



# The Pandemic as a Conservation Marketing Intervention: Could COVID-19 Lower Global Demand for Wildlife Products?

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We wished to assess whether the COVID-19 pandemic, thought to have a zoonotic origin, may lead to a reduction in consumer demand for wildlife products. In 2018, we surveyed the effect of demand reduction messaging on consumers' desire to own exotic pets with 1,000 respondents in each of Brazil, China, the USA, and Vietnam. In July 2020, during the pandemic, we repeated the survey with 100 new respondents in each country. Mean desire to own a given exotic pet was 40–60% lower in 2020 during the pandemic, but only for respondents from Brazil, China, and the USA, and only for the group of respondents who had high *a priori* purchase likelihoods: those who had already owned an exotic pet. The stated desire to own of non-owners was no different in 2020, but this group already had extremely low purchase likelihoods. Vietnamese pet owners, in contrast to those in other countries, exhibited higher purchase desire during the pandemic than previously. We speculate that this arose because Vietnam has a long history of dealing with epidemic disease, had no COVID-19 related deaths by the time of survey, and so population uncertainty about the consequences of exotic pet ownership may have decreased. While limited, our initial evidence indicates that the global pandemic is unlikely to permanently curb demand for wildlife products.

**Keywords:** COVID-19, coronavirus, demand reduction, conservation marketing, exotic pet

## INTRODUCTION

The COVID-19 pandemic has at the time of writing infected 30.6 million people globally, and caused 950,000 deaths (World Health Organisation, 2020a). The pandemic is considered to have a zoonotic origin, with initial studies suggesting it spilled-over from a wildlife reservoir among bat (Lu et al., 2020; Shereen et al., 2020) or pangolin populations (Zhang et al., 2020). Later work appears to have exonerated pangolins as a potential source (Frutos et al., 2020; Lee et al., 2020), but the most likely origin for COVID-19 remains zoonotic (Guo et al., 2020). With emphasis in the press and popular culture on the zoonotic origins of COVID-19 (e.g., CaptainJon720, 2020; McGorry, 2020), and given that considerations of zoonotic disease risk reduces purchase desire among consumers of exotic animals or wildlife products (e.g., Moorhouse et al., 2017, Moorhouse et al., 2020; Moorhouse et al., this volume), a key question is whether the public's response to this zoonotic pandemic led to a reduction in consumer demand for wildlife products.

## METHODS

In a 2018 survey of respondents from Brazil, China, the USA, and Vietnam, we tested the effect of different conservation marketing messages on respondents' stated likelihood of buying exotic pets (Moorhouse et al., this volume). We addressed our above research question by repeating this survey in July 2020, 6 months after the emergence of COVID-19, with a reduced sample size of 411 respondents (102 from each of Brazil, China, and USA, and 105 from Vietnam).

We combined data from 2018 and 2020 into a single dataset and reanalyzed the results reported in Moorhouse et al. (this volume) to assess whether survey year (2018 vs. 2020) correlated with a change in respondents' desire to purchase a given exotic, or interacted with the effects of the experimental treatments.

All research was subject to ethical approval, references R57894/RE001 and R57894/RE004, Oxford University CUREC.

## RESULTS

Our results showed an effect of year on stated desire to purchase exotic pets, mediated by two factors: whether a respondent had ever owned an exotic pet, and the respondent's nationality (Figures 1A–C). Among non-owners (who had never owned an exotic pet) of any nationality there was no evidence that desire to purchase differed between surveys. In 2018 mean stated desire to purchase mammals, birds, and reptiles (on a 1–10 scale) was 2.07, 3.28, and 1.70, respectively, among non-owners. In 2020, these figures were 2.85, 3.68, and 1.94 (LRT effect of year  $> 1.2027$ , d.f. = 1,  $p > 0.27$  across all analyses).

Among pet owners (respondents who currently, or had at some point previously, owned an exotic), the effect of year varied with respondents' nationality. Among respondents from Brazil, China, and the USA, desire to own any pet was significantly lower in 2020 than in 2018 (LRT effect of year = 11.875, 3.8631, 14.353, d.f. = 1,  $p < 0.001$ ,  $p = 0.049$ ,  $p < 0.001$  for mammals, birds, and reptiles, respectively) in models that excluded respondents from Vietnam (see Figures 1A–C). Mean odds ratios for the effect of year were 0.40, 0.58, and 0.39 for mammals, birds, and reptiles, respectively, indicating that across these taxa the onset of COVID-19 was associated with a reduction of 40–60% in the likelihood of respondents selecting high desires to own. There was no evidence that responses varied between Brazil, China, and the USA (LRT effect of year\*country on desire to own  $< 1.778$ , d.f. = 2,  $p > 0.4111$  in all analyses of mammals, birds, and reptiles), and also no evidence that the effect of experimental treatments varied with year (LRT effect of year\*treatment  $< 3.9274$ , d.f. = 4,  $p > 0.416$  in all analyses) in models in which these interactions were fitted.

