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COVID-related changes in public attitudes toward wildlife consumption on a Chinese social media site

Yuhan Li[1,2] | **Daniel W. S. Challender**[1] | **Yang Zhang**[3] | **E. J. Milner-Gulland**[1]

[1]Interdisciplinary Centre for Conservation Science, Department of Biology, University of Oxford, Oxford, UK

[2]Shan Shui Conservation Center, Peking University, Beijing, China

[3]Beijing Institute of Big Data Research, Peking University, Beijing, China

Correspondence
Yuhan Li, Department of Biology, University of Oxford, Oxford, UK.
Email: yuhan.li@biology.ox.ac.uk

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Abstract

Wildlife consumption in China has been relatively common, which has led to a substantial wildlife farming industry and caused concern among some conservationists. The assumed link between COVID-19 and wildlife consumption attracted significant public attention and led to a change in wildlife management policies in China. However, it is unclear how the Chinese public perceives wildlife consumption and whether they are supportive of the wildlife management policies introduced. We collected and analyzed 488,016 posts from a prominent Chinese social media site—Weibo—from September 1, 2019, to August 31, 2020. Our results suggest that during our study period, COVID-19 dramatically altered people's attitudes toward wildlife consumption; following the emergence of the pandemic, posts spiked and overwhelmingly called for a stop to wildlife consumption. We selected pangolins, bats, wild pigs, and snakes for in-depth analysis, where disease and conservation were the top themes discussed. When the wildlife consumption ban in China was introduced in February 2020, the majority of Weibo users supported it. However, not all users did, including those concerned about the wildlife farming industry and those questioning the link between COVID-19 and wildlife consumption. Users also discussed traditional Chinese medicine, including its impacts on wildlife consumption, conservation, and medical efficacy. Our results indicated that understanding public sentiment is useful for evaluating support for conservation policies and interventions.

KEYWORDS

COVID-19, social media, Weibo, wildlife consumption, wildlife management, wildlife trade

1 | INTRODUCTION

Unsustainable harvest, trade, and consumption of wildlife are of conservation concern because they directly influence biodiversity conservation and human wellbeing, including through effects on livelihoods and public health (‘t Sas-Rolfes et al., 2019). When well managed, wildlife trade can generate income, support livelihoods, and contribute to the conservation of threatened species (‘t Sas-Rolfes et al., 2022; McRae et al., 2022).

Wild meat is also a substantial protein source across the globe (Cawthorn & Hoffman, 2015). However, the unsustainable harvest of wildlife, including for trade, is a key threat to many species (Ingram et al., 2021), and wildlife consumption has been implicated in the emergence of various infectious diseases (Ye et al., 2020).

The COVID-19 pandemic has led to a dramatic loss of human life and caused devastating social and economic disruption globally (WHO, 2020). Several early cases involved workers at a market that sold both domestic and wild animals in Wuhan, China. In the SARS outbreak in 2003, the coronavirus concerned (SARSr-CoV) likely originated from Chinese horseshoe bats (*Rhinolophus sinicus*), and the masked palm civet (*Paguma larvata*) was assumed to be the intermediate host (Hu et al., 2017; Lau et al., 2005). Reports from the World Health Organization (WHO) and other studies have suggested that species such as bats (*Chriroptera*) and pangolins (most likely the Sunda pangolin *Manis javanica*) might be the reservoir of the virus that caused COVID-19, but this has not been confirmed (Ji et al., 2020; Lam et al., 2020; Zhao et al., 2020).

The assumed link between COVID-19 and wildlife trade and consumption has attracted substantial attention worldwide and has catalyzed calls for stronger wildlife trade regulation, ranging from radical wildlife trade bans to more nuanced legislation (Roe et al., 2020). In China, prior to COVID-19, among terrestrial wild animals, only those under first-class protection, second-class protection, and species of important ecological, scientific, and social value (Sanyou species) were generally protected from hunting and consumption (Huang et al., 2021). In response to COVID-19, China banned the consumption of all terrestrial wild animals, including both artificially bred and wild animals; China has also revised and added 517 species to the list of state protected species, revised the list of Sanyou species, removed pangolin scales from the main text of the Chinese pharmacopeia, and revised the Wildlife Protection Law in 2022 (Table 1; MFG, 2020b, 2021b, 2021a, 2022; MOA, 2020; NPC, 2020). Other countries have followed suit, introducing strict controls on wildlife trade and consumption. For example, Vietnam banned the import of wildlife, and Gabon banned the consumption of pangolins (Manidae spp.) and bats (*Chriroptera*) (Marot, 2020; TRAFFIC, 2020). However, there has been pushback against these policies (e.g., Roe et al., 2020) due to the lack of evidence that COVID-19 was transmitted through the wildlife trade and resulting unintended consequences on livelihoods and conservation. Previous public health-related wildlife trade bans (e.g., on bushmeat trade in West Africa) led to wildlife trade going underground and increased mistrust within communities and of external authorities (Bonwitt et al., 2018).

Measures to combat COVID-19, both regarding wildlife trade and public health, will only be effective when based on evidence and with public support. Hence, it is important to understand public sentiment and discourse on wild meat consumption in light of COVID-19 and associated policy changes in China. As in-person interviews and surveys are more challenging in the context of social distancing, social media offers an alternative data source on public discourse (Koh & Liew, 2020). In 2020, Weibo was one of the key platforms for information dissemination and public discussion of topics related to the pandemic in China, which outnumbered other issues; there were over 1 trillion views of the COVID-19-related posts in 2020 (Weibo, 2021). Posts on heavily used platforms such as Twitter and Weibo have been used to understand public sentiments in response to COVID-19 (Kaur et al., 2020; Xia et al., 2020). Regarding wildlife trade, researchers have used social media data to monitor online trade in particular species and people's perceptions, including whether trade dynamics have changed due to events including COVID-19 (Di Minin et al., 2019; Morcatty et al., 2020). China has been at the center of the discussion around wildlife consumption, COVID-19, and policy responses. Chinese social media is a critical platform to understand public opinions in the country (Fu & Chau, 2013), and research has demonstrated that censorship was extremely low for critical commentary related to the COVID-19 pandemic (Lu et al., 2021). Posts on social media platforms have yet to be used to understand public perceptions around wildlife consumption in response to COVID-19.

In this article, we aim to understand public perceptions of wildlife consumption in China using the Chinese social media platform Weibo over a 12-month period spanning pre-COVID (September 2019) to post-COVID (August 2020), defined as the period during which the first main epidemic had passed in China. We sought to answer the following questions:

1. What were the pre-COVID perceptions of wildlife consumption on Weibo?
2. How did perceptions of wildlife consumption change in the period between September 2019 and August 2020 (with reference to the COVID-19 outbreak)?
3. Which types of users discussed issues around wildlife consumption on Weibo over the period September 2019 to August 2020?
4. Which wildlife species were regularly mentioned among the posts, and how do users think that they should be managed in response to COVID-19?

TABLE 1 COVID-19-related policy changes regarding wildlife management in China since February 24, 2020, with the impacts on our focal species.

