



Chinese health workers test frozen food and packaging for traces of SARS-CoV-2.

CAN COVID SPREAD FROM FROZEN WILDLIFE?

SARS-CoV-2 might be transmitted on frozen surfaces – but that’s unlikely to be how the pandemic started.

By Dyani Lewis

Momentum is growing for acceptance of the suggestion that the coronavirus can spread from infected frozen wildlife. A World Health Organization (WHO) fact-finding mission in China did not rule out the idea that this mode of transmission contributed to early outbreaks of COVID-19 – although investigators say it’s unlikely to have started the pandemic.

At a press conference last month, the WHO team concluded that the virus probably came from bats, and was passed to people through a live intermediate animal. But the team also said it was important to investigate whether frozen meat from wild animals bred on Chinese farms might have been contaminated with the virus and have led to one of the earliest reported outbreaks, at the Huanan Seafood Market in Wuhan, China.

“We all thought the cold-chain stuff was a reasonable hypothesis” that needed to be considered, says team member Dominic Dwyer, a virologist at New South Wales Health Pathology in Sydney, Australia.

But the WHO team’s call to investigate

infected frozen meat has become confused with suggestions from China that the virus can spread on frozen surfaces. For months, media outlets in the country have pushed the idea that the virus might have arrived in Wuhan on frozen wildlife imported from abroad. Subsequent local outbreaks of SARS-CoV-2 have

“Bringing all those distant species to one location, there are more chances to incubate and generate a new virus.”

also been linked to imported frozen food, and scientists in China have published a growing body of evidence that transmission on frozen meat is theoretically possible.

Many scientists outside China, however, argue that this ‘cold chain’ theory is a red herring in the overall search for the pandemic’s origin, and is an attempt to deflect criticism.

Some studies suggest that transmission on frozen surfaces is feasible. A preprint¹ posted on the bioRxiv server by researchers in Singapore last August, which has not been peer reviewed, found that SARS-CoV-2 can

remain infectious on the surface of frozen or refrigerated meat for more than three weeks.

Two months later, researchers in China linked² a June outbreak in Beijing to the city’s Xinfadi Market. The first cases came after 56 days with no community transmission in the city, and were connected with a distinct strain of SARS-CoV-2. Outbreak investigators found viral particles from the same strain on cold-stored salmon at a market stall.

The WHO team took these findings into account. “We spent a lot of time going through the evidence from the Beijing Xinfadi Market outbreak. It’s a really good piece of work. They really went into detail to try to find the connections to a source,” says team member Peter Daszak, president of the non-profit EcoHealth Alliance in New York City.

In a third study³, published last November, another group of scientists in China reported isolating infectious virus from the packaging of frozen cod that was thought to have been the source of infection in dock workers.

“We have no reason to assume that it might not happen,” says Erwin Duizer, a virologist at the Dutch National Institute for Public Health and the Environment in Bilthoven.

In November, in the wake of these and other outbreaks in China, authorities introduced mandatory disinfection of imported frozen goods to prevent surface transmission.

Origin link

The WHO team does not think the pandemic started from transmission on food or packaging. However, the investigators consider it possible that an animal infected with the virus might have been the source of the large, early outbreak at the Huanan Seafood Market.

Before the market was closed in January 2020, 10 of its 653 stalls sold live or frozen wildlife captured in the wild or brought from farms. Animals including raccoons and ferret-badgers are known to be susceptible to coronaviruses, Dwyer says. When investigators checked the market after the closure, none of the meat or animals they sampled – including frozen carcasses – tested positive for SARS-CoV-2. However, Dwyer says it’