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Rapid Communication

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Impact of national lockdown on the suspected SARS-CoV-2 epidemic in terms of the number of fever cases in North Korea

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After a strict 2-year border control from the early coronavirus disease 2019 (COVID-19) pandemic in 2020, North Korea tentatively reopened the border in China in January 2022. North Korea's massive gathering (military parade) took place in Pyeongyang on 25 April 2022, and the first COVID-19 case (Omicron variant) was identified on 12 May 2022. While the high-income countries were relaxing public health and social measures and enjoying the return of a pre-COVID-19 pandemic lifestyle, North Korea, which has a population of around 25 million, announced national emergency on 12 May 2022.[1] Nationwide lockdown was immediately implemented and on 30 May 2022, the lockdown was lifted as North Korean government believed the epidemic was under control.[2] An epidemic is considered to be controlled if the time-varying effective reproduction number (R_t) sustainably falls <1.[3] However, this has not been assessed in North Korea. Here, we investigated changes in the R_t of SARS-CoV-2 using the best available proxy data of reported fever cases and the impact of lockdown on SARS-CoV-2 transmissibility in North Korea.

We assumed the COVID-19 cases as fever cases, given that North Korea has limited public health resources.[4] We collected the daily number of cases from the North Korea Central News Agency between 12 May (when the daily number of cases was first reported) and 13 June 2022. To assess the R_t, we reconstructed the daily number of infections using a deconvolution-based method (Supplementary data).[5] Then, we estimated the R_t, which represents the average number of infections from a case infected at time t. Furthermore, we estimated the impact of national lockdown by fitting a regression model for R_t accounting for the depletion of susceptibles (Supplementary data).

We identified that the mean R_t declined to <1 within 5 days after the lockdown, and R_t further declined and remained at <1 during the rest of the observation period (Figure 1). We also found the lockdown was associated with a moderate decrease in R_t by 11% [95% confidence interval (CI), 6–17%].

As the limitation of this study, the incidence of other infectious diseases, for which data were not available, could have led to an overestimation of the SARS-CoV-2 transmissibility. However, a rapid surge with a large number of cases nationwide was observed after opening the border in China and permitting mass gatherings; therefore, the number of fever cases could be considered as the best proxy for COVID-19 incidence. Behavioural changes to avoid strict quarantine could have reduced the number of reported cases and could have delayed the reporting date.[4] Lastly, we could not take into account the number of cases developed before 12 May 2022. This could have led to an underestimation of the impact of strict lockdown.

The findings suggest that North Korea benefited from the lockdown to control the SARS-CoV-2 epidemic. Relaxation of the measures could have resulted in an additional surge in the number of cases, and resuming strict measures could have a damaging impact, including mass starvation in North Korea. Pharmaceutical measures, including vaccination, could be considered as sustainable control measures for reducing the future burden of SARS-CoV-2 in North Korea.

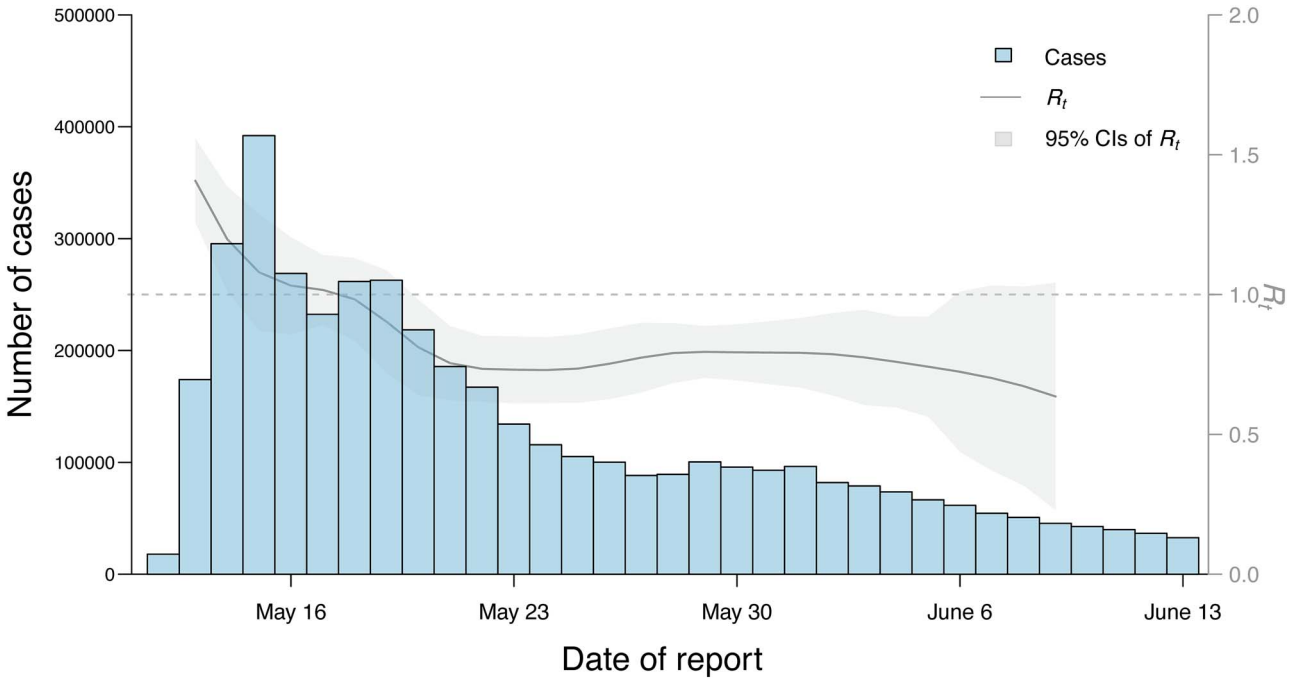

Figure 1. Daily number of people with fever, a proxy of COVID-19 cases, and the time-varying effective reproduction number (R_t) of the cases from 12 May 2022 to 13 June 2022; grey solid lines indicate the daily estimated R_t, and grey areas indicate the pointwise 95% CIs of R_t; grey horizontal dashed lines indicate the transmission threshold ($R_t = 1$)

Supplementary data

Supplementary data are available at *JTM* online.

Data availability

All data are collected from open-source with a description in Supplementary data.

Authors' contributions

S.R. conceived the study. H.S. and D.K. did the data collection and assimilation. C.H., H.S. and D.K. did the data analysis. S.R., H.S. and C.M. discussed the results. S.R. and C.H. wrote the first draft of the manuscript. All authors critically read and approved the final manuscript.

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Conflict of interest

None declared.

Ethical approval and consent to participate

This study did not require institutional review board approval or informed consent because all data used were anonymous and publicly available on websites.

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