Category	Summary of policy change	Focal taxon in this research impacted by the change
Wildlife consumption	Before February 24, 2020, nonprotected species could be consumed for food under legitimate licenses of hunting, artificial breeding, quarantine and/or trade (You, 2020). After February 24, 2020, the consumption for food of all terrestrial wild animals, including those that are artificially bred or raised, is banned (NPC, 2020, 2022).	Prior to the February ban, bats not listed in CITES Appendices I and II and farmed snakes were not under state and Sanyou protection and could be consumed. After the ban, it is no longer legal to hunt, farm, and/or consume these species for food.
	In July 2020 and January 2021, the Catalogue of Animal Genetic Resources was published and revised. Terrestrial animal species in the catalogue can be farmed for consumption (MOA, 2020, 2021).	The specified breeds of hybrid offspring of wild pigs are included in the Catalogue; they can be consumed legally.
	In September 2020, the Classified Management of the Wild Animals Consumption Ban was published. Forty-five previously farmed species were required to be disposed of and the owners compensated; a further 19 species were required to be used for other purposes (e.g., medical, research and/or display; MFG, 2020b).	Farmed snakes were disposed of or transferred to other nonedible uses.
Revision of the List of Protected Species (1989)	All species of pangolins were moved from Class two protection to Class 1 protection, which prioritizes their conservation, increases penalties for illegal activities involving the species, and promotes research (MFG, 2020c). 517 more species were added to the List of Protected Species (MFG, 2021a)	Pangolins
	In June 2023, wild pigs were removed from the list of species that have ecological, scientific, and social values (Sanyou species) (MFG, 2023).	Though wild pigs are no longer categorized as protected species, they are still illegal to be consumed.
Revision of the official Chinese pharmacopeia	Pangolin scales were excluded from the 2020 Chinese pharmacopeia's (the compendium of approved medicines in China) key ingredient section. However, they are still permitted to be used in patent medicines (i.e., in specific TCM recipes) (National Pharmacopoeia Committee, 2020).	Pangolins

2 | METHODS

We collected publicly available social media data from Weibo, a microblogging website and software, and one of the biggest social media platforms in China, with over 462 million active users per month (Weibo, 2018). Ethical approval for the research was provided by the University of Oxford (CUREC 1A Approval Ref: R70841/RE001). The term "wildlife", for the purpose of this study, refers to all wild fauna, including those raised in captivity, but excluding wild flora and fungi. We defined "wildlife consumption" as all activities relating to eating wildlife, regardless of the purpose. We used the most common Chinese term for wildlife consumption "野味" (meaning "wild meat") as the key search term and searched Weibo for posts containing the above term between September 1, 2019, and August 31, 2020. We used an automatic web scanning tool, "Bazhuayu" (Bazhuayu, 2022), to collect data on posts, including the time, text, user's name, user's URL, whether the post was an original post or a repost, and if it was a repost, the above information for the original post (illustration of data collection and cleaning process in Figure S1). As Weibo provides 50 pages of results for each search conducted, we started by using a single day as a search unit. If the results exceeded 50 pages, we broke the day down into 24-hour periods (the smallest searching unit on Weibo) and searched each hour of the day separately. We also collected publicly available user data with the same scanning tool (Bazhuayu), including year of birth, gender, and region (at provincial level). This information was self-reported and may be inaccurate. As such, quantitative analysis that used user information included "verified accounts" only, i.e., user identities were verified by Weibo (Fu et al., 2013; Weibo, 2022).

Before analysis, we removed irrelevant posts—those containing the keyword but discussing matters other than wildlife consumption. Since automatic programs could not identify these posts accurately, we randomly sampled 10%

of all posts and manually categorized them as relevant or irrelevant. We recorded the key themes and keywords for each category. Keywords characterizing the irrelevant category included, for example, cars and beauty products. We used these keywords to scan and remove 5199 irrelevant posts (1.1% of all posts) from the entire dataset.

We used both automatic and manual methods to identify and analyze key events, topics, species, and public reactions to wildlife management policies. We used topic modeling in Python with packages "jieba" (Jieba, 2020) for Chinese language text segmentation and "Genism" (Řehůřek & Sojka, 2010) to identify top themes. These two packages are commonly used for Chinese language topic modeling (Chen, 2021). We used the "Genism" package cross-referenced with word frequency software "Weiciyun" to identify species mentioned in the posts; "Weiciyun" is an automatic word count tool for the Chinese language (Weiciyun, 2022).

We selected pangolins, bats, wild pigs (*Sus* spp.) and snakes (*Serpentes*) for manual and in-depth qualitative analysis due to their high frequency of mentions and differing conservation and legal statuses: Pangolins are protected species and illegal to consume as food; all bats and snakes (both farmed and wild) became illegal to consume as food after the 2020 wildlife consumption ban; specified breeds of hybrid wild pig offspring, classified as livestock, were legal to consume before and after the ban; but it is illegal to consume wild-sourced wild pig (Table 1). Based on the context and content of the discussions, we categorized the taxon-specific posts into five themes: disease; conservation; consumption experience; hunting, trade and law enforcement; and farming.

We used Microsoft Excel to calculate Z-scores for gender differences in discussing wildlife consumption posts compared to the overall Weibo user demographics. We used packages "DescTools" (Signorell et al., 2020), "stats" (R Core Team, 2020) and "stargazer" (Hlavac, 2018) in RStudio to run and export a generalized linear model to explore whether certain characteristics of the topic discussed increased the likelihood of directly stated support for or against the wildlife consumption ban introduced in February 2020 (R Core Team, 2020).

3 | RESULTS

3.1 | Key events and topics

We collected 488,016 Weibo posts discussing wildlife consumption from September 1, 2019, to August 31, 2020 (Figure 1). Of these, 51% were categorized by Weibo as original, and 49% as reposts. The first COVID-19-related post appeared on December 31, 2019, reporting that an unknown pneumonia had been discovered in a Wuhan market that sold wild meat. Public discussion on wildlife consumption increased throughout January, peaking in February 2020 with nearly 200,000 posts daily. In March, social media campaigns by NGOs and celebrities, which called for the rejection of wild meat consumption and the protection of wildlife, sparked a large-scale social media

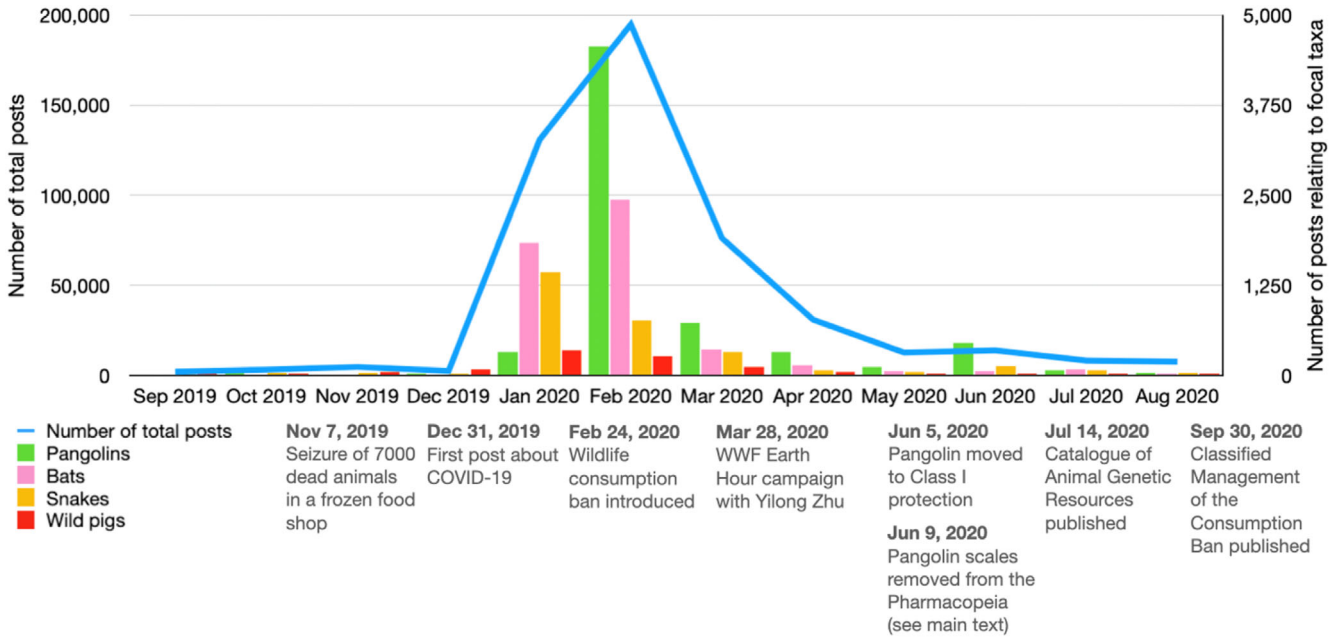

FIGURE 1 Number of Weibo posts on wildlife consumption and focal taxa from September 2019 to August 2020. Key events and policy changes are listed below the timeline.

discussion. This gradually declined from April 2020 but remained higher than in 2019.

In 2019 (except for December 31st), Weibo posts around wildlife consumption mainly discussed "tasty food" (2371 posts, 7% as reposts) and "countryside leisure" (1615 posts, 11% as reposts), including hunting or consuming wildlife as a pleasant experience, and advertising wildlife as special restaurant dishes. A specific seizure event of "a shop which contained 7000 dead animals" also received public attention in November (1699 posts, 83% as reposts).

