

Evaluating the direct and indirect effects of Covid-19 on morbidity and mortality in MSF projects: time-series analysis using routine health facility data



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Introduction

- SARS-CoV-2 cases first identified in most countries by April 2020.
- Limited testing capacity in MSF projects has made it challenging to ascertain viral circulation, transmission dynamics, risk groups for severe disease, and mortality.

Aim

To use health facility data from sentinel health facilities between 2014 and 2020, to assess and document changes in trends for morbidity and mortality that could be potentially attributed to the direct and/or indirect impact of the Covid-19 pandemic.

Methods

- Sentinel MSF-supported health facilities were chosen with a minimum of five years health information data
- Weekly rates of disease diagnoses and deaths per 10,000 patient discharges were categorised into: diarrhoea, lower respiratory tract infection (LRTI), malaria, tuberculosis, and other.

Surveillance

- Time-series analysis models with negative binomial regression, including terms for trend and seasonality.
- Models fit to weekly rates between 2014 and 2019 to define baseline and predict expected rates in 2020.
- Calculated 95% and 99% prediction intervals based on quantiles of binomial distribution.
- Observed rates in 2020 outside prediction intervals triggered alerts for discussion with field teams, for interpreting evolving situation in hospitals.

Impact of SARS-CoV-2

- Segmented regression used to assess changes in morbidity and mortality potentially attributed to Covid-19 introduction.
- We compared the pre- and post-first confirmed Covid-19 time period for each region.
- We present results from four of eleven health facilities analysed: Mweso and Walikale, North Kivu; Baraka, South Kivu, Democratic Republic of Congo and Lashkargah, Helmand, Afghanistan.
- We present analysis including data until the end of 2020.

Results

Surveillance

- We detected LRTI rates above the threshold in two health facilities in North Kivu (DRC), which began in December 2019 (Figure 1).
- In Lashkargah, we detected a sustained decrease in LRTI rates below expected (data not shown), in early January 2020, but this normalised over the summer.
- Increases in LRTI could be Covid-19 related, but uncertain how much attributable due to programmatic changes

Impact of SARS-CoV-2

- Diarrhoea patient rates in Lashkargah hospital were 50.2% lower compared to pre-covid-19 period (95%CI -62.5; -33.8, p-value <0.001).
- Malaria patient rates in South Kivu (DRC) were 24.2% lower compared to pre-covid-19 period (95%CI -35.7; -10.7, p-value 0.001; Figure 2).
- Decreases in disease rates could be attributed to health seeking behaviour changes or programmatic changes.
- Limitations: Findings may be confounded by changes in data collection following introduction of a new health information system or by programmatic changes (e.g. in hospital capacity/admission criteria).

