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Game consumption and the 2019 novel coronavirus

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In December, 2019, the 2019 novel coronavirus (2019-nCoV) infecting humans was first identified in Wuhan, China.[1–3] As of Feb 3, 2020, the National Health Commission of China had reported 20 471 confirmed cases of 2019-nCoV infection in 34 provinces (autonomous regions, municipalities, and special administrative regions).[4] Cases have also been confirmed globally.

Coronaviruses are RNA viruses that are phenotypically and genotypically diverse. As well as in humans, coronaviruses are widespread in other species worldwide, including birds, rabbits, reptiles, cats, dogs, pigs, monkeys, and bats. They can cause respiratory, enteric, hepatic, and neurological diseases of variable severity, and are sometimes fatal in humans.[5,6] Two of the previously identified strains of coronaviruses—severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV)—have caused widespread epidemics and are zoonotic in origin.[7,8] 2019-nCoV is also likely to have a zoonotic origin. Early confirmed cases of the new coronavirus in Wuhan were closely linked to the Huanan seafood market (a wet market),[1,9,10] where a large variety of vertebrate and invertebrate animals, wild caught and farm raised, are sold. Right after the official confirmation of the close linkage between severe pneumonia and the game animals in the market, it was closed on Jan 1, 2020.

The practice of consuming meat and products of wild animals in China dates back to prehistoric times. In modern times, although game is not needed for food, the tradition of eating it persists. In China, especially in the southeastern part where Guangdong and Wuhan are located, game is a favourable delicacy on everyday menus.

The obsession with meat and products from wild animals may originate from the philosophy of medicine food homology. *Huang Di Nei Jing Su Wen* (The Yellow Emperor's Internal Classics) from the Hang dynasty (206 BC–220 AD) states "[of things] eaten when hungry is food, eaten when ill is medicine" and is considered an early reflection of the homology. However, through not being able to fully comprehend the essence of the philosophy, many Chinese people mistakenly extend the scope of the homology and simply think that one is made of the supplements they eat. For instance, kidney and penis of deer or tiger are believed to have aphrodisiac effect, and brain of fish or monkey are supposed to make people brighter.

Another false belief often held is that meat and products from wild animals have certain therapeutic effects. For example, Chinese pangolin meat is believed to help relieve rheumatism, its blood is believed to promote blood circulation and remove meridian obstruction (a concept in traditional Chinese medicine), and its bile is believed to eliminate so-called liver fire (irascibility) and improve eyesight.

Behaviours seen on the internet may have also encouraged the spread of the 2019-nCoV. On popular livestream platforms such as Kuaishou and Douyin, hosts engage in so-called mukbangs, which involve hosts eating food in front of their audience. Sometimes the food they eat is strange or dangerous. In 2016, a host was broadcast live eating soup made from bats. Eating of other wild animals, such as African snail, frog, bamboo rat, or octopus, has also been broadcasted.

Sometimes the animals are eaten raw or even alive, especially octopuses, despite the possibility that these are infected with various viruses.

Instead of attempting to control outbreaks of zoonotic viral diseases such as SARS, MERS, Ebola, and 2019-nCoV after the fact, the key is to interrupt their emergence by refraining from game, with legislation being only part of the solution. The ultimate solution lies in changing people's minds about what is delicious, trendy, prestigious, or healthy to eat.

In response to the outbreak of 2019-nCoV, the Chinese Government has banned all forms of wild animal transaction, and there are already spontaneous efforts on the internet to explain the risks involved in consuming game, together with pleas to withhold from buying, selling, or consuming wild animals. We believe that through a change in the outdated and inappropriate tradition of consuming wild animals and their products, we can conserve the natural habitat of wild animals, and humans and other living creatures can coexist in harmony.

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*Jie Li, Jun (Justin) Li, Xiaoru Xie, Xiaomei Cai, Jian Huang, Xuemei Tian, *Hong Zhu*
zhuhong@gzhu.edu.cn

School of Geographical Sciences, Guangzhou University, Guangzhou 510006, Guangdong, China (JL, JH, HZ); College of Resources and Environmental Science, Ningxia University, Yinchuan, Ningxia, China (JL); School of Tourism Management (J[J]L, XC) and School of Life Science (XT), South China Normal University, Guangzhou, Guangdong, China; and Division of Geography and Tourism, Department of Earth and Environmental Sciences, Katholieke Universiteit Leuven, Leuven, Belgium (XX)

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Lessons learnt from ceftriaxone-resistant gonorrhoea in the UK and Australia

Neisseria gonorrhoeae, the causative pathogen of gonorrhoea, has shown impressive agility in developing resistance to successive classes of antimicrobials used for therapy, leading to a progressive reduction in available treatment options. Ceftriaxone is the last-line treatment option for gonorrhoea, and many countries recommend dual therapy with ceftriaxone (250–1000 mg) in combination with azithromycin (1–2 g). However, since the introduction of dual therapy, the global prevalence of azithromycin resistance has increased.[1] Additionally, the extensively drug-resistant *N gonorrhoeae* FC428 clone, which is associated with ceftriaxone resistance and intermediate resistance to azithromycin, has been reported to have spread internationally, with epidemiological links to the Asia-Pacific region.[2]

The first treatment failure to dual therapy was reported in the UK in 2016, a heterosexual man with urethral and pharyngeal gonococcal infections acquired in Japan (table).[3] In 2018, the first strain that was resistant to ceftriaxone (minimum inhibitory concentration [MIC] 0·5 mg/L) and showed a high level of resistance to azithromycin (MIC >256·0 mg/L) was reported, again in the UK, in a heterosexual man with urethral and pharyngeal gonococcal infections acquired in Thailand (table).[4] The urethral infection was successfully treated with ceftriaxone, but the pharyngeal infection persisted and was eventually cleared after 3 days of treatment with intravenous ertapenem (1 g). Of particular concern was the identification of two patients infected with strains of *N gonorrhoeae* that were genetically identical to the UK