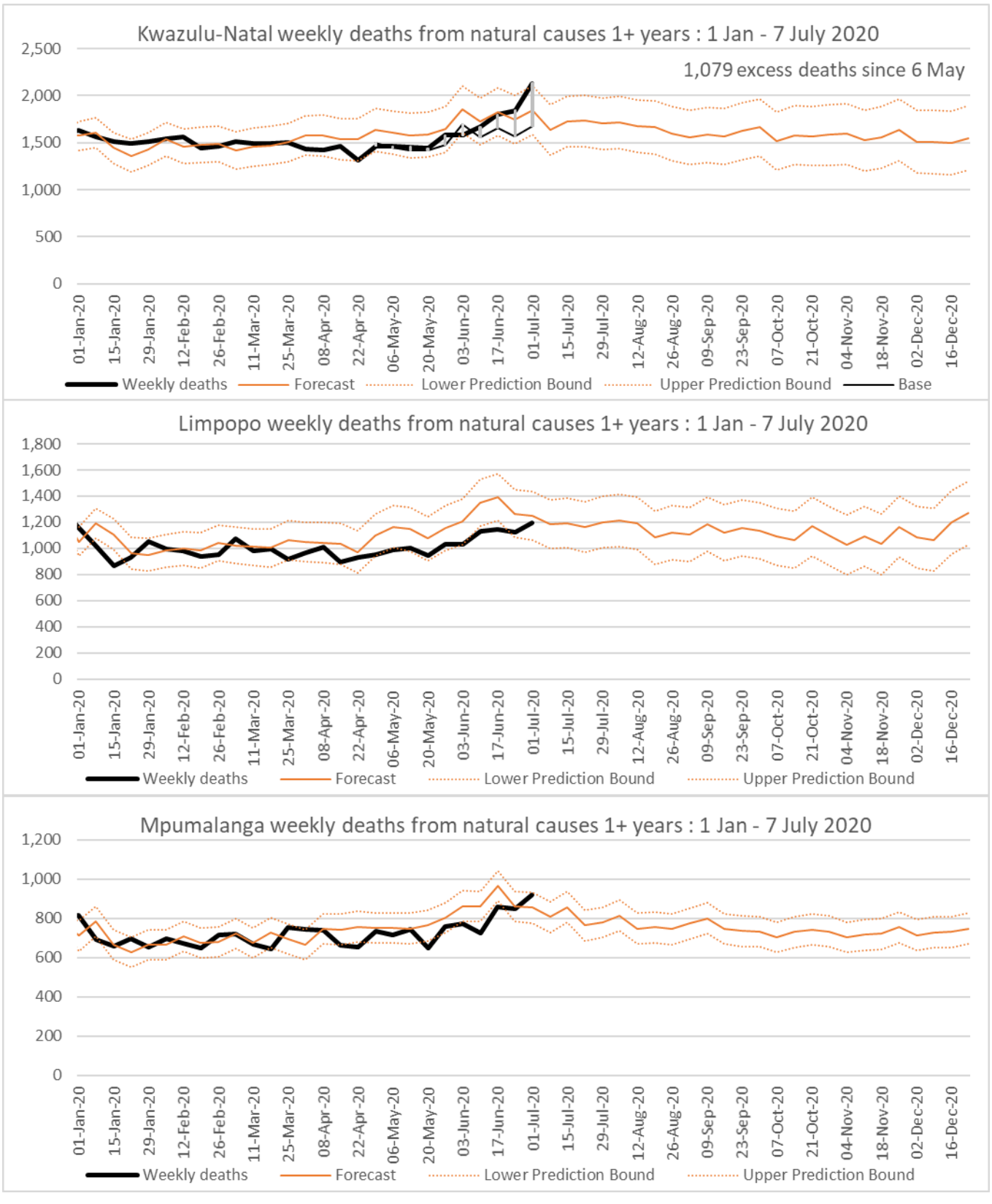

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