International Journal of Epidemiology, 2020, 1–3
doi: 10.1093/ije/dyaa071
Commentary

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# Commentary on: The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? A One Health approach to coronaviruses

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Editorial decision 31 March 2020; Accepted 7 April 2020

Peeri *et al.*[1] have provided a comprehensive overview, comparing the epidemiological characteristics of and public health responses to three coronaviruses: Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS) and now SARS coronavirus 2 (SARS-CoV-2), which have emerged from animals into humans over the past 18 years. All three have been identified as betacoronaviruses. One Health is the concept that human, animal and environmental health are linked. It provides a useful framework for examining and dealing with emerging zoonotic diseases such as coronaviruses. In 2005, Lau *et al.*[2] identified a coronavirus in non-caged Chinese horseshoe bats, which was closely related to the SARS-CoV isolated from civet cats and humans. Two years later, Cheng *et al.*[3] concluded that the presence of a large reservoir of SARS-CoV-like viruses in horseshoe bats, together with the culture of eating exotic mammals in southern China, is a time bomb. Surveillance of wild animals such as bats provides important information about potential zoonotic disease threats. Integrating scientific findings into effective public policies to prevent zoonotic spillover events remains aspirational, as the current COVID-19 pandemic illustrates.

Both SARS and SARS-CoV-2 originated in China from exotic animals sold for food. Cases of atypical pneumonia began appearing in November 2002 in the Guangdong province, but the disease was not identified as SARS until a month later.[4] Unfortunately, the Chinese government did not report the worsening outbreak to WHO until 3 months after it began, hindering containment efforts and ultimately contributing to its 8-month cumulative total of 8096 laboratory-confirmed cases and 774 deaths with a case-fatality rate of 9.6%.[5] MERS appeared in Saudi Arabia 9 years after the SARS epidemic ended. Dromedary camels were identified as the source of the virus; however, a number of bat species are theorized to be the reservoir host animals for coronaviruses.[6] SARS disappeared, but MERS has continued to circulate and, as of November 2019, has caused 2494 laboratory-confirmed cases and 858 deaths. Its case-fatality rate is 34.4%.[7]

In December 2019, SARS-CoV-2 appeared in Wuhan, Hubei province, China. Pangolins had been suspected as the intermediate hosts; however, genetic analyses suggest that SARS-CoV-2 did not come directly from these endangered animals.[8,9] In contrast to SARS, the SARS-CoV-2 virus was identified relatively quickly. Cases of atypical pneumonia appeared in Wuhan City, Hubei province, at the end of December 2019. In 1 week the novel coronavirus, 2019-nCoV, was determined by real-time reverse transcription polymerase chain reaction (RT-PCR) as the causative agent. Five days after that, the virus's genome sequence was released online on 12 January 2020 to assist public health response preparations.[10] The speed of China's viral identification and development of diagnostic criteria should have helped other countries prepare for a potential pandemic if their political leaders had taken the threat seriously. Readily available rapid testing is essential for understanding the extent of the disease spread and to estimate the mortality rate. SARS, MERS and SARS-CoV-2 can be diagnosed with a variety of clinical specimens such as serum and respiratory fluids, using tests including RT-PCR analysis, serum antibody analysis and cell cultures.

Peeri *et al*. have estimated the COVID-19 case-fatality rate to be 2%, much less than SARS or MERS but 20 times greater than seasonal influenza. Most COVID-19 cases have been older men with comorbidities such as cardiovascular disease, diabetes and hypertension. Over half of the initial cases in China, 66%, had been directly exposed to a live animal market before the disease began spreading rapidly from person to person.[11]

What are the implications of Peeri and colleagues' paper?

First, preventing zoonotic epidemics is preferable to putting out the viral fires after they have spilled over into human populations. These zoonotic viruses come from animals sold for food or medicinal purposes. Ideally, endangered exotic animals should be banned from such use, especially animals identified as reservoir or intermediate hosts in pathogen surveillance studies.[12] The current COVID-19 crisis has prompted China to ban the trade of wildlife for food but not for medicinal purposes.[13] Whether or not this ban is effective in stopping zoonotic disease transmissions remains to be seen. A black market developed the last time China tried to ban wild animal trading, after the SARS crisis.[14] Protecting wildlife habitats such as tropical rainforests would be another important strategy to prevent zoonotic pathogen spillover events.[15]

Second, understanding the epidemiological characteristics of the novel agent is critical for successful containment. With an estimated basic reproductive rate ($R_0$) of 2.2, SARS-CoV-2 is much more communicable than SARS or MERS and can be transmitted person to person by symptomatic and asymptomatic individuals, similarly to influenza. The virus can persist on some surfaces for up to 72 h. These features have allowed the virus to spread efficiently.

Third, China made a similar mistake with COVID-19 as it did with SARS. It waited too long to respond, but fortunately not as long. Surprisingly, it was not prepared for another coronavirus spillover event even though live animal markets continue to exist. According to Peeri and colleagues, the country lacked the policies, the supplies and the laboratory facilities to address such a large outbreak. China ultimately had to implement draconian social distancing measures, by placing Wuhan and other affected cities on lockdown, to get the crisis under control. In less than a week, the government built two hospitals to care for the deluge of patients. These measures helped to break the chain of transmission and mitigate the outbreak. China's COVID-19 case numbers have begun to recede.

In 2019 China is a manufacturing giant and well connected globally. Wuhan is a large city serving as a hub with the rest of the country and with the world. These conditions helped set the stage for the highly communicable virus to spread worldwide. On 11 March 2020, Dr Tedros Adhanom Ghebreyesus, Director-General of WHO, declared COVID-19 to be a global pandemic. Countries that heed China's example and implement rapid, strict social distancing measures might be able to reduce their epidemic curves, spare their health care systems from being overwhelmed and save lives. Implementing a One Health approach, conducting surveillance of animals for potential zoonotic disease threats and paying attention to the scientific findings might help prevent future coronavirus pandemics.

## Conflict of Interest

None declared.

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