



## Illicit Wildlife Trade, Wet Markets, and COVID-19: Preventing Future Pandemics

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*Although the exact origin of SARS-CoV-2, the etiologic agent of COVID-19, is currently unknown, there is substantial evidence to suggest the source of transmission of the virus occurred within the Wuhan wet market. In these markets, bats and wild animals are frequently sold and stored in close contact. During several of the world's past pandemics, bats were essential to the spread of zoonotic diseases from bat to another animal or to humans directly. Live animal markets create the perfect conditions for novel viruses such as COVID-19 to emerge. This paper suggests that to prevent future pandemics, the sale of exotic animals be banned at wet markets. It also advocates for the integration of the analysis of illicit trade with the study of zoonotic disease transmission and pandemics.*

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**KEY WORDS:** COVID-19, Illicit Wildlife Trade, SARS-CoV-2, Zoonotic diseases

### Introduction

As the world continues to struggle with the unprecedented ramifications of COVID-19, two central questions are being asked: Where did this novel virus come from and how can we prevent future pandemics? Although there is no definitive answer as to the origins of the virus, specialists in the field of immunology and microbiology have suggested that COVID-19, occurred naturally (Choudhury, 2020). There is significant evidence to suggest that live animal markets or wet markets in Wuhan, China are the original source of transmission of the virus. A major indication is that some of the first patients to test positive for COVID-19 had connections to the wet markets in Wuhan (Broad, 2020, p. 3). Additionally, the causative virus known as SARS-CoV-2 is a betacoronavirus that originated in bats, much like SARS and MERS diseases (Centers for Disease Control and Prevention [CDC], 2020). An examination into these forms of contagion supports the hypothesis that COVID-19 potentially transmitted from bats to another susceptible animal, such as a pangolin, and then to a human (Choudhury, 2020). Transmission may have occurred at the wildlife market, or while *en route* to the wildlife market where illicitly traded wildlife may be sold. It is currently unknown as to precisely how the virus was transmitted from animals to humans but the threat of bats spreading disease has been a long-held concern for public health officials and biological researchers. Viruses that are transmitted from animals to humans are very dangerous to human life due to the absence of herd immunity among the population. This article will explore the connections among the

current pandemic, live-animal markets, the spread of animal-related diseases, and the illicit wildlife trade and will include a set of policy recommendations prescribed to prevent future outbreaks stemming from these issues.

### Materials and Methods

To explore the connections between bats and COVID-19, we reviewed academic literature and scientific journals on bat ecology and conservation, emerging zoonotic diseases, the COVID-19 outbreak, and wet markets in China. We used websites of authoritative bodies such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). We looked at scholarship and reports addressing the illicit wildlife trade from prominent intergovernmental organizations and non-governmental organizations such as the United Nations Office on Drugs and Crime (UNODC), and TRAFFIC. We also reviewed reporting from news media outlets such as the *New York Times* and the *Wall Street Journal*.

### The Role of Bats and Diseases Related to COVID-19

Although it could be several years before any final conclusions are drawn on the origins of the COVID-19 outbreak, there is still substantial evidence that it originated in bats. Biological and epidemiological research indicates that different species of bats may potentially carry multiple strands of the virus very similar to that of the current coronavirus. The *Los Angeles Times* stated “scientists estimate that 3 out of 4 new or emerging infectious diseases in people come from animals” (Su, 2020).

At the Institute of Virology in China, a horseshoe bat (*Rhinolophus affinis*) identified as RaTG13, was discovered to be carrying a form of coronavirus, which shared 96% of its DNA with SARS-CoV-2 (Ridley, 2020). Although this information provides compelling circumstantial evidence, it does not prove that this particular species of bat contributed to or assisted in the spread of COVID-19. However, this does not mean that another species of bat does not carry this form of coronavirus that can then be shared with humans. In perspective, humans share 96% of our genome with chimpanzees (Bat Conservation Trust, 2020). Experts are not certain as to how SARS-CoV-2 was transmitted to humans; it may have been transmitted through another susceptible animal such as a pangolin, the most illegally traded mammal in the world (Conciatore, 2019).