From December 31, 2019 to August 31, 2020, "refuse wildlife consumption" (131,792 posts, 62% as reposts) was the main theme of online discussion, with users pledging to refuse wild meat to conserve wildlife. The second theme directly linked wildlife consumption with COVID-19 (109,909 posts, 54% as reposts), featuring terms like Wuhan market, face mask and virus. Weibo users also used "wild meat pneumonia" as a nickname for COVID-19 (4645 posts, 33% as reposts), highlighting the potential health risks associated with wildlife consumption. Users also cursed wildlife consumers for causing the pandemic (95,299 posts, 33% as reposts); these were typified by users venting frustration at consumers of wildlife in the country. Posts related to north-eastern China stood out (7353 posts, 9% as reposts), joking about not daring to eat wildlife in the area because animals there including the tiger (*Panthera tigris*) and bears (Ursidae spp.) would treat humans as "wild meat". Apart from wildlife, public attention also spilled over to domestic animals, with appeals to ban the consumption of dog and cat meat (738 posts, 36% as repost).

From March, a WWF advert featuring celebrity Yilong Zhu urging people to "stay away from wildlife consumption and protect the earth" dominated online discussions (35,773 posts, 83% as reposts). Zhu's popularity made his name the top word in word frequency analysis from March onward, overtaking the original search term "wild meat" (野味).

3.2 | User profiles

A total of 306,515 Weibo accounts discussed wildlife consumption in our study period, with 45,844 accounts (15% of all users) verified. Among verified users, 58% were registered as female and 42% male, significantly more female-biased than the overall Weibo user base (43% female; $z = 64.9$, $p < .001$) (NBS, 2011; Weibo Data Center, 2019).

Verified users discussing wildlife consumption were younger compared to the national population (NBS, 2011), based on registered birth years ($N = 16{,}459$), with over 75% aged 15–34, consistent with the general Weibo age distribution (Weibo Data Center, 2019).

Users from eastern coastal provinces were more active in these discussions than those from inland or western provinces. When examining the proportion from each province relative to the total discussants ($N = 26{,}433$), Beijing and Guangdong each accounted for over 10%. This is partly an artifact of the underlying distribution of Weibo users. However, places like Hubei and Shanghai had a higher proportion of users discussing wildlife consumption relative to their general user base. Wuhan, in Hubei province, reported the first COVID-19 cases, while Shanghai is China's largest city. In contrast, a lower percentage of users discussed wildlife consumption in provinces such as Guangxi and Liaoning, despite these provinces being wildlife consumption hotspots identified in previous research (Stoner, 2014; Zhang et al., 2008; Zhang & Yin, 2014).

A small number of Weibo accounts were highly influential, in terms of the number of reposts. The 10 accounts with the most reposts included celebrities, official media accounts, commercial media accounts, medical company, science blogger, and a conservation organization. The account with the most reposts was Yilong Zhu, a Chinese celebrity; his posts had 32,516 reposts; all 10 of these accounts called for "refuse wildlife consumption" (Table S2).

3.3 | Qualitative analysis of topics around key species

More than 79 common wild animal names were mentioned on Weibo (Table S3). Most species were discussed in relation to wildlife trade and consumption, but some (e.g., giant panda *Ailuropoda melanoleuca*) were mentioned in a broader conservation context. Our focal species (pangolins, bats, wild pigs, and snakes) were mentioned in 15,762 posts (34% as reposts), comprising 3.2% of overall posts. Among them, 42.7% mentioned pangolins (56.6% as reposts), 31.7% mentioned bats (17.4% as reposts), 19% mentioned snakes (16.5% as reposts), and 6.6% mentioned wild pigs (14.2% as reposts).

In 2019, the main theme relating to pangolins was conservation, and for wild pigs and snakes, it was the consumption experience. Only one post discussed bats in 2019, which focused on disease risk; all other bat discussion took place in 2020 related to COVID-19 and SARS (Table 2; Figure 2).

Disease risk was the most discussed topic (24.8% of posts). Bats, pangolins, and snakes were assumed to have links with COVID-19, either as a natural reservoir (bats) or intermediate hosts (pangolins and snakes; Zhao

TABLE 2 Discussion themes around pangolins, bats, snakes, and wild pigs over the study period (with the number prior to 31st December 2019 in brackets). Each post contained one or multiple themes. The legality of hunting, trading, farming, and/or consuming the taxa and relevant policy changes is presented in Table 1.

Themes	Description	Example
Disease 3896 posts (2019: 7 posts)	Associate the species with health risks, such as zoonotic diseases and parasites.	"Bats are the natural host of these viruses."
Conservation 3650 posts (2019: 90 posts)	Call for the conservation of the species or call for wildlife conservation.	"In order to conserve the diversity of nature and guard human health, we need to protect pangolin and refuse wild meat!"
Consumption experience 506 posts (2019: 139 posts)	Consumption of the species by the user, his or her acquaintances, or an identifiable person.	"When my family was rich, my father loved wild meat, especially civets, pangolins, and snakes."
Hunting, trade, or law enforcement related to illegal hunting or trade 619 posts (2019:102 posts)	Hunting and/or trade of the species by the user, his or her acquaintances, or an identifiable person. Law enforcement of illegal hunting and/or trade of wildlife.	Hunting: "When I was young, my cousin and I hunted a snake. We were going to eat the snake bile but failed." Hunting: "Ten years ago, my relative was taken to the forest for hunting wild pigs in luxury cars by his business partner." Trade: "In winter, it is not rare to find traders selling wild pigs, pheasants, and roe deer in the countryside markets." Trade: "Wild pig meat is the best festival present. Fed by pure grain. Make reservation by calling..." Law enforcement: "County government's warehouse stored bear paws, wild pigs and owls. Four people were arrested for illegal trade and hunting."
Farming 292 posts (2019: 7 posts)	The farming of the species.	"I am against the ban on snake consumption! Consuming snakes is a tradition for people living in the south, and most of the snakes are farmed!"

et al., 2020). Evidence cited included interviews with officials or research reports (e.g., Xiao et al., 2020). Other zoonotic diseases mentioned included SARS, Ebola, MERS, and HIV. Parasite infection was also raised as a health concern from wild meat consumption, especially among the posts on consuming snakes and wild pigs. However, 146 original posts disputed the wildlife origin of COVID-19 and criticized the resulting stigma against Chinese people.

Conservation was the second most discussed theme (23.2% of posts). Unlike in 2020, there was no mention of bat or wild pig conservation and limited mention of snake conservation in 2019. Pangolin conservation featured heavily in both years, largely due to campaigns like WildAid (1602 posts, 99% as repost) and World Pangolin Day (638 posts, 50.2% as repost) in February 2020.

Posts on wildlife trade regulation enforcement described enforcement such as arrests and prosecutions of poaching, trading, or storing wildlife (Table 2). Live pangolins and their meat and scales were mentioned in enforcement cases, with seizures occurring in southern China, including Guangxi, Guangdong, Yunnan, and Zhejiang. Users also discussed selling pangolin meat online and in restaurants, though it was unclear if enforcement occurred. There were no mentions of bat hunting, farming, or trading. Wild pigs and snakes were often discussed in the context of hunting and trade, with hunting wild pigs viewed as countryside leisure despite its illegality. People also used Weibo as an online marketing space to promote their farmed products and wild meat restaurants, offering farmed wild pig meat and snake cuisine.

All four species groups were mentioned as consumed by Chinese people, in China and/or in other countries (e.g., UK, Italy, and Malaysia). In China, snakes and wild pigs were discussed as being consumed as delicacies; 25 posts noted farmed snakes and five mentioned farmed wild pigs, while the rest of the posts did not specify the source. Pangolin meat consumption was discussed in the context of rich people, social gatherings, and healthcare practices (e.g., pregnancy, childcare, promoting lactation) in China (e.g., in Guangdong, Guangxi, and Hubei), Southeast Asia, and Africa. Bat consumption was strongly disapproved of by Weibo users, as bats were described as virus carriers and natural SARS hosts (see also Lau et al., 2005). There were five notable discussions related to bat consumption Twenty-four posts were about a female Chinese television host consuming a farmed fruit bat in Palau in 2016, among which 15 posts mentioned that her video was misused as evidence of bat

FIGURE 2 Key discussion themes (same as Table 2) around pangolins, bats, snakes, and wild pigs in 2019 and 2020. The contour lines are the number of posts.

consumption in Wuhan and that she was cyberbullied; 9 posts opposed bat consumption entirely, even if they are farmed, due to disease risks and conservation. Four posts discussed bat consumption experiences: two unpleasant (in Guangxi and Guangdong), one favorable (farmed bat), and one with no detail.