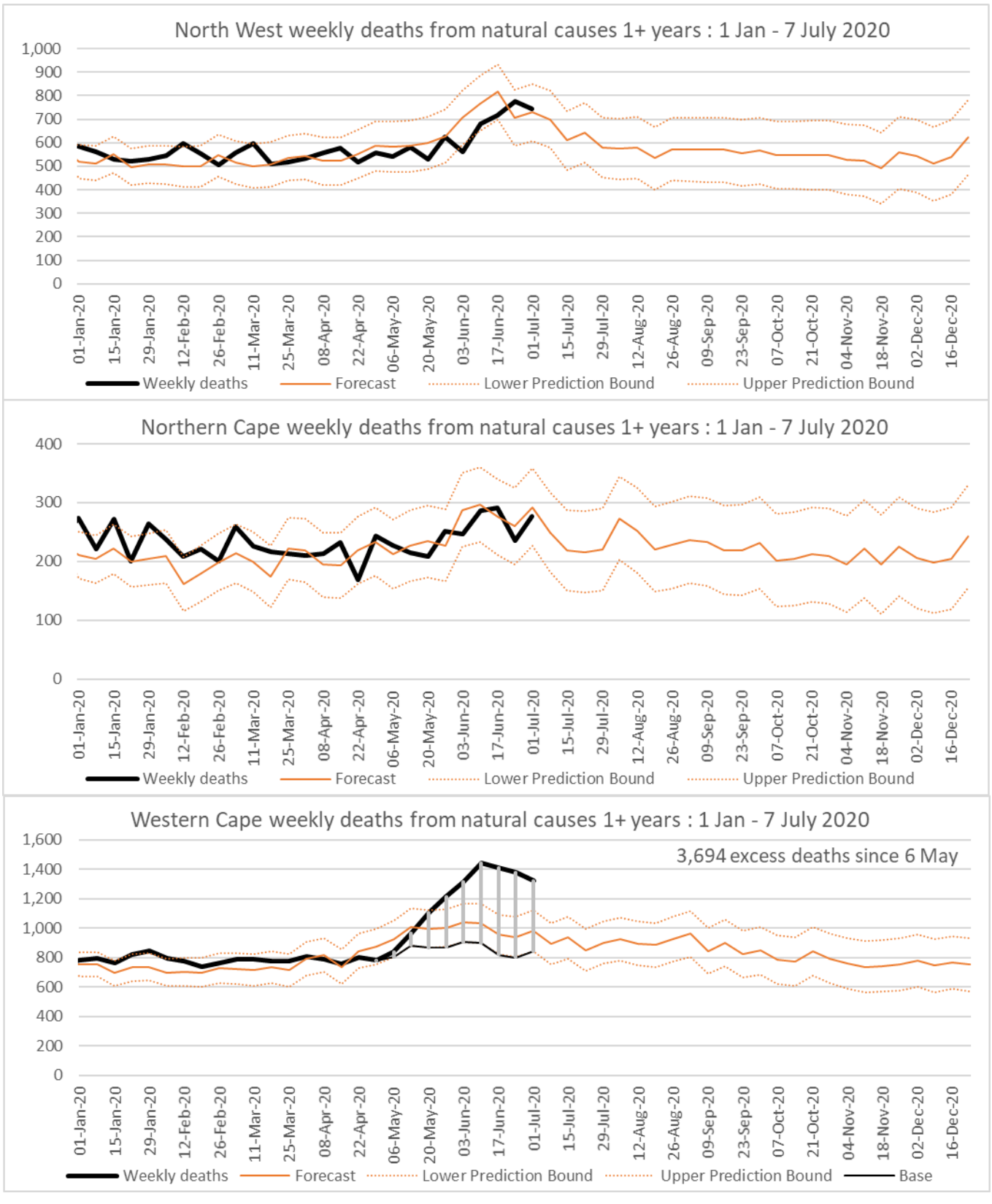

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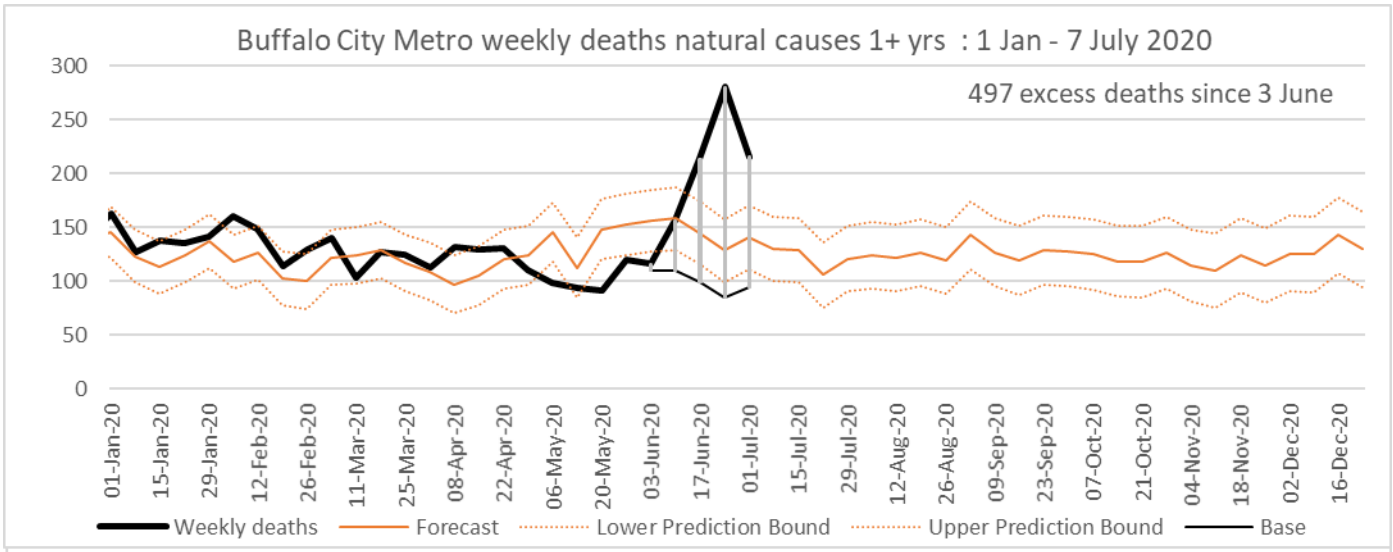