Past research has shown that bats are central to the dissemination of COVID-like diseases among animals and humans. Although rodents bear the responsibility for spreading the bubonic plague during the fourteenth century, bats present a unique danger as reservoirs for zoonotic viruses, hosting even more bacteria and diseases than rodents (Luis et al., 2013, p. 3). Therefore, bats have been much studied as transmitters of viruses to humans through close contact or direct consumption. Humans cause harm to bats not only through consumption but also by contributing to their loss of habitat. As a consequence of environmental destruction, bats seek new areas to feed, sometimes causing them to come into contact with

livestock that will be eventually sold in open markets (Plowright et al., 2015, pp. 3–4). Additionally, habitat destruction can cause bats to shed and contract more viruses, further increasing the likelihood that they will transmit disease (Olival, 2016, p. 7). Bats are frequently stored and sold in wet markets and are often transported alongside large groups of uncommon and illicitly traded animals that are consumed by humans. This form of transportation and storage allows the spread of pathogens between bats and different, sometimes exotic, and rare creatures that can carry and advance diseases under severe, stressful situations.

The concern over pathogens being transferred from bats to humans is widespread; not only among public health professionals but also has been much studied by academics. The American Society for Microbiology published a report entitled *Identification of a Novel Coronavirus in Bats*, which stated “the recent emergence of severe acute respiratory syndrome-associated coronavirus (SARS-CoV) highlights the importance of virus surveillance in wild animals” (Poon et al., 2005, p. 2001). It further explains “the identification of severe acute respiratory syndrome-associated coronavirus (SARS-CoV) in civet cats and other wild animals in live animal markets suggests that this novel human pathogen emerged as a result of an interspecies transmission” (Poon et al., 2005, p. 2001). This report illustrates how other coronavirus-like illnesses in animals have been previously identified as potential sources of transmission to humans. In fact, this is not a recent discovery and concerns existed already in 2007 that there was a serious danger to human life. A University of Hong Kong study at that time found 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” (Cheng, Lau, Woo, & Yuen, 2007, p. 638). Indeed, this warning was unheeded and the failure to act on this insight has contributed to the most serious global pandemic in a century.

### **The History of Health Risks Relevant to Wildlife Trade Practices**

This global health crisis originating from zoonotic transmission is not novel; in fact, over the last 20 years, several deadly diseases are thought to have originated from live animal or wet markets. Wet markets are where fresh meats, produce, and animals are often stored to be sold in open-air environments, in close proximity, with little to no health safety precautions or sanitation measures. These wet markets exist across the world and in China, they often contain foreign, rare, and sometimes endangered species that are sold, among other goods, by traveling suppliers. Wet markets facilitate and heavily contribute to the practice of illicit wildlife trade and in turn, this practice has led to the spread of zoonotic diseases among the animals and to customers at markets. Transportation and storage of animals for wildlife trade at these markets enables the spread of diseases from animals to other animals.

As one science writer reports “live meat markets are perfect laboratories for creating new viruses. Stressed animals shed more viruses and are more susceptible to infections, and cages are often stacked on top of each other, facilitating exposure” (Nuwer, 2020). Exotic meats that are traded illegally, such as pangolins, are less

likely to be inspected for health risks and may come into contact with bats while in transit. Additionally, because these rare animals are often from remote areas, they may be more likely to carry diseases that humans have never come into contact with (Hemley, 2020). The conditions the live animals are subjected to in wet markets create a petri dish for the spread of diseases.

In China and in some other Asian countries, these markets are prevalent because consumers view wet markets as fresher, not expensive, and providing rare types of creatures that serve as status symbols or are believed to possess unique healing elements (Daszak, Olival, & Li, 2020, p. 7). Yet the spread of disease from the live and exotic animals represents the biggest threat.

For instance, wild carnivores, birds, reptiles, and primates that are traded in these markets carry pathogens from every taxonomic origin. Therefore, pathogens such as Newcastle disease can jump from wild to domestic birds, and pathogens such as simian foamy virus and *Chlamydomphila psittaci* can be transmitted from wild animals to humans (Gómez & Aguirre, 2008, p. 17). There is a well-documented history of regional and even global pandemics originating from the transmission of diseases from animals to humans due to the practice of wet markets and illegal wildlife trafficking.

In April 2020, the United Nations (UN) acting Head of Biodiversity stated, “countries should move to prevent future pandemics by banning wet markets that sell live and dead animals for human consumption but cautioned against unintended consequences” (Greenfield, 2020). Public health officials in the United States and around the world have pointed to wet markets and illegal wildlife trading as conduits for the transfer of disease. The transference of diseases from animals to humans may transpire through the consumption, proximity, or mixing of animals or their by-products. Typically, animals are susceptible to different types of diseases. Once a strand is introduced into the human population, it can be spread from human to human and cause an outbreak or potential public health emergency. Relatively recent epidemics such as Ebola, Middle East respiratory syndrome (MERS), bird flu, severe acute respiratory syndrome (SARS), and swine flu are all examples of diseases that have originated through the transfer of disease to humans from animals. For example, the highly pathogenic Asian avian influenza A (H5N1) virus or bird flu is highly contagious, and it occurs when humans come into direct or close contact with infected or already diseased poultry (CDC, 2018). Therefore, the significant risk factors for infection include visiting or mixing animals in live poultry markets. Similarly, while the swine flu is sporadic in humans, infections are typically the result of exposure to infected pigs within live markets, fairs, or the pork industry (CDC, 2019a).