3.4 | Public reactions to policy changes regarding focal taxa

Discussion around pangolins, bats, snakes, and wild pigs was all seemingly influenced by China's 2020 wildlife management policies, notably the ban on consuming terrestrial wild animals (Table 1). Weibo users expressed their opinions by both directly commenting on or posting content that aligned with the policies (Table 3). Posts in line with the wildlife consumption ban were dominant (87.0% of relevant posts), though opinions varied by policies and taxonomic groups (Figure S4). Support for policies affecting pangolins was nearly unanimous (99.8% of 3946 posts, 66.1% as reposts), both around banning consumption and promoting pangolin conservation. Similarly, 96.0% of 378 posts (18.8% as reposts) directly or implicitly supported the bat consumption ban, often noting their "terrifying" appearance and high disease risk. In contrast, wild pigs (14.6% of 151 posts, 22.7% as reposts) and snakes (18.7% of 412 posts, 41.6% as reposts) saw more opposition; both are seen as common delicacies. While farming, trading, and eating hybrid wild pigs are legal, the consumption of all snake species has been banned, causing concerns over impacts on the wildlife farming industry and food choices (Table 3).

While the consumption of terrestrial wild animals for food is banned, their use in medicine, display and research is still permitted. Posts debated the use of wild animals in traditional Chinese medicine (TCM), focusing on pangolin scales, snake gallbladders, bat feces and wild

TABLE 3 Examples of opinions toward the ban on consuming wildlife for food in response to COVID-19.

Categories of reactions	Examples
In line with the ban 4249 posts, 62.2% as repost	"To conserve biodiversity and protect human health, let's protect pangolin and reject wild meat!"
Directly support the ban 411 posts, 19.0% as repost	"Finally there is a regulation banning wildlife consumption! I don't understand why people want to eat wild animals! Bats look so terrible to eat..."
Not in line with the ban 25 posts, 52% as repost	"Wildlife consumption is a food culture that lasts for thousands of years. We don't know yet if COVID-19 emerged from wildlife consumption."
Directly against the ban 98 posts, 30.6% as repost	"Appeal from the snake farmers: no blanket ban on wildlife consumption!"
Neutral attitude 106 posts, 17.9% as repost	#Hubei banned wildlife consumption# "I want to know what counted as wild meat? Does wild pig count?"

TABLE 4 Generalized linear model for the association between attitude to the wildlife consumption ban (reference level: Directly support the ban) and other contents of a given post (reference levels for each topic: No mention).

	Coefficient	SE
Discuss wildlife conservation *Reference: No mention*	−3.063**	1.180
Discuss consumption behaviors *Reference: No mention*	0.546	1.859
Discuss disease risks *Reference: No mention*	−1.057	.664
Discuss wildlife farming *Reference: No mention*	4.736***	.468
Discuss hunting and trading wildlife *Reference: No mention*	0.795	.903
Discuss TCM *Reference: No mention*	0.926	1.002
Discuss the definition of wild meat *Reference: No mention*	2.654***	.987
Discuss that COVID-19 did not originate from wild meat *Reference: No mention*	4.022***	.701
Observations	509	
Log Likelihood	−105.360	
Akaike Inf. Crit.	228.721	

Note: A negative coefficient means that users who mention a particular topic are more likely to directly support the ban (so, for example, those mentioning conservation are significantly more likely to directly support the ban). The number of posts directly against the ban was 98, out of a total of 509. Details of hypotheses are in Table S5.
*Indicates statistical significance.
**$p < .05$; ***$p < .01$.

pig meat. Pangolins were most discussed (402 posts, 75.1% as reposts), followed by bats (40 posts, 2.5% as reposts), snakes (20 posts, 15% as reposts) and wild pigs (1 post). Of 442 posts giving opinions about TCM, 21% were in favor of, or defended, TCM, while 79% showed opposition. Divergent opinions existed depending on the taxon. Support was highest for snakes (40%), followed by pangolins (19.4%), and bats (17.5%). The single wild pigs post was neutral in sentiment.

Opinions on TCM related to the focal taxa clustered around three topics: wildlife consumption (70 posts, 40% as repost), wildlife conservation (106 posts, 60.4% as repost), and TCM effectiveness (209 posts, 89.5% as repost) (Table S6). Regarding wildlife consumption, users stated that it was hard to delineate TCM from wildlife consumption (43 posts, 28% as repost), as people may consume wildlife products for health reasons (e.g., snake gallbladders in raw, cooked, or wine form). However, other posts defended TCM by pointing out that the classic TCM literature such as the Compendium of Materia Medica was against the consumption of wildlife, as wild animals could be poisonous and make people ill (27 posts, 59.3% as repost).

Discussion on TCM and wildlife conservation centered on pangolins (105 out of 106 posts). Seventy-three posts (47.9% as repost) argued that TCM threatened wild pangolins, given that farmed pangolin scales were not available, and therefore called for pangolins and wildlife products to be excluded from TCM. When pangolin scales were removed from the main section of the 2020 TCM pharmacopeia, 167 posts (31.1% as repost) supported the policy, but one was against, claiming TCM was scapegoated for pangolin population declines. No post discussed patented medicines, which still contain pangolin scales and are still legal to trade (see also National Pharmacopoeia Committee, 2020). This is perhaps because the full details of this change were not immediately apparent. Additionally, 32 posts (90.6% as repost) defended TCM, blaming wildlife consumption and the Wenwan subculture (Wenwan means toys of culture and sophistication; some Wenwan items involve animal body parts, such as the pangolin scale) rather than TCM for threatening the species.

The third category of discussion addressed TCM effectiveness. Three posts recognized the positive effect of wildlife ingredients (e.g., pangolin scales and snake gallbladders), three endorsed TCM for curing SARS and COVID-19 patients. However, 203 posts questioned its

effectiveness, stating pangolin scales were no different from human nails or pig hooves (201 posts, 92% as repost).

Overall, among posts that discussed the wildlife consumption ban directly (509 posts), users that mentioned "wildlife farming", "COVID-19 is not from wild meat" and that questioned the definition of wild meat (e.g., whether aquatic species and farmed wild animals are included) were less likely to support the ban, while posts mentioning "wildlife conservation" more likely to be in favor of it (Table 4). Weibo users also suggested that the ban represented an admission that Chinese consumption of wild meat caused the emergence of COVID-19 and would therefore damage the image of China and Chinese people.

4 | DISCUSSION

Social media has become a public arena for information dissemination, open debate, and educational campaigns in China and elsewhere, and it can capture a large amount of data for understanding public perceptions across time and geographical range and enable before-and-after comparisons. The posts collected in this study reflected behaviors and attitudes regarding wildlife consumption and how they shifted with key events, in particular the COVID-19 pandemic and related wildlife policy changes. Our research demonstrates that policymakers and conservationists can use social media to gain an understanding of public perceptions of wildlife use and trade to support the design of policies and information campaigns to safeguard public health, livelihoods, and biodiversity.

4.1 | The characteristics of social media users and implications for conservation

Social media is a new data source for monitoring and understanding public perceptions around conservation issues (Di Minin et al., 2019). In this research, 12 months of Weibo posts on wildlife consumption provided insights about people's reasons for consuming wildlife (or not), the species consumed, reactions to wildlife management policy changes, and how these varied across time and space and between demographic groups.