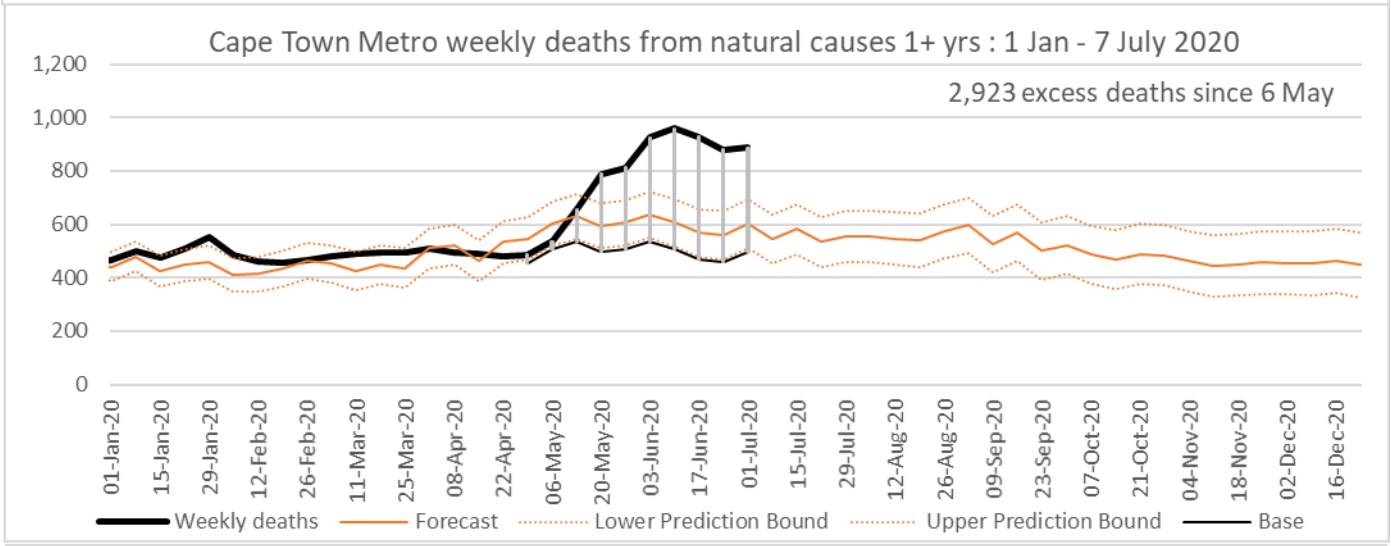

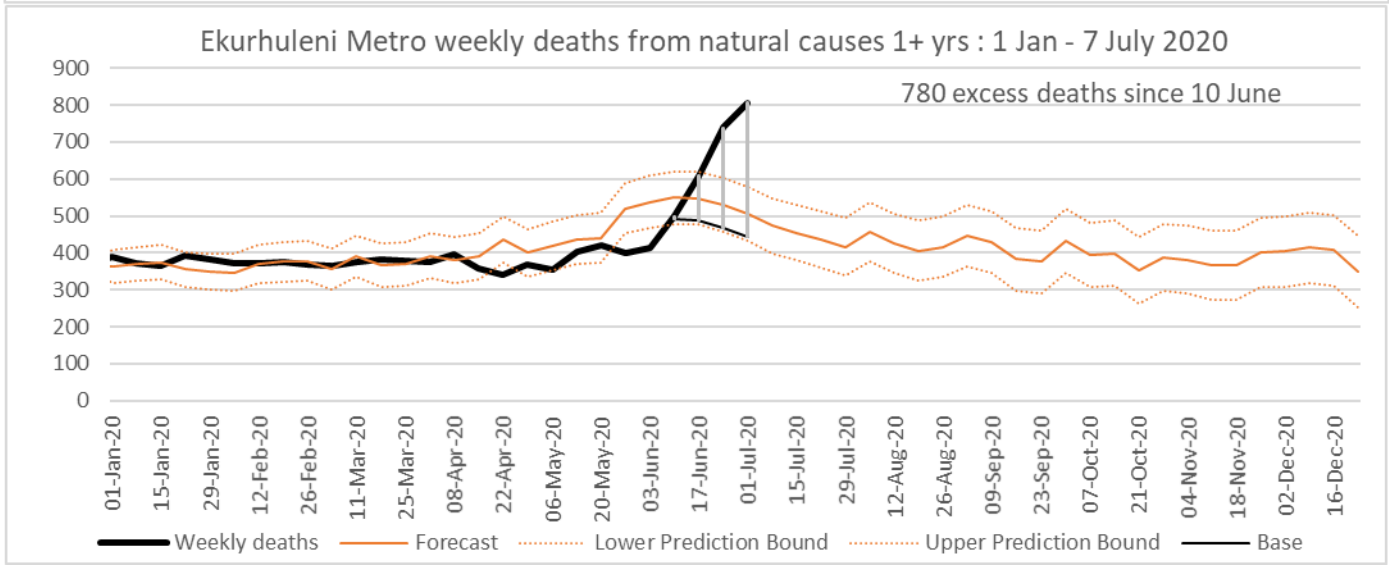