Unfortunately, due to the nature of infections, there is still a lot of information left unknown about how some of these outbreaks originated. In the case of Ebola and based on the analyses of similar viruses, scientists believe it is animal-borne, with bats or nonhuman primates such as apes or chimpanzees being the most likely source (CDC, 2019b). Another example would be in 2003, when SARS broke out in the southern province of Guangdong in China. Experts believe this outbreak is the result of an unknown animal reservoir,

some experts have suggested bats, and the spread occurred through other animals such as civet cats (World Health Organization [WHO], 2020). During its initial outbreak, SARS resulted in more than 8,000 cases in over 25 countries. Similar to SARS, MERS began as the result of a zoonotic virus in Saudi Arabia. Although different practices other than wet markets or animal reservoirs led to the outbreak of MERS, the method of transfer is the same; animal to human (WHO, 2019). The Director of the National Institute of Allergy and Infectious Diseases, Dr. Anthony Fauci, insisted on a global closure of wet markets because the current crisis is a “direct result” of this practice (Guzman, 2020). After the SARS outbreak, China attempted to institute a similar, more stringent ban on wildlife trade but this has eroded over time (Su, 2020). Several conservationists and medical professionals, including members of the Chinese Academy of Sciences, hoped this ban would be permanent, but the markets and trade routes returned after the crisis ended (WHO, 2020). It is certain that without cooperative, comprehensive, and enforced policies on wildlife trade and of endangered species, such as the pangolin, in place there will continue to be a spread of global sickness and international loss of life.

### Potential Policy Solutions

The devastation resulting from the spread of COVID-19 could potentially serve as a future warning for what is to come, if practices such as illicit wildlife trade and wet markets are allowed to continue on a global scale. A combination of factors ranging from loss of habitat to increased human-animal interactions through the illicit wildlife trade have increased the likelihood of novel zoonotic diseases emerging and spreading. This pandemic began in China, but there is no reason a similar pandemic could not begin elsewhere in Southeast Asia, South Asia, sub-Saharan Africa, or Latin America (Daszak et al., 2020, p. 7). Significant actions must be taken to ensure this type of pandemic is prevented in the future. Here, we outline policy proposals to address the issue of zoonotic diseases spread by illicitly traded animals.

These policy suggestions are multifaceted and do not depend entirely on law enforcement strategies. The limits of law enforcement are clear. In 2019, anti-smuggling officers in Guangdong intercepted 21 live pangolins and discovered many of them were sick with coronaviruses (Ridley, 2020). The illicit trade of pangolins, a suspected susceptible host and potential carrier of COVID-19, for their meat and scales represents over \$125 million in illegal activity each year (United Nations Office on Drugs and Crime [UNODC], 2013, p. 86). Although increasing operations targeting the illicit wildlife trade is a worthwhile endeavor for weakening revenue sources for transnational criminals, conserving endangered species, and fighting corruption, there are limits to how effective it alone would be in stopping the spread of novel diseases.

*Global Enforcement Cooperation to Crack Down on Illicit Wildlife Trade*

Global law enforcement to address the illegal trading in exotic animals for consumption or possession represents a high priority in preventing future animal to human disease transmission. To address this problem, countering illicit wildlife trade must be a higher priority of INTERPOL (the international police body) and of regional and law enforcement bodies. But this trade is highly linked to transnational crime that requires corruption to operate. Therefore, there needs to be much more attention paid to dismantling cross-national illicit networks, addressing corruption, and following the money linked to this trade. Moreover, the role of corporate actors as part of the supply chain for this illicit transit needs much more attention. Much illicit wildlife trade flows through free-trade zones in Asia, and they must be held much more responsible for the cargo that goes through their ports (Shelley, 2018, p. 193).