While there are many advantages of using social media data, it is worth noting the issue of censorship. On Chinese social media such as Weibo, censorship may take the forms of blocking certain keywords which will lead to no search results, rendering posts invisible for others, or deleting posts, either manually or automatically (Ng, 2014). Political uprisings, political scandals, politicians' names, and pornography are among the frequently censored categories; in contrast, crisis-related topics (e.g., rainstorm) and environmental issues that have been acknowledged by the authorities can be openly debated on Weibo (Arefi et al., 2019; Fu et al., 2013; King et al., 2013; Rauchfleisch & Schäfer, 2015). Furthermore, Lu et al. (2021) used the Weiboscope-COV dataset (Fu & Zhu, 2020) and found an extremely low occurrence of censorship, even among the most critical posts related to the COVID-19 pandemic; the Weiboscope-COV used dataset covers predefined keywords, including the terms "bat" and "pangolin," which are pertinent to this study (Fu & Zhu, 2020). Therefore, it was unlikely that this study was influenced by censorship in any meaningful way, given that the keyword "wild meat" (野味) was not blocked during the study period, the contents were related to environmental issues which are typically uncensored, and the extremely low rates of censorship on Weibo related to COVID-19. On the other hand, we need to be aware of other limitations. Reasons why wild meat-related posts might not be found in our search include (i) if users adopted strict self-censorship and did not wish to express their opinions on these topics on Weibo, (ii) if a post contained other terms which did fall foul of censorship, or (iii) if users used coded language to describe "wild meat" to avoid censorship. However, we have no reason to believe that these issues were prevalent.

It is important to be aware of the accuracy and unmeasured bias of social media data (Dobson et al., 2020), and the views presented on social media should not be extrapolated to the overall population. In this research, we analyzed data from user accounts verified by the social media platform only, to improve the accuracy of our research and results. However, user characteristics, such as whether they have consumed wild meat and whether they have been targeted by conservation campaigns, are unknown. Nonetheless, our results show that young, female Weibo users from Eastern provinces disproportionately discussed wildlife consumption. This was partially due to the underlying distribution of Weibo users, as young users from Eastern provinces predominate; but the discussion was significantly more female-biased, compared to the overall gender distribution where men comprised the majority (Weibo Data Center, 2019). These results correspond with previous studies suggesting that women place greater importance on wildlife conservation, and young adults (18–29 years old) are more likely to post on social media (Czech et al., 2001; Toivonen et al., 2019). However, there was a mismatch between those active in the online discussion and those who are more likely to consume wildlife. For example, research indicates that men are the main consumers of wildlife in China (Zhang et al., 2008), and the

level of discussion in southwest provinces such as Guangxi and Yunnan was comparatively low, despite these places being hotspots for wildlife consumption (Zhang et al., 2008; Zhang & Yin, 2014). Regarding potential interventions, conservation organizations could identify geographical and demographic hot and cold spots such as these, and design targeted campaigns, to reach men and Weibo users in western provinces where there is a recognized need to change consumer behavior to achieve sustainability in wildlife trade. Our results showed a high rate of reposts for breaking news and conservation campaigns. Fan groups were very active in reposting the messages from celebrities who collaborated with environmental NGOs and called for an end to wildlife consumption, potentially making Weibo users more aware of the illegality of consuming many wildlife products. However, it remains uncertain whether such reposts actually change consumer behavior due to the complex nature of behavior change (Thomas-Walters et al., 2020). Therefore, the extent to which celebrities contribute to conservation outcomes is unclear (Olmedo et al., 2020).

Social media platforms are also digital marketplaces for wildlife products (Siriwat & Nijman, 2020). Users posted on Weibo about hunting experiences, advertisements for both farmed and wild-sourced animals, and the promotion of wild meat restaurants. These posts provided valuable data about the scale, species involved (Table S3), and awareness of the legality of online wild meat trade. However, these data need to be interpreted carefully because clandestine activities such as illegal wildlife trade may not actually be posted about publicly, making it difficult to determine whether trade discussed online actually took place (Dobson et al., 2020). On the other hand, users who were supportive of wildlife conservation used Weibo to report illegal activities, tag governmental agencies, and call for enforcement action. If these calls receive online public attention, it may spur government agencies to take enforcement action and report the results back to the public on Weibo. To better utilize this online space, government agencies, social media operators, and environmental NGOs could design an online reporting system or collaborate with existing networks such as the Coalition to End Wildlife Trafficking Online (Coalition, 2021), where users can report illegal activities directly on the social media platform and monitor the progress of enforcement activities.

4.2 | Understanding wildlife consumption in China through Weibo posts

In China, consuming wildlife is a cultural and social practice and is generally no longer done for subsistence purposes. Before December 31, 2019 (the day when the first post discussing wildlife consumption and COVID-19 appeared), wildlife consumption was regularly posted about on Weibo, and was linked with tasty food, authentic countryside experiences, travel, and social gatherings. Studies have shown that curiosity and rarity were among the reasons for wildlife consumption (Zhang et al., 2008). These motivations are different from consuming wild meat as an essential protein source. This is partly borne out by the price of wild meat in China, which is higher than that of red meat (Cawthorn & Hoffman, 2015). Our research indicates that, over our study period, discussions about wildlife consumption on Weibo changed from focusing on wildlife as tasty food and rare experiences to zoonotic diseases and wildlife conservation, suggesting changing public perceptions and sentiments in response to the COVID-19 pandemic and new wildlife management policies. Our results also show that the collective attention dynamics peaked in February 2020 and then declined, consistent with other studies on Weibo and Twitter that found a decay and dilution of public attention toward COVID-related topics after their peak in early 2020 (Alshaabi et al., 2021; Cui & Kertész, 2021). This decline in discussion does not imply that public perceptions will return to pre-COVID levels. Experimental studies have shown that exposure to social media can lead to attitude change, particularly under conditions of information overload (Wang et al., 2021), as was the case with wild meat discussion on social media during our study period.

On the other hand, Weibo posts showed that people consumed wildlife for health treatments. This consumption was sometimes related to TCM beliefs, where food and medicine are connected, and everything that is ingested has a health effect (Zhu & Zhu, 2020). However, TCM is complex and was a debated concept on Weibo. While the official Chinese pharmacopeia no longer includes threatened species such as the tiger, rhinos (Rhinocerotidae spp.) and pangolins as key ingredients for TCM, illegal and unsustainable use of wildlife still exists in folk beliefs and practices, such as consuming raw snake gallbladders and pangolin meat, as mentioned by Weibo users. TCM was associated with wildlife conservation in Weibo discussions, and both positive and negative views were expressed by users. The association between attitudes toward TCM and the wildlife consumption ban did not show statistical significance, as the relationship is complex and could work both ways; therefore, more research is needed. Given this complexity, wildlife conservation efforts linked to TCM need to be aware of the cultural background and varied public opinions, recognize the heterogeneity of TCM and TCM users, and seek common ground with TCM stakeholders (Cheung et al., 2020).

4.3 | Post COVID-19 wildlife management in China

During our study period, the COVID-19 pandemic led to huge amounts of attention and discussion on wildlife management in China. Chinese scientists, official media channels, environmental NGOs and celebrities all called for an end to wild meat consumption, given the potential disease risks and the need to conserve wildlife. Weibo posts related to "refuse wild meat consumption" became the primary theme and took up more than a quarter of the overall discussion of wild meat in our study. Posts supportive of the wildlife consumption ban were also in the majority among the posts related to our four focal taxa (despite consumption of wild pigs having no known relationship to COVID-19). The overwhelming support for stopping wild meat consumption on Weibo aligned with an online survey of 74,040 respondents conducted during COVID-19, which found that among the 12.3% of respondents who had previously consumed wild meat, 95.1% indicated they would no longer consume it (Shi et al., 2020). These results suggest the public support the consumption ban. Other studies have also demonstrated that survey respondents reported a decline in wildlife consumption or other behaviors after COVID-19 due to factors such as concerns about disease risks, limited access to wild meat and conservation (Li & Wang, 2021; Liu et al., 2020; Rizzolo et al., 2023; Si et al., 2021), which showed support for this ban and its potential impact.

However, there was opposition to the ban from Weibo users. The debate centered on whether farmed animals should be considered as wild meat and therefore banned or not. Previous surveys showed that 29.6% of 1352 respondents agreed that farmed wildlife should be used for food consumption while wild-sourced animals should not, in comparison to 6.8% of respondents who believed both should be consumed (Zhang et al., 2008). Further debate related to the wildlife farming industry, which was once promoted by local governments as a poverty relief strategy. Despite the government compensating individuals in the farming industry for losses incurred (MFG, 2020a), Weibo users argued that the ban ignored livelihood issues and food choices, and may prove negative for wildlife conservation if consumers turn to wild-sourced animals instead. Weibo users also argued that it was unclear whether the virus came from wild meat consumption and believed that the ban was a rushed decision by the Chinese government. These opinions emerging from Weibo provided instant and more nuanced responses for understanding public reactions to the management of wild meat than surveys or questionnaires can achieve, which usually have a time delay related to the specific policy event and mostly center around predefined issues such as food safety, wild meat access, and conservation (Li & Wang, 2021; Liu et al., 2020; Rizzolo et al., 2023; Si et al., 2021).