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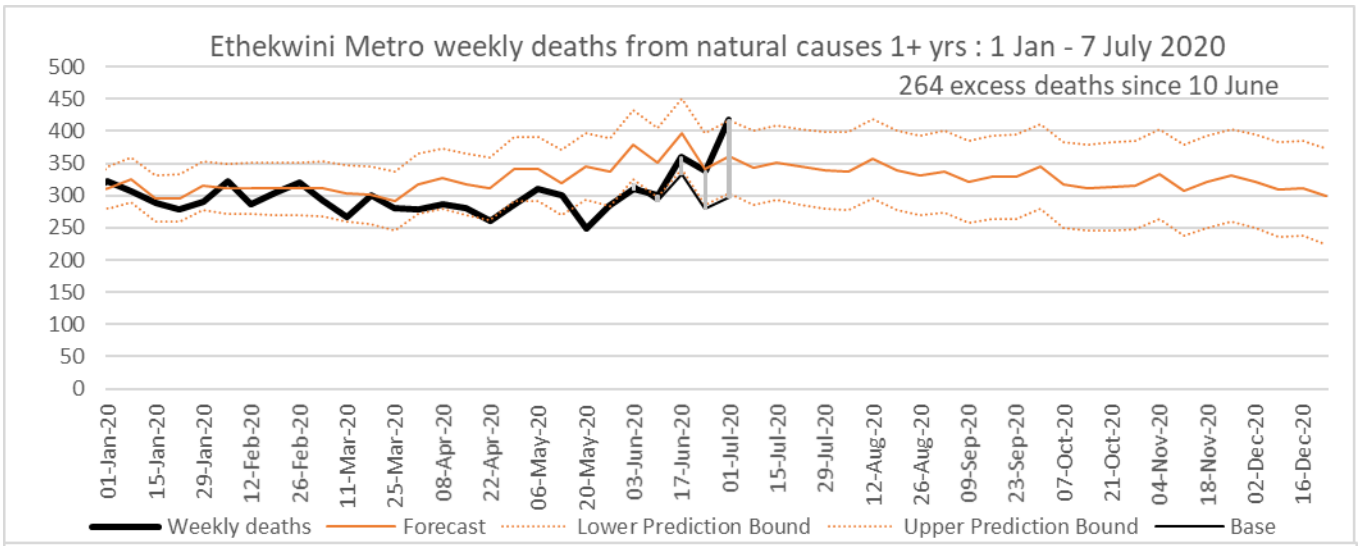