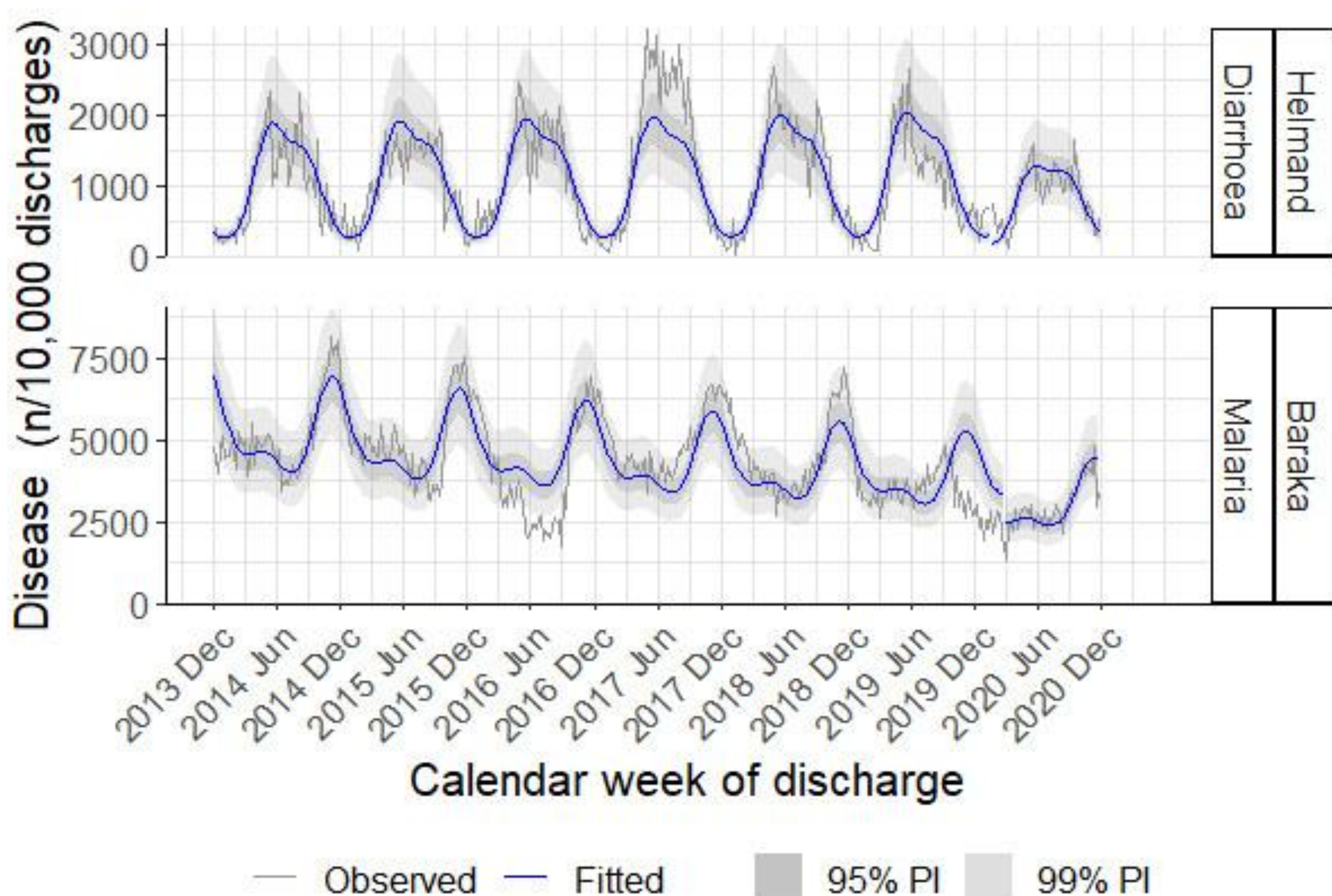


Figure 2: Segmented regression showing change in disease specific rates by week

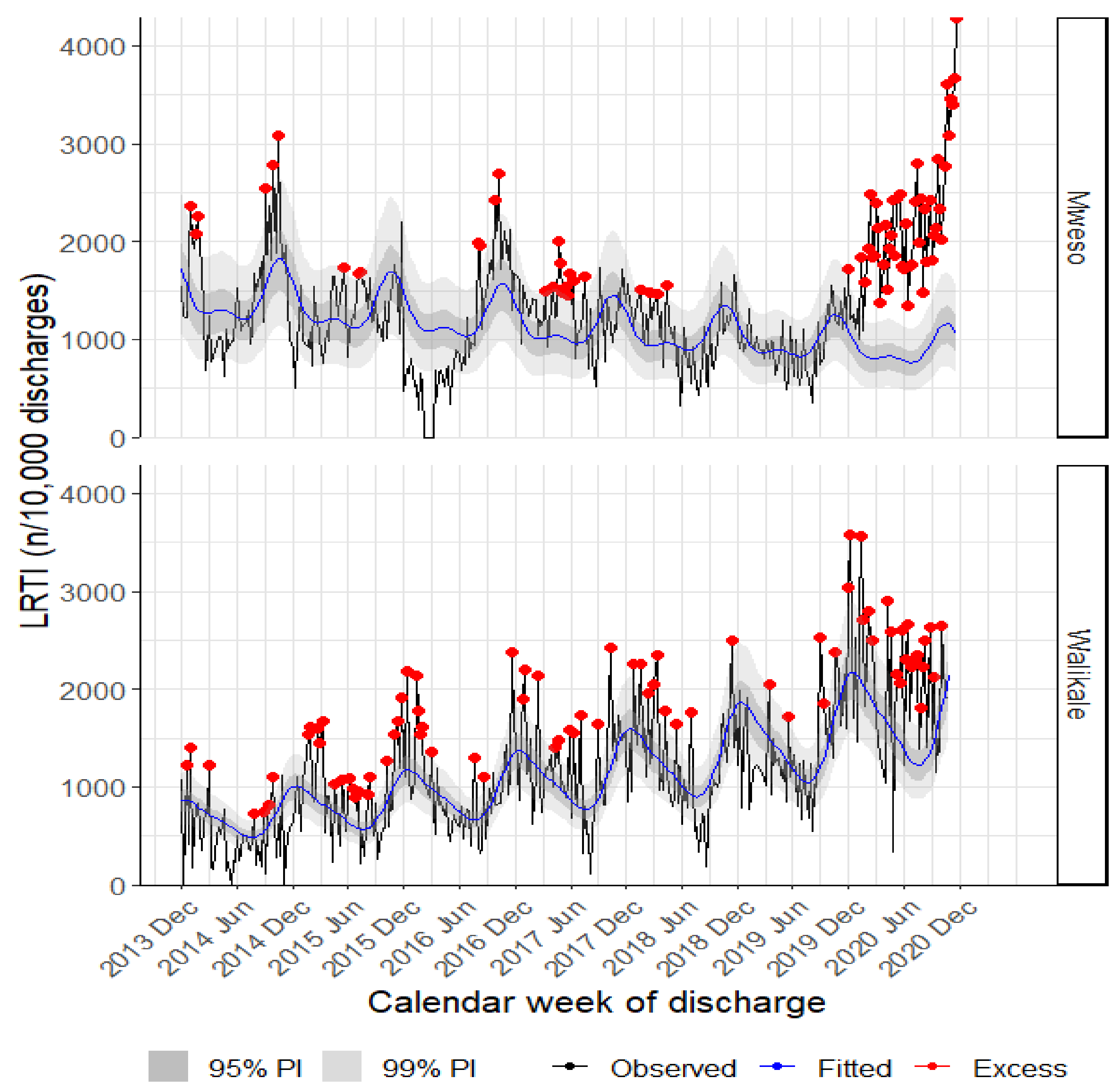


Figure 1: LRTI case rate with prediction intervals (PI) and alert thresholds by week of discharge

Conclusion

- Demonstrated utility of time series analysis techniques with routine health facility data for:
 - Regular monitoring of morbidity for situational awareness
 - Pandemic impact in limited surveillance and testing capacity settings.
- Potential wider use in monitoring programme activities in MSF hospital settings.
- Maintaining high quality standardised data collection is crucial to ensure the reliability of these analyses.

Ethics

This work fulfilled the exemption criteria set by the MSF Ethics Review Board (ERB) for a posteriori analyses of routinely collected clinical data, and thus did not require MSF ERB review.



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