

Adaptation of the Be-MOMO model's expected mortality predictions following the 2020 excess mortality (18 June 2021)

The Be-MOMO model (Belgian Mortality Monitoring, <https://epistat.wiv-isp.be/momo/>) is used by Sciensano to distinguish between days with excess mortality and days when all-cause deaths are within the expected range. To establish these limits, the Be-MOMO model uses data observed over the last five years.

In 2020, the two waves of COVID-19 and the August heat wave were events that resulted in an exceptionally large number of all-cause deaths. The model is already used to remove the influence of previous excess mortality events on the expected number of deaths (baseline), by weighting outliers and performing a power transforming on the prediction interval. **The 2020 excess mortality events were, however, too large to be eliminated by the usual method and would affect the baseline as well as the prediction interval estimate for the following five years, thus impairing the model's ability to detect health threats as it is used, for example, every year during heat peaks.**

Several simulations were carried out with the model, either excluding deaths occurring in March and April 2020 (1st wave) as already done by EuroMOMO, or excluding deaths occurring during the whole year 2020 (Figure 1).

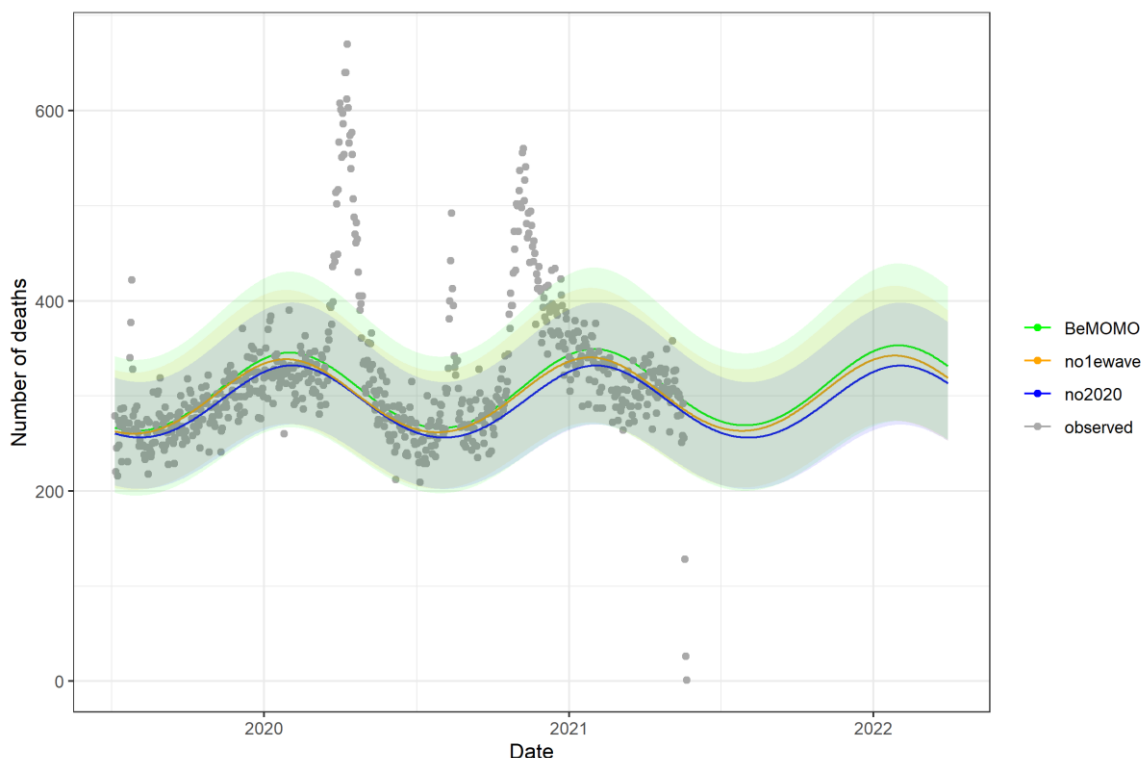


Figure 1 • Be-MOMO predictions according to three simulations : (1) green (BeMOMO) = no changes made, (2) red (no1ewave) = exclusion of March and April 2020, (3) blue (no2020) = exclusion of the year 2020. The dots represent the number of daily deaths. The middle line represents the expected number of deaths, surrounded by the prediction interval

If we did not make any changes to the model, during future pollution peaks, heat waves or epidemics in the coming years, Be-MOMO would only be able to detect very large mortality anomalies (similar in magnitude to the excess mortality associated with COVID-19), whereas it is obviously essential to be able to detect weaker excess mortality signals.

In order to preserve the main role of Be-MOMO, which is to detect excess mortality at an early stage during specific events, the 2020 observations were therefore removed from the model fit (since 14 June 2021).

This decision has a number of implications for the expected mortality model (Figure 2):

- A few episodes of excess mortality, mainly from 2021 onwards, will now be observed where they had not been detected before.
- The excess mortality during the second wave and in 2020 will be slightly higher because the estimates of excess mortality, especially for the second wave of COVID-19, have been underestimated by the model (as mentioned in the press release on the analysis of excess mortality from COVID-19 in 2020 dated 15 January 2021).
- The excess mortality thresholds for the summer of 2021 will be in line with the thresholds of previous summers.
- The lower limit of the prediction interval is also affected by this change, it will be closer to the baseline, so a harvesting effect¹ will also be better captured.

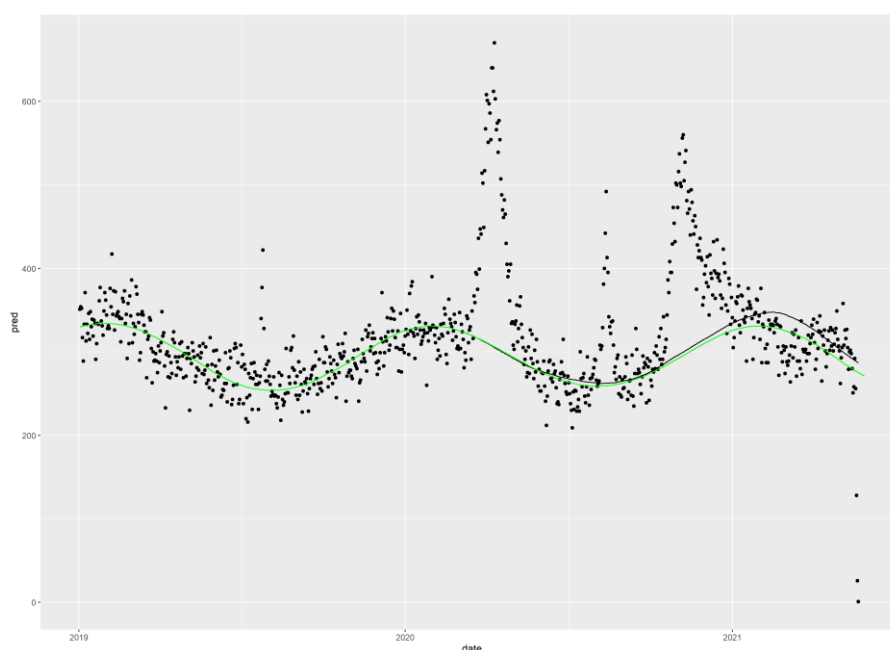


Figure 2 • New Be-MOMO baseline (green line) compared to the baseline before 14 June 2021 (black line)

In July 2021, a report will publish new mortality analyses for the period covering the first two waves of the epidemic.

¹ The harvesting effect is a phenomenon of mortality displacement, with the most vulnerable people dying earlier as a result of a particular event.