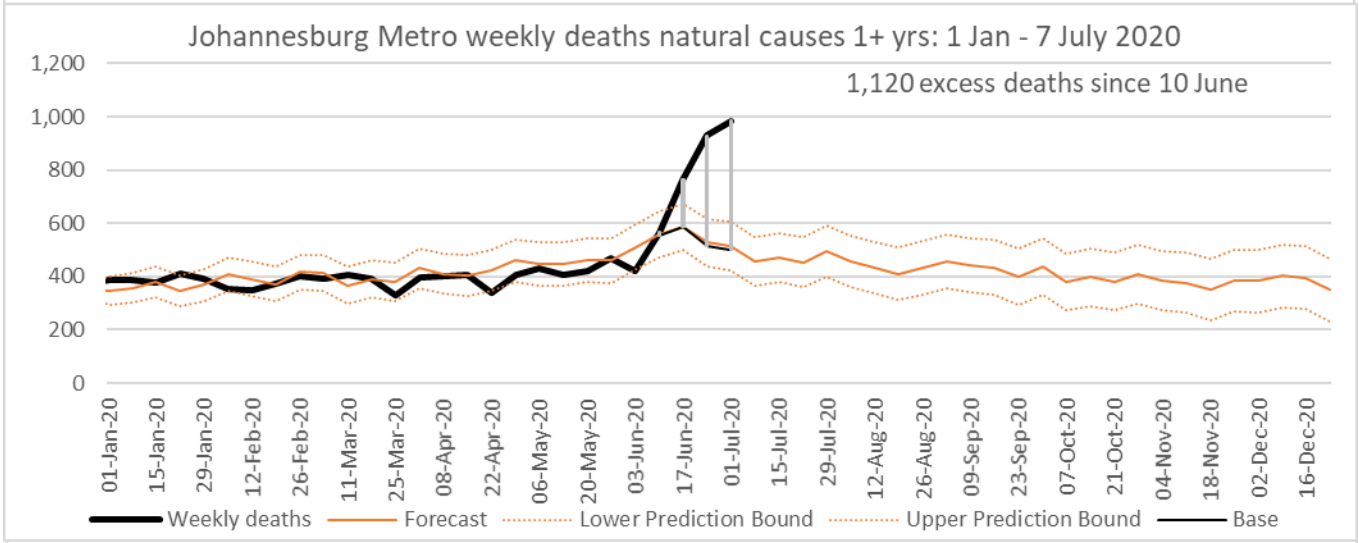

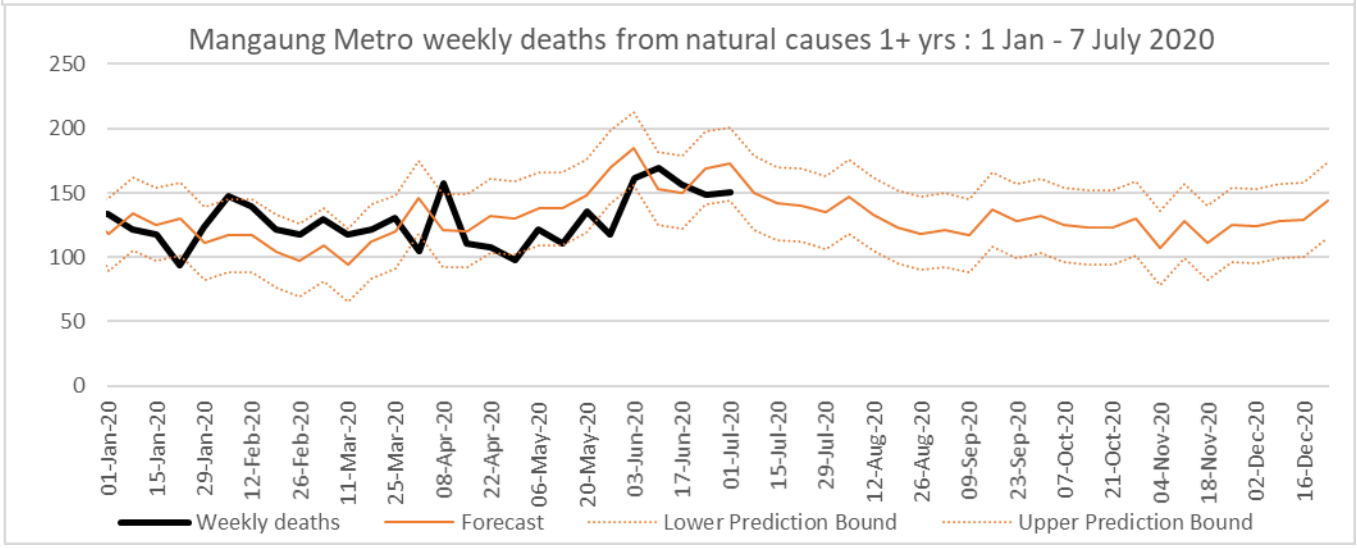

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