Will the wild meat consumption ban fulfill its aim of protecting human health and conserving wildlife? The answer is unclear. Wildlife consumption in China has posed severe threats to wildlife; however, wildlife is generally not consumed for subsistence purposes in the country, and existing regulations have not led to effective and safe management of all legal wild meat trade for consumption (Xiao et al., 2021). More stringent legislation could, in theory, have value for conserving wildlife and securing public health if it is enforced adequately and seen to be legitimate by relevant stakeholders along wild meat supply chains. On the other hand, wildlife consumption is only one channel for zoonotic disease transmission, and emerging infectious diseases may emerge from other interactions between humans and wild and/or domestic animals, such as industrialized livestock production, deforestation, and the expansion of agriculture (di Marco et al., 2020; Haider et al., 2020; Morse et al., 2012). Moreover, wildlife consumption in China is deeply intertwined with food culture and TCM (Cheung et al., 2020; Zhu & Zhu, 2020), and a strict ban could simply lead to trade going underground, increasing the difficulty of management and potentially the risk of infectious disease emergence ('t Sas-Rolfes et al., 2019).

Recognizing the uncertainty of the effectiveness of the ban, both the ban and associated wildlife management policies may be a step forward. Compared with previous wildlife consumption measures in China and elsewhere, these policies could be more successful, given widespread public support and the structural change to the wildlife legislation which it has engendered, such as the first revision of the list of protected species in 30 years (Koh et al., 2021). However, the implementation of such regulations requires an understanding of the potential impact on biodiversity, including feedback mechanisms (e.g., incentives for illegal trade), and whether or not there is likely to be support for, and compliance with, such measures among key stakeholders in the short-, mid-, and longer term (Roe et al., 2020).

5 | CONCLUSION

COVID-19 has shifted the public debate on wildlife consumption in China on an influential and widely used social media platform and increased risk perceptions of wildlife consumption and advocacy efforts from the government, NGOs, and celebrities geared at stopping wildlife consumption. Despite a drop in public discussion during the later phase of our study period, it is unlikely that attitudes toward wild meat will return to prepandemic levels,

as refusing wild meat has become a mainstream online discourse, and large-scale structural policy changes have increasingly associated its consumption with illegality. In the long run, whether changing attitudes among Weibo users will translate into changes in consumer behavior concerning wildlife will depend upon the enforcement of the ban and implementation of associated policies, including identification and characterization of particular consumer groups, targeted conservation interventions, enhanced public participation, and mainstreaming of wildlife conservation into the public discourse, from high-level policy-making to individual decision-making.

AUTHOR CONTRIBUTIONS

Yuhan Li: Conceptualization, methodology, software, data curation, formal analysis, writing—original draft, visualization. Yang Zhang: Methodology, software, data curation. Daniel W.S. Challender: Conceptualization, methodology, formal analysis, writing—review and editing, visualization, supervision. E.J. Milner-Gulland: Conceptualization, methodology, formal analysis, writing—review and editing, visualization, supervision.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

Due to the identifiable nature of social media data, and in order to protect user privacy, the datasets used in this study will not be made publicly available.

ETHICS STATEMENT

Ethical approval for the research was received from the University of Oxford (CUREC 1A Approval Ref: R70841/RE001).

ORCID

Yuhan Li https://orcid.org/0000-0002-6620-9654
Daniel W. S. Challender https://orcid.org/0000-0002-0606-1715
Yang Zhang https://orcid.org/0009-0005-0208-2964
E. J. Milner-Gulland https://orcid.org/0000-0003-3243-2710

REFERENCES

't Sas-Rolfes, M., Challender, D. W., Hinsley, A., Veríssimo, D., & Milner-Gulland, E. J. (2019). Illegal wildlife trade: Scale, processes, and governance. *Annual Review of Environment and Resources*, *44*(1), 201–228. https://doi.org/10.1146/annurev-environ-101718-033253

't Sas-Rolfes, M., Emslie, R., Adcock, K., & Knight, M. (2022). Legal hunting for conservation of highly threatened species: The case of African rhinos. *Conservation Letters*, *15*(3), e12877. https://doi.org/10.1111/conl.12877

Alshaabi, T., Arnold, M. V., Minot, J. R., Adams, J. L., Dewhurst, D. R., Reagan, A. J., Muhamad, R., Danforth, C. M., & Dodds, P. S. (2021). How the world's collective attention is being paid to a pandemic: COVID-19 related n-gram time series for 24 languages on twitter. *PLoS One*, *16*(1), e0244476. https://doi.org/10.1371/journal.pone.0244476

Arefi, M. N., Pandi, R., Tschantz, M. C., Crandall, J. R., Fu, K., Qiu Shi, D., & Sha, M. (2019). Assessing post deletion in sina weibo: multi-modal classification of hot topics. In *Conference on Empirical Methods in Natural Language Processing*. arXiv preprint arXiv:1906.10861.

Bazhuayu. (2022). https://www.bazhuayu.com/

Bonwitt, J., Dawson, M., Kandeh, M., Ansumana, R., Sahr, F., Brown, H., & Kelly, A. H. (2018). Unintended consequences of the "bushmeat ban" in West Africa during the 2013–2016 Ebola virus disease epidemic. *Social Science and Medicine*, *200*-(September 2017), 166–173. https://doi.org/10.1016/j.socscimed.2017.12.028

Cawthorn, D. M., & Hoffman, L. C. (2015). The bushmeat and food security nexus: A global account of the contributions, conundrums and ethical collisions. *Food Research International*, *76*(P4), 906–925. https://doi.org/10.1016/j.foodres.2015.03.025

Chen, C. (2021). *Chinese Keyword Extraction*. https://github.com/fxsjy/jieba

Cheung, H., Doughty, H., Hinsley, A., Hsu, E., Lee, T. M., Milner-Gulland, E. J., Possingham, H. P., & Biggs, D. (2020). Understanding traditional Chinese medicine to strengthen conservation outcomes. *People and Nature*, *3*(1), 115–128. https://doi.org/10.1002/pan3.10166

Coalition. (2021). 2021 Progress Update – Coalition to End Wildlife Trafficking Online. https://www.endwildlifetraffickingonline.org/2021-progress-update

Cui, H., & Kertész, J. (2021). Attention dynamics on the Chinese social media Sina Weibo during the COVID-19 pandemic. *EPJ Data Science*, *10*(1), 8. https://doi.org/10.1140/epjds/s13688-021-00263-0

Czech, B., Devers, P. K., & Krausman, P. R. (2001). The relationship of gender to species conservation attitudes. *Wildlife Society Bulletin*, *29*(1), 187–194.

di Marco, M., di Marco, M., Baker, M. L., Daszak, P., de Barro, P., Eskew, E. A., Godde, C. M., Harwood, T. D., Herrero, M., Hoskins, A. J., Johnson, E., Karesh, W. B., Machalaba, C., Garcia, J. N., Paini, D., Pirzl, R., Smith, M. S., Zambrana-Torrelio, C., & Ferrier, S. (2020). Sustainable development must account for pandemic risk. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(8), 3888–3892. https://doi.org/10.1073/pnas.2001655117

di Minin, E., Fink, C., Hiippala, T., & Tenkanen, H. (2019). A framework for investigating illegal wildlife trade on social media with machine learning. *Conservation Biology*, *33*(1), 210–213. https://doi.org/10.1111/cobi.13104

Dobson, A. D. M., Milner-Gulland, E. J., Aebischer, N. J., Beale, C. M., Brozovic, R., Coals, P., Critchlow, R., Dancer, A.,