For pet-owners from Vietnam the above relationship was reversed: in 2020 Vietnamese pet-owners selected higher desires to own mammals and birds than they did in 2018, with the effect for reptiles less pronounced, but consistent with the direction of the effect (LRT effect of year = 3.8813, 12.471, 3.1876, d.f. = 1,  $p = 0.0488$ ,  $p < 0.001$ ,  $p = 0.0742$  for mammals, birds, and reptiles, respectively; Figures 1A–C). Odds ratios for the effect of year were 2.24, 3.43, and 1.93 for mammals, birds, and reptiles, respectively, indicating that Vietnamese respondents

were twice to three times more likely to select higher desires to own in 2020 than in 2018. There was no evidence that treatments interacted with year in a model in which this interaction was entered (LRT effect of year\*treatment  $< 6.7624$ , d.f. = 4,  $p > 0.149$  in all analyses).

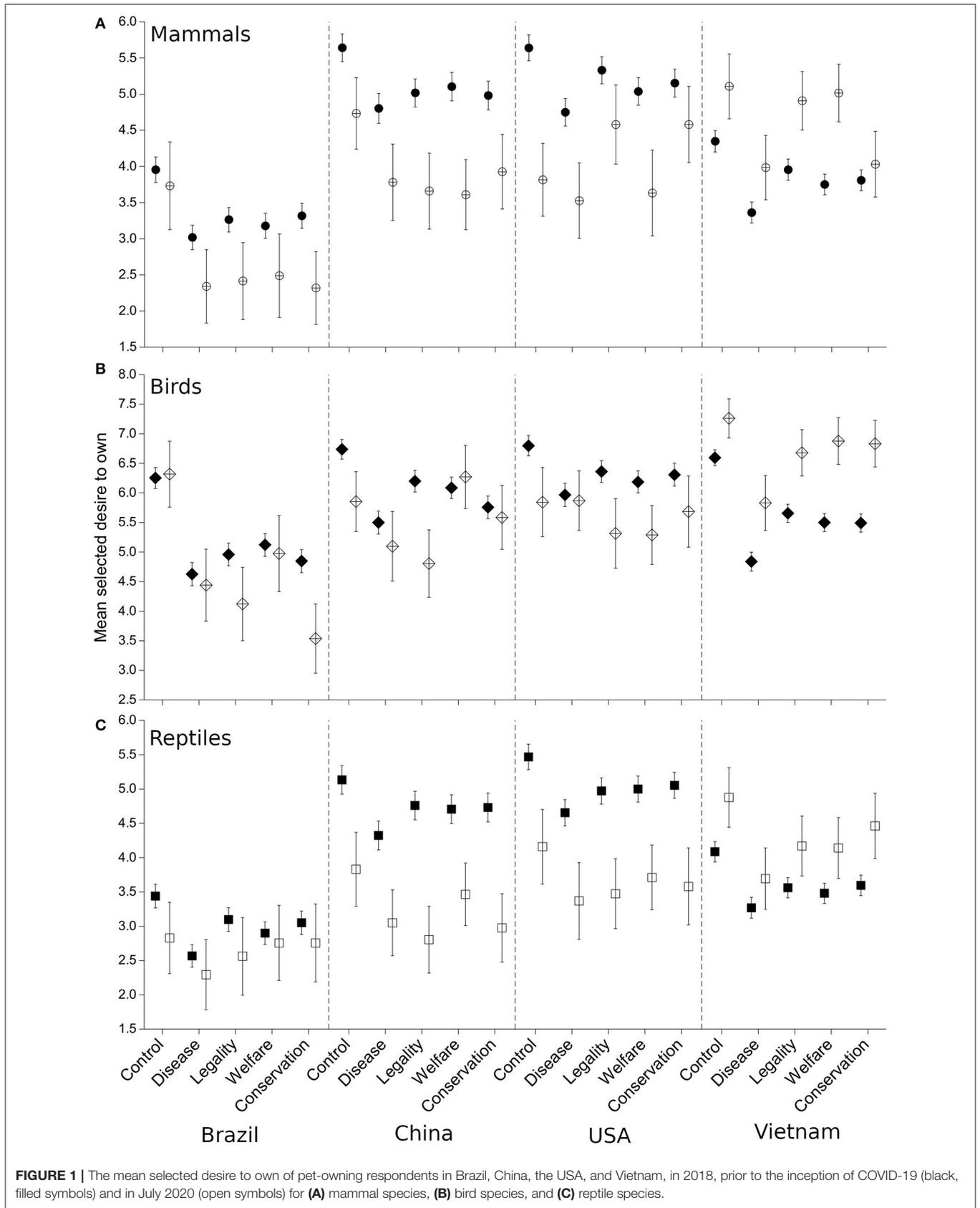
In both 2018 and 2020, respondents from Brazil and the USA were asked to rate their agreement with a number of attitudinal statements (see Moorhouse et al., this volume).