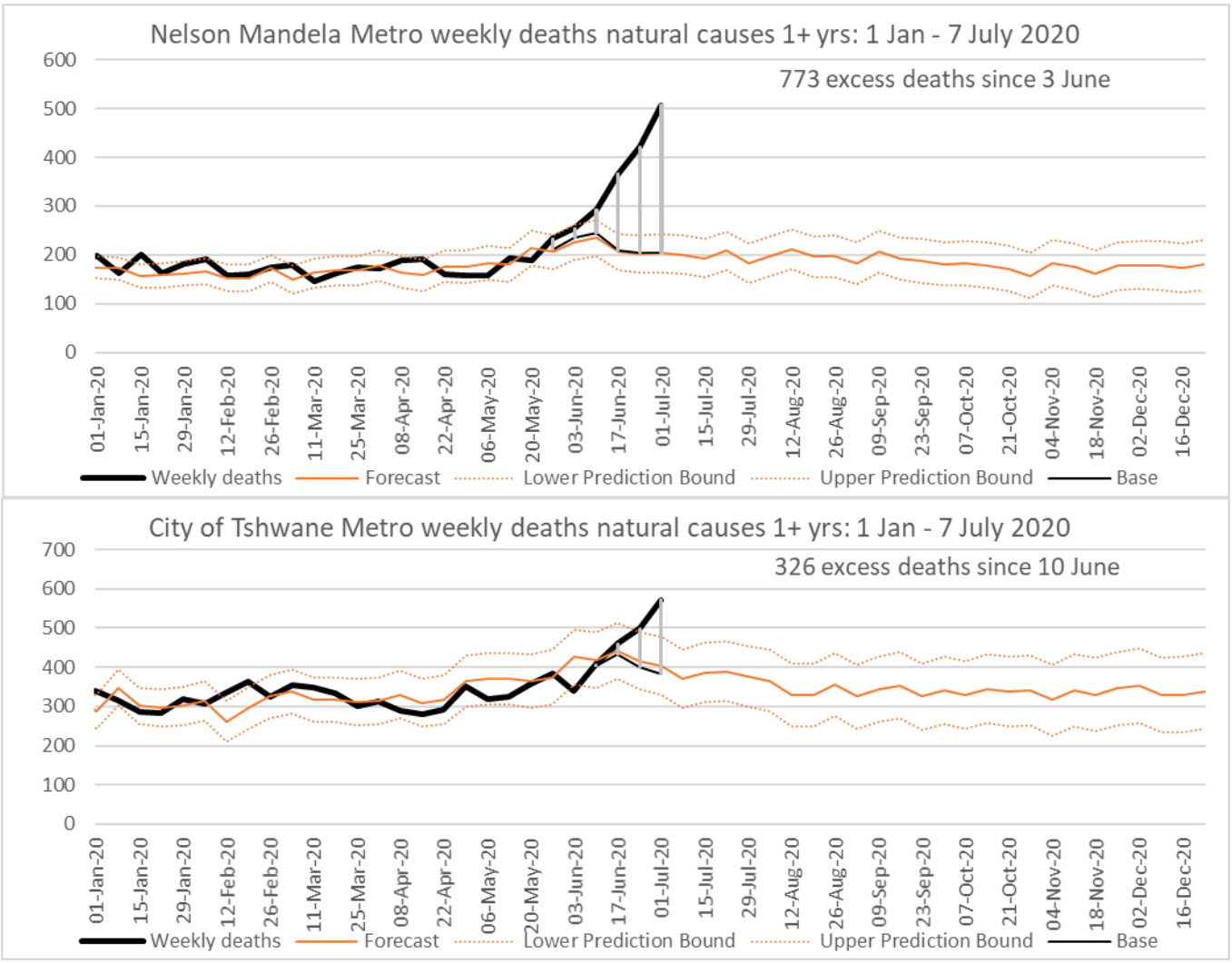

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