Greve, M., Hinsley, A., Ibbett, H., Johnston, A., Kuiper, T., Le Comber, S., Mahood, S. P., Moore, J. F., Nilsen, E. B., Pocock, M. J. O., Quinn, A., … Keane, A. (2020). Making messy data work for conservation. *One Earth*, *2*(5), 455–465. https://doi.org/10.1016/j.oneear.2020.04.012

Fu, K., Chan, C., & Chau, M. (2013). Assessing censorship on microblogs in China: Discriminatory keyword analysis and the real-name registration policy. *IEEE Internet Computing*, *17*(3), 42–50. https://doi.org/10.1109/MIC.2013.28

Fu, K., & Zhu, Y. (2020). Did the world overlook the media's early warning of COVID-19? *Journal of Risk Research*, *23*(7–8), 1047–1051. https://doi.org/10.1080/13669877.2020.1756380

Fu, K. W., & Chau, M. (2013). Reality check for the Chinese microblog space: A random sampling approach. *PLoS One*, *8*(3), e58356. https://doi.org/10.1371/journal.pone.0058356

Haider, N., Rothman-Ostrow, P., Osman, A. Y., Arruda, L. B., Macfarlane-Berry, L., Elton, L., Thomason, M. J., Yeboah-Manu, D., Ansumana, R., Kapata, N., & Mboera, L. (2020). COVID-19—Zoonosis or emerging infectious disease? *Frontiers in Public Health*, *8*(November), 1–8. https://doi.org/10.3389/fpubh.2020.596944

Hlavac, M. (2018). 'stargazer: Well-Formatted Regression and Summary Statistics Tables'.

Hu, B., Zeng, L. P., Yang, X. L., Ge, X. Y., Zhang, W., Li, B., Xie, J. Z., Shen, X. R., Zhang, Y. Z., Wang, N., Luo, D. S., Zheng, X. S., Wang, M. N., Daszak, P., Wang, L. F., Cui, J., & Shi, Z. L. (2017). Discovery of a rich gene pool of bat SARS-related coronaviruses provides new insights into the origin of SARS coronavirus. *PLoS Pathogens*, *13*(11), e1006698.

Huang, Q., Wang, F., Yang, H., Valitutto, M., & Songer, M. (2021). Will the COVID-19 outbreak be a turning point for China's wildlife protection: New developments and challenges of wildlife conservation in China. *Biological Conservation*, *254*, 108937. https://doi.org/10.1016/j.biocon.2020.108937

Ingram, D. J., Coad, L., Milner-Gulland, E. J., Parry, L., Wilkie, D., Bakarr, M. I., Benítez-López, A., Bennett, E. L., Bodmer, R., Cowlishaw, G., & El Bizri, H. R. (2021). Wild meat is still on the menu: Progress in wild meat research, policy, and practice from 2002 to 2020. *Annual Review of Environment and Resources*, *46*, 221–254. https://doi.org/10.1146/annurev-environ-041020

Ji, W., Wang, W., Zhao, X., Zai, J., & Li, X. (2020). Cross-species transmission of the newly identified coronavirus 2019-nCoV. *Journal of Medical Virology*, *92*(4), 433–440. https://doi.org/10.1002/jmv.25682

Jieba. (2020). "Jieba" Chinese text segmentation: built to be the best Python Chinese word segmentation module.

Kaur, S., Kaul, P., & Zadeh, P. M. (2020). ScienceDirect monitoring monitoring the the dynamics dynamics of of emotions emotions during during COVID-19 COVID-19 using using twitter data twitter data. *Procedia Computer Science*, *177*, 423–430. https://doi.org/10.1016/j.procs.2020.10.056

King, G., Pan, J., & Roberts, M. E. (2013). How censorship in China allows government criticism but silences collective expression. *American Political Science Review*, *107*(2), 326–343. https://doi.org/10.1017/S0003055413000014

Koh, J. X., & Liew, T. M. (2020). How loneliness is talked about in social media during COVID-19 pandemic: Text mining of 4,492 twitter feeds. *Journal of Psychiatric Research*, *145*, 317–324. https://doi.org/10.1016/j.jpsychires.2020.11.015

Koh, L. P., Li, Y., & Lee, J. S. H. (2021). The value of China's ban on wildlife trade and consumption. *Nature Sustainability*, *4*(1), 2–4. https://doi.org/10.1038/s41893-020-00677-0

Lam, T. T.-Y., Jia, N., Zhang, Y. W., Shum, M. H., Jiang, J. F., Zhu, H. C., Tong, Y. G., Shi, Y. X., Ni, X. B., Liao, Y. S., & Li, W. J. (2020). Identification of 2019-nCoV related coronaviruses in Malayan pangolins in southern China. *Nature*, *583*, 282–285. https://doi.org/10.1038/s41586-020-2169-0

Lau, S. K. P., Woo, P. C. Y., Li, K. S. M., Huang, Y., Tsoi, H.-W., Wong, B. H. L., Wong, S. S. Y., Leung, S.-Y., Chan, K.-H., & Yuen, K.-Y. (2005). Severe acute respiratory syndrome coronavirus-like virus in Chinese horseshoe bats. *Proceedings of the National Academy of Sciences of the United States of America*, *102*(39), 14040–14045. https://doi.org/10.1073/pnas.0506735102

Li, Z., & Wang, H. (2021). Consumer behavior and wild animal consumption in China. *The Chinese Economy*, *54*(6), 389–401. https://doi.org/10.1080/10971475.2021.1890357

Liu, S., Ma, Z. F., Zhang, Y., & Zhang, Y. (2020). Attitudes towards wildlife consumption inside and outside Hubei Province, China, in relation to the SARS and COVID-19 outbreaks. *Human Ecology*, *48*(6), 749–756. https://doi.org/10.1007/S10745-020-00199-5/TABLES/5

Lu, Y., Pan, J., & Xu, Y. (2021). *Public Sentiment on Chinese Social Media during the Emergence of COVID-19*. Rochester, NY. https://doi.org/10.2139/ssrn.3757135

Marot, C. (2020). Du pangolin à la chauve-souris, la viande de brousse sur liste noire [in French]. Jeuneafrique https://www.jeuneafrique.com/996696/societe/du-pangolin-a-la-chauve-souris-la-viande-de-brousse-sur-liste-noire/

McRae, L., Freeman, R., Geldmann, J., Moss, G. B., Kjær-Hansen, L., & Burgess, N. D. (2022). A global indicator of utilized wildlife populations: Regional trends and the impact of management. *One Earth*, *5*(4), 422–433. https://doi.org/10.1016/j.oneear.2022.03.014

MFG. (2020a). Ministry of Forestry and Grassland Requires to Complete the Succeeding Works of Wildlife Consumption Ban Before the End of September [in Chinese]. http://www.forestry.gov.cn/main/586/20200828/085553708891202.html

MFG. (2020b). Notice of the Ministry of Forestry and Grassland on the Classified Management of the Wild Animals Consumption Ban [In Chinese]. http://www.gov.cn/zhengce/zhengceku/2020-10/06/content_5549490.htm

MFG. (2020c). Notice of the Protection Level Change of Pangolins [in Chinese]. http://www.forestry.gov.cn/main/5460/20200611/092327112948854.html

MFG. (2021a). Announcement from Ministry of Forestry and Grassland and Ministry of Agriculture and Rural Affairs on List of Key Protected Wild Animals. http://www.forestry.gov.cn/main/5461/20210205/122418860831352.html

MFG. (2021b). Opinion Solicitation on List of Species of Important Ecological, Scientific, and Social Value. http://www.forestry.gov.cn/main/4461/20211210/101145329663518.html

MFG. (2023). Newly Adjusted List of Sanyou Species. http://www.forestry.gov.cn/lyj/1/lcdt/20230704/510063.html

MOA. (2020). Ministry of Agriculture and Rural Affairs announces National Animal Genetic Resources Catalog [in Chinese]. http://www.moa.gov.cn/nybgb/2020/202006/202007/t20200714_6348537.htm

MOA. (2021). Publication of the Catalogue of Animal Genetic Resources (2021). http://www.moa.gov.cn/govpublic/nybzzj1/202101/t20210114_6359937.htm

Morcatty, T. Q., Feddema, K., Nekaris, K. A. I., & Nijman, V. (2020). Online trade in wildlife and the lack of response to COVID-19. *Environmental Research*, *193*, 110439. https://doi.org/10.1016/j.envres.2020.110439

Morse, S. S., Mazet, J. A. K., Woolhouse, M., Parrish, C. R., Carroll, D., Karesh, W. B., Zambrana-Torrelio, C., Lipkin, W. I., & Daszak, P. (2012). Prediction and prevention of the next pandemic zoonosis. *The Lancet*, *380*(9857), 1956–1965. https://doi.org/10.1016/S0140-6736(12)61684-5

National Pharmacopoeia Committee. (2020). *Pharmacopoeia of the People's Republic of China* Beijing. China Medical Science Press.