In an updated analysis incorporating the 2020 survey results there was no evidence that levels of agreement with any statement varied for either owners or non-owners between the 2018 survey and the 2020 resurvey (LRT effect of year  $< 2.444$ , d.f. = 1,  $p > 0.118$  for all analyses). The only exception was the statement "People have a duty to make sure they don't buy pets that come from the wild," with which non-owners (counter-intuitively) selected higher levels of agreement in 2018 than in 2020 (7.94 vs. 6.98, LRT effect of year = 12.541, d.f. = 1,  $p < 0.001$ ).

## DISCUSSION

Our results show that the pandemic decreased the stated likelihood of pet-owners from Brazil, China or the USA buying a given exotic pet. That there was no evidence for such a relationship among non-owners is explicable in that non-owners already exhibited very low likelihoods of purchasing an exotic: 54.1% of non-owners stated that they did not want to buy an exotic vs. 0% of owners; and 24.8% of non-owners stated they had a high likelihood of purchase vs.  $> 77%$  of owners. That experimental treatment did not interact with year in our analyses suggests that COVID-19 had a blanket effect of lowering desire in pet owners from these countries. This latter finding may indicate that respondents did not necessarily recognize the zoonotic origin of the pandemic, given that the effect of disease statements in lowering desire to own was not more pronounced in 2020 than in 2018. We therefore speculate that the decreasing desire to own among these respondents in 2020 did not represent a recognition of the dangers of zoonotic disease arising from the consumption of wildlife products, but more likely arose as a response to some other facet of the social disruption resulting from the pandemic (e.g., abrupt financial shock or uncertainty about the future). This conclusion is supported by a finding from Morcatty et al.'s (2020) study of 20,000 Facebook posts from buyers and sellers of wildlife in Brazil and Indonesia between February and April 2020: online sellers and consumers did not discuss zoonotic disease risks, and viewed COVID-19 as a logistical (e.g., shipping) challenge, rather than a risk potentially arising from local wildlife trade.

By contrast to respondents from the other countries, Vietnamese pet-owners were between twice and three times more likely to select higher desires to own a given exotic in 2020 than 2018. A plausible explanation for this discrepancy is that by the end of July 2020 (the month during which we conducted our survey) Vietnam had recorded only 446 confirmed cases and zero deaths from coronavirus (World Health Organisation, 2020b), compared with 2,442,375 cases and 87,618 deaths in Brazil (World Health Organisation, 2020c), 87,457 cases/4,664 deaths in China (World Health Organisation, 2020d), and 4,263,531 cases/147,449 deaths in the USA (World Health Organisation, 2020e). Vietnam has also experienced multiple epidemics in the



recent past, including Sars in 2003, avian influenza in 2010, as well as substantial outbreaks of measles and dengue fever, and their government moved swiftly to implement strict containment measures far before those of the majority of other countries acted (Jones, 2020).

Speculatively, the response of participants in Brazil, China, and the USA may reflect societal shock from the impacts of COVID-19, whereas Vietnamese respondents may have experienced little equivalent shock due to their prior experience with epidemics, familiarity with state measures to contain these, and having recorded no deaths from coronavirus. We have no data that could explain why Vietnamese respondents should choose *higher* desires to own exotics post-COVID-19, as opposed to their responses being unchanged, but speculatively if Vietnam was comparatively unaffected the population may perceive there to be few negative consequences to buying a pet: any arising could be expected to be successfully managed, and so individual uncertainties about the consequences of purchasing exotics may in fact have decreased in the wake of the pandemic.

Consumer demand for different wildlife products (e.g., meat or medicines) may respond to the COVID-19 pandemic in different and complex ways, but our results indicate that for exotic pets any resulting decrease in consumer demand may only be temporary. We found little evidence that fundamental attitudes shifted: levels of agreement with attitudinal statements concerning purchasing exotics were similar in both years. The difference in response in Vietnam, compared with Brazil, China, and the USA, suggests that increasing familiarity with epidemic disease, and with state measures to control its spread, has the potential to negate any initial decrease in desire to purchase these commodities. It remains to be seen whether the populations of other countries will in time react similarly to that of Vietnam. Whether they do may rely on how effectively their governments contain future epidemics. Our explanation does, however, make the counter-intuitive prediction that increasing instances of spill-over of zoonoses into human populations, if increasingly well-managed, could quickly result in a return to normal—or increased—levels of consumer demand for exotic pets in the future.

Our findings are preliminary results from a small survey and further work is clearly required to substantiate and develop them. On the face of our initial evidence, however,

the sobering conclusion is that even a global pandemic of (most likely) zoonotic origin may not be sufficient on its own to permanently reduce consumer demand for exotic pets in particular, and perhaps wildlife products in general—although more evidence is needed as to what the impact of COVID-19 will be on medicinal and meat consumption of wildlife.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The survey involved human participants and was reviewed and approved by Oxford CUREC. The participants provided informed consent to their participation in this study.

## AUTHOR CONTRIBUTIONS

TM: conceptualization, methodology, analysis, writing—original draft, writing—review and editing, and funding acquisition. ND'C: writing—review and editing and funding acquisition. DM: writing—review and editing and supervision. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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