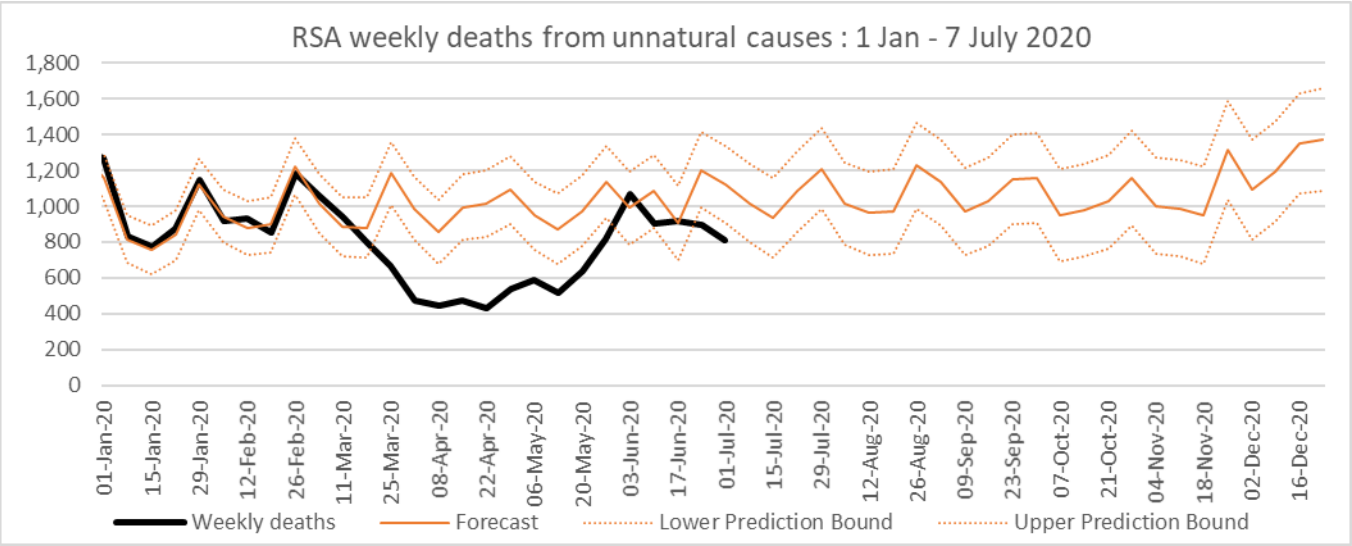

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