

03/05/2019

Temporal dynamics of Middle East respiratory syndrome coronavirus in the Arabian Peninsula



Researchers from the Universitat Autònoma de Barcelona together with other research groups have analyzed the progression and modeled the spatio-temporal distribution of the epidemic of the new Middle Eastern coronavirus (MERS-CoV), a respiratory disease, in human populations in the Arabian Peninsula between 2012 and 2017. This study could lead to an improvement in the control and intervention of this disease, which poses a great risk to current public health.

Figure 1. Middle East Respiratory Syndrome coronavirus (MERS-CoV).

Middle East respiratory syndrome coronavirus (MERS-CoV) is a severe viral respiratory disease that poses a significant threat to global public health. The Arabian Peninsula continues to be a significant global epicenter for the disease, and the virus has crossed regional and continental boundaries since 2012. Since then, in this region, the disease has caused more than 1500 confirmed human infections with more than 580 deaths. Although the main route of transmission is the prolonged contact with an infected person, dromedary and camels can act as primary intermediate hosts and are recognized as a source infection by direct contact or consumption of camel products. Bats are considered the primary reservoir of these viruses, but no evidence suggests a direct transmission route from bats to humans.

Researchers of Autonomous University of Barcelona (UAB) and Institute of Agri-food Research and Technology (IRTA) have collaborated with scientists of the Kuwait University, and the University of Minnesota to explore the epidemic progression and the temporal dynamics of MERS-CoV in human populations in the Arabian Peninsula between 2012 and 2017. This study assessed the epidemic progression by quantifying the number of secondary cases that resulted from an infected case over time and modeled the temporal pattern of MERS-CoV epidemic while accounting for geographical variability between three major affected regions in Saudi Arabia (Eastern Province, Riyadh, and Makkah).

Results of the present suggested that during this 6-year-period, the epidemic size in Saudi Arabia was large and an infected person could infect more than one person over time causing a significant disease spreading events until 2017. In both Makkah and Riyadh regions, the epidemic progression reached its peak in April 2014, during the highest incidence period of MERS-CoV cases. In the Eastern Province, a superspreading event was identified in May 2013, which comprised of the most notable cases of human-to-human transmission. Results of time series models indicated that in regions such Riyadh, characterized by heavy seasonal camel-related activities, the epidemic showed significant biannual seasonality. However, this seasonal pattern was not evidenced in the Eastern Province and Makkah. Instead, both areas were marked by an endemic pattern of cases with sporadic outbreaks. Until today, at least one confirmed human case of MERS-CoV is reported on weekly basis in Saudi Arabia, which confirms the study's major conclusions.

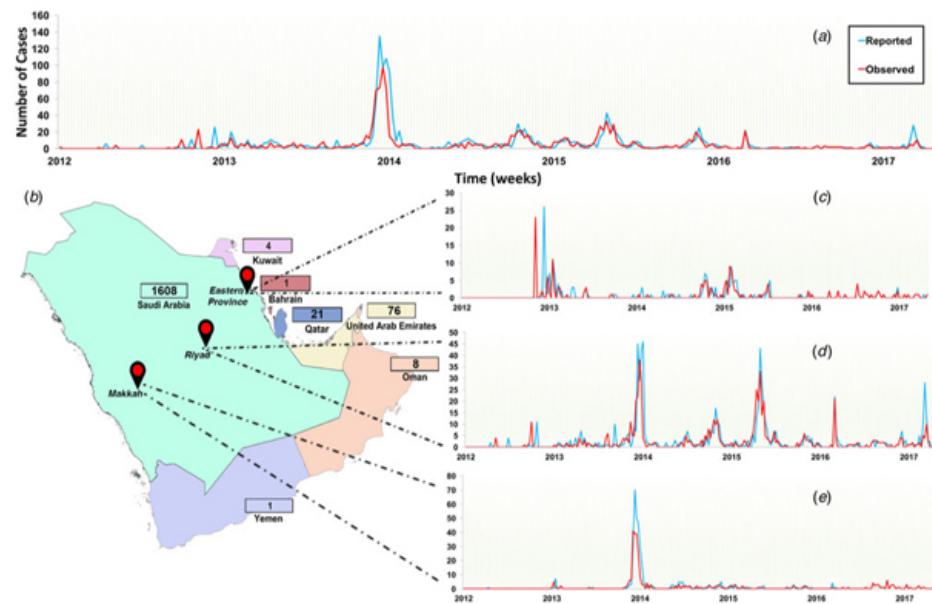


Figure 2. Epidemic curve of observed and reported human cases of Middle Eastern respiratory syndrome coronavirus (MERS-CoV) in the Arabian Peninsula aggregated by week from June 2012 to July 2017.

This study provides new insights about MERS-CoV epidemic progression and evidences for seasonality. Despite the inherent limitations of the available data, this work can provide further guidance to currently implement risk-based surveillance in high-risk populations and,

subsequently, improve related interventions strategies against the epidemic at country and regional levels.

This work has been published in the prestigious journal *Epidemiology and Infection* (2018).

Pere Puig ¹ i Anna Alba-Casals ²

Statistics and Operations Research Area

Department of Mathematics

Universitat Autònoma de Barcelona¹

ppuig@mat.uab.cat

IRTA

Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB)

Universitat Autònoma de Barcelona²

anna.alba@irta.cat

References

Alkhamis, MA., Fernández Fontelo, A., VanderWaal, K., Abuhadida, S., Puig, P., Alba-Casals, A. (2018). **Temporal dynamics of Middle East respiratory syndrome coronavirus in the Arabian Peninsula, 2012–2017.** *Epidemiology and Infection*, 147, e21, 1–10. DOI: <https://doi.org/10.1017/S0950268818002728>

[View low-bandwidth version](#)