*Shut Down Wet Markets That Sell Live Animals or Exotic Meats*

A targeted ban could be effective and have fewer unintended consequences than an outright ban. Focusing on the most likely vectors of zoonotic diseases could protect public health without the negative effects of a blanket ban. Although a ban on wild animal and wet markets would lower the number of opportunities for Chinese consumers to come into contact with meat infected with infectious agents, there is the chance that underground markets will pop up. Therefore, allowing the sale of a limited category of meat in markets as the Chinese government is now considering would preserve people's access to food. An overarching ban could destroy these people's livelihoods or even lead to a black market facilitated by corruption with even greater risks (Samuel, 2020). Enforcement of regulations are essential and inspections must be carried out to ensure that meat from exotic animals is not disguised as meat from domestic animals.

There are certain aspects of this pandemic that might make a total ban on wet markets politically viable. The markets in China were closed temporarily after the SARS outbreak in 2003, though this ban did not last long (Samuel, 2020). This time might be different, however. The SARS outbreak resulted in around 800 deaths worldwide, while the death toll from COVID-19 has caused over 432,000 deaths as of June 15, 2020. With the recommendations of experts and the drastic toll of COVID-19, shutting down the wet markets may be politically possible.

*Promote Understanding of Health Risks of Meat Sold in Wet Markets*

Even if wildlife markets are banned, outreach will be necessary to drive down demand for a black market. Consumption of wild animals from wet markets is influenced by Chinese and Asian culture, which holds that wild animals and their by-products have healing powers. Eating rare animals has also become a status symbol signifying that the consumer is wealthy (Daszak et al., 2020, p. 7). In addition, Chinese culture places a great deal of emphasis on the "freshness" of the

food being consumed. This concept of freshness extends to perceptions of food quality, healthiness, and taste, with fresher always being better. Food from a grocery store is seen as less fresh than food from wet markets. Some Chinese consumers will make trips to easily accessible wet markets every day (Zhong, Crang, & Zeng, 2020, p. 179).

Dealing with the underground markets will require convincing people that they should not buy from underground wet markets. This could be done through public health outreach campaigns that inform people of the dangers of exotic meats and markets that have live wild animals. Research has shown that public health outreach campaigns can work. The first anti-smoking campaign given federal funds by the United States government showed impressive results, inspiring 1.8 million smokers to attempt to quit and 104,000 to quit for good in 2014 (CDC, 2016). Although there are crucial differences between cigarettes and meats from animal markets in terms of addiction and their places in different cultures, the concept may have applicability in convincing people not to buy food from wild animal markets.

### **Research and Analysis**

Future research by the health, medical, and environmental community must be combined with research on illicit trade and corruption. A transdisciplinary approach has been taken in the One Health perspective but this approach has not gone outside the scientific perspective (Aguirre et al., 2019; Wilcox, Aguirre, De Padua, Siritaroonrat, & Echaubard, 2019). Going forward, these barriers among academic disciplines must be bridged to consider all the risks to public health.

### **Conclusion**

Addressing and preventing pandemics requires an array of transdisciplinary research. Research must focus on the central causes of the spread of zoonotic diseases such as illicit wildlife trade and wet markets. Public health, conservation biology, and illicit trade scholars should collaborate on addressing the facets of supply chains, corruption, and trade that may contribute to zoonotic transmission. There will need to be much more work with the business community to follow the supply chains linked to illicit trade in wildlife. Governments will need to get involved as well and take action to suppress the wildlife trade in order to prevent future outbreaks.

Those who are part of the illicit wildlife trade have not taken off days during this crisis. Lockdown policies and the changing dynamics of international travel have resulted in multiple changes to the supply chains for illicit wildlife trade. Trade by air has been slowed due to quarantine regulations and transportation by road has been complicated by roadblocks and checkpoints, particularly at borders. The trade is still happening by sea, however. Additionally, because governments have closed so many national parks, poachers have taken the opportunity to go after animals that are not being as closely guarded as before. The combination of transportation difficulties and unwatched national parks has led to

stockpiling of products in the illicit wildlife trade. Without addressing these issues now, the trade could come roaring back as lockdowns are lifted (Wildlife Justice Commission, 2020, p. 5).

This outbreak was caused by an array of factors, including the conditions of wet markets, the illicit wildlife trade, and environmental destruction. A multi-pronged approach will be necessary to make sure this never happens again. On the illegal trade aspect, policymakers will need to address the source of demand for these products: the wet markets. Shutting down the wet markets, or at least strictly regulating them and banning the sale of live wild animals, will be necessary to address the problem of zoonotic diseases. Hopefully, this pandemic will convince government officials that these markets need to be dealt with and convince scholars to study the intersection of illicit trade and public health.

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### Notes

Conflicts of interest: None declared.

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