NBS. (2011). Tabulation of the 2010 Population Census of the People's Republic of China [in Chinese]. http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/indexch.htm

Ng, J. (2014). *Blocked on weibo: What gets suppressed on China's version of twitter (and why)*. The New Press.

NPC. (2020). Decision of the Standing Committee of the National People's Congress on banning illegal wildlife trade, the consumption of wild animals and protecting people's health and safety [in Chinese]. http://www.npc.gov.cn/npc/c30834/202002/c56b129850aa42acb584cf01ebb68ea4.shtml

NPC. (2022). Wildlife Protection Law of People's Republic of China. http://www.forestry.gov.cn/main/586/20221231/161051624730493.html

Olmedo, A., Milner-Gulland, E. J., Challender, D. W. S., Cugnière, L., Dao, H. T. T., Nguyen, L. B., Nuno, A., Potier, E., Ribadeneira, M., Thomas-Walters, L., Wan, A. K. Y., Wang, Y., & Veríssimo, D. (2020). A scoping review of celebrity endorsement in environmental campaigns and evidence for its effectiveness. *Conservation Science and Practice*, *2*(10), 1–15. https://doi.org/10.1111/csp2.261

R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing.

Rauchfleisch, A., & Schäfer, M. S. (2015). Multiple public spheres of Weibo: A typology of forms and potentials of online public spheres in China. *Information, Communication & Society*, *18*(2), 139–155. https://doi.org/10.1080/1369118X.2014.940364

Řehůřek, R., & Sojka, P. (2010). *Software Framework for Topic Modelling with Large Corpora*. ELRA.

Rizzolo, J. B., Zhu, A., & Chen, R. (2023). Wildlife consumption, health, and zoonotic disease in China after the emergence of COVID-19. *EcoHealth*, *20*(3), 323–342. https://doi.org/10.1007/S10393-023-01651-W/TABLES/3

Roe, D., Dickman, A., Kock, R., Milner-Gulland, E. J., Rihoy, E., & 't Sas-Rolfes, M. (2020). Beyond banning wildlife trade: COVID-19, conservation and development. *World Development*, *136*, 105121. https://doi.org/10.1016/j.worlddev.2020.105121

Shi, X., Zhang, X. C., Xiao, L. Y., Li, B. V., Liu, J. M., Yang, F. Y., Zhao, X., Cheng, C., & Lü, Z. (2020). Public perception towards wildlife consumption and trade during the COVID-19 outbreak [in Chinese]. *Biodiversity Science*, *28*(5), 630–643. https://doi.org/10.17520/biods.2020134

Si, R., Lu, Q., & Aziz, N. (2021). Impact of COVID-19 on peoples' willingness to consume wild animals: Empirical insights from China. *One Health*, *12*, 100240. https://doi.org/10.1016/J.ONEHLT.2021.100240

Signorell, A., Aho, K., Alfons, A., Anderegg, N., Aragon, T., Arppe, A., Baddeley, A., Barton, K., Bolker, B., & Borchers, H. W. (2020). DescTools: Tools for descriptive statistics.

Siriwat, P., & Nijman, V. (2020). Wildlife trade shifts from brick-and-mortar markets to virtual marketplaces: A case study of birds of prey trade in Thailand. *Journal of Asia-Pacific Biodiversity*, *13*(3), 454–461. https://doi.org/10.1016/j.japb.2020.03.012

Stoner, S. (2014). Tigers: Exploring the threat from illegal online trade. *TRAFFIC Bulletin*, *26*(1), 26–30.

Thomas-Walters, L., Veríssimo, D., Gadsby, E., Roberts, D., & Smith, R. J. (2020). Taking a more nuanced look at behavior change for demand reduction in the illegal wildlife trade. *Conservation Science and Practice*, *2*(9), e248. https://doi.org/10.1111/csp2.248

Toivonen, T., Heikinheimo, V., Fink, C., Hausmann, A., Hiippala, T., Järv, O., Tenkanen, H., & di Minin, E. (2019). Social media data for conservation science: A methodological overview. *Biological Conservation*, *233*(April), 298–315. https://doi.org/10.1016/j.biocon.2019.01.023

TRAFFIC. (2020). Vietnam issues ban on wildlife imports & announces closure of illegal wildlife markets. https://www.traffic.org/news/viet-nam-issues-ban-on-wildlife-imports-announces-closure-of-illegal-wildlife-markets/

Wang, Y., Dai, Y., Li, H., & Song, L. (2021). Social media and attitude change: Information booming promote or resist persuasion? *Frontiers in Psychology*, *12*, 596071. https://doi.org/10.3389/fpsyg.2021.596071

Weibo. (2021). Weibo 2020 User Development Report. https://data.weibo.com/report/reportDetail?id=456

Weibo. (2022). How to apply for identity verification. https://kefu.weibo.com/faqdetail?id=37&display=0&retcode=6102

Weibo Data Center. (2019). Weibo User Development Report 2018 [in Chinese]. https://data.weibo.com/report/reportDetail?id=433&sudaref=www.baidu.com

Weiciyun. (2022). Simple and powerful word cloud generator. https://www.weiciyun.com/

WHO. (2020). Impact of COVID-19 on people's livelihoods, their health and our food systems. https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people%27s-livelihoods-their-health-and-our-food-systems

Xia, H., An, W., Li, J., & Zhang, Z. J. (2020). Outlier knowledge management for extreme public health events: Understanding public opinions about COVID-19 based on microblog data. *Socio-Economic Planning Sciences*, *80*, 100941. https://doi.org/10.1016/j.seps.2020.100941

Xiao, K., Zhai, J., Feng, Y., Zhou, N., Zhang, X., Zou, J. J., Li, N., Guo, Y., Li, X., Shen, X., Zhang, Z., Shu, F., Huang, W., Li, Y., Zhang, Z., Chen, R. A., Wu, Y. J., Peng, S. M., Huang, M., … Shen, Y. (2020). Isolation of SARS-CoV-2-related coronavirus from Malayan pangolins. *Nature*, *583*(7815), 286–289. https://doi.org/10.1038/s41586-020-2313-x

Xiao, L., Lu, Z., Li, X., Zhao, X., & Li, B. V. (2021). Why do we need a wildlife consumption ban in China? *Current Biology*, *31*, 161–185.

Ye, Z. W., Yuan, S., Yuen, K. S., Fung, S. Y., Chan, C. P., & Jin, D. Y. (2020). Zoonotic origins of human coronaviruses. *International Journal of Biological Sciences*, *16*(10), 1686–1697. https://doi.org/10.7150/ijbs.45472

You, M. (2020). Changes of China's regulatory regime on commercial artificial breeding of terrestrial wildlife in time of

COVID-19 outbreak and impacts on the future. *Biological Conservation*, *250*, 108756. https://doi.org/10.1016/j.biocon.2020.108756

Zhang, L., Hua, N., & Sun, S. (2008). Wildlife trade, consumption and conservation awareness in southwest China. *Biodiversity and Conservation*, *17*(6), 1493–1516. https://doi.org/10.1007/s10531-008-9358-8

Zhang, L., & Yin, F. (2014). Wildlife consumption and conservation awareness in China: A long way to go. *Biodiversity and Conservation*, *23*(9), 2371–2381. https://doi.org/10.1007/s10531-014-0708-4

Zhao, J., Cui, W., & Tian, B. P. (2020). The potential intermediate hosts for SARS-CoV-2. *Frontiers in Microbiology*, *11*-(September), 1–11. https://doi.org/10.3389/fmicb.2020.580137

Zhu, A., & Zhu, G. (2020). Understanding China's wildlife markets: Trade and tradition in an age of pandemic. *World Development*, *136*, 105108. https://doi.org/10.1016/j.worlddev.2020.105108

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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