

The bush meat trade thrives in Nigeria despite anxiety over coronavirus

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In nature, many infectious pathogens evolve from animals and occasionally spill over to humans, which may escalate to an epidemic and sometimes attain the proportions of a pandemic, like severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The swine flu H1N1 is another recent example of a pandemic. Exposure to wildlife through habitat encroachment, hunting, ecotourism, trade (the handling or processing/eating of bush meat) are well-described pathways of pathogen transmission. These human activities may lead to the emergence of pathogens that have been shown, many times, to be deadly when a new host is infected. While >60% of known diseases identified to date in nature are zoonotic, >70% of these diseases originated from wildlife.¹

In recent times, three highly pathogenic coronaviruses, SARS-CoV, Middle East respiratory syndrome coronavirus (MERS-CoV) and SARS-CoV-2, have each emerged from animal reservoirs to cause epidemics/a pandemic with alarming morbidity and mortality.² Hence, the recent outbreak of coronavirus in China illustrates how a new pathogen from an animal source can cause severe morbidity with a global impact. The economic impact of this zoonotic disease outbreak has permeated every sphere of life, resulting in major global social and economic disruption. The novel coronavirus now known as COVID-19 for the disease and SARS-CoV-2 for the virus,³ was declared a Public Health Emergency of International Concern by the WHO and is now a confirmed pandemic. The virus has been linked to a sea food (live animal) market in Wuhan, China, which is similar to the scenario presented by SARS-CoV during 2002–2003. It is a failure not to learn from past experiences and the body of knowledge in the scientific domain is rife with speculations, conjectures and warnings of apocalypse regarding possible diseases. There are data to the effect that a new virus may emerge from animals (wildlife) and cause fatal infection in humans. Although it was anticipated, we failed to prevent this from happening with SARS-CoV-2.

As SAR-CoV-2 spread throughout Wuhan, mainland China and the rest of the world, researchers in Nigeria were part of a field team composed of virologists, an epidemiologist and pathologists searching animal reservoirs for infectious diseases of public

health concern. The expedition led the team to a bush meat market in a megacity Lagos in the southwest of the country on the same day that Chinese scientists hypothesized that coronavirus may have been transmitted through pangolins, which are peculiar, slow, harmless ant-eating mammals that are highly sought after for their meat (as a delicacy) and their scales (for use in traditional medicine). Although the capture of and trade in pangolins has been banned worldwide because they are an endangered species, the animal is still smuggled from Asian and African countries. Generally in Africa, and in Nigeria in particular, pangolins are traded alongside other species like crocodiles at active bush meat markets (Figures 1A and B). Previously, the same team visited another bush meat market in oil-rich south Nigeria, where a rich diversity of killed wildlife were on display (Figures 1C and D). It has been claimed that coronavirus may have been transmitted to humans through a probable pangolin intermediate host of the virus that is known to be found in bats reservoir, premised on a report from Chinese researchers, who found a coronavirus in smuggled pangolins which had a 99% genetic match with the virus currently circulating around the world. However, this similarity is not applicable to the entire genome, but relates only to a specific site, which is known as the receptor-binding domain.⁴

A few years ago, the Ebola virus was initially transmitted to a toddler in West Africa and >10 000 lives were lost in <1 y. Bats are a known natural reservoir of many pathogens including coronaviruses, Ebola, Marburg, Hendra, Nipah and Lyssavirus, and researchers have found coronaviruses in Nigerian bats.⁵ These flying foxes are abundant in wildlife parks and zoos and are also intimately associated with humans in city centre streets and homes. The many pathogens they harbour are not well understood and will necessitate vigilance and monitoring through surveillance and risk analysis.

The first case of a coronavirus virus detected in Nigeria was 'imported' from Italy, in the same manner in which a Liberian diplomat 'imported' the Ebola virus, ironically through the same international airport in Lagos. Just as with Ebola, we failed to stop the virus at the border. The Italian visitor to Nigeria graciously checked himself into a hospital when he became ill.



Figure 1. Bush meat market in southern Nigeria. (A) Live pangolin, (B) live crocodiles, (C) killed grass cutters, (D) processed grass cutters. (Photograph: Adeyinka Adedeji).

The case was missed, probably because he was not exhibiting clinical signs, just like the first case of coronavirus in Egypt. This phenomenon, now associated with SARS-CoV-2, has further increased the risk of expanded contact exposure to coronavirus and has heightened anxiety, not only in Nigeria's megacities, but also across the country. Many citizens in Nigeria were already wearing surgical masks and observing social distancing, even before there was any scientific evidence of community transmission.

Meanwhile, diverse wildlife are hunted and brought for sale to the thriving bush meat markets of southern Nigeria. The species we observed included antelopes, grass cutters, porcupines, crocodiles, turtles and pangolins. Interestingly, many of these animals were displayed alive (some were juveniles) and the market can be described as a live animal (wildlife) market (Figures 1A and 1B). The lesson from the field includes the pos-

sibility of interspecies intermingling and sharing pathogens, akin to current observations regarding the emergence of SARS-CoV-2 in Wuhan, China. Also, in real time we observed the exploitation of wildlife resources that may contribute to the extinction of endangered species such as the pangolin. In the midst of upheaval, especially in Nigeria, bureaucrats and politicians may miss the fact at the heart of this matter, which is that SARS-CoV-2 would have remained innocuous in animals if conditions had not favoured its transmission to humans. It may be in China today, and if care is not taken then it could become an African problem tomorrow, whenever and wherever the conditions are similarly favourable. The lesson here is that policymakers should not lose sight of the root cause of the coronavirus virus outbreak. One health initiative, to proactively identify the animal sources of coronaviruses and similar pathogens, is important for the prevention of new outbreaks. Sustainable measures for the control

of zoonoses and safeguarding public health are more imperative now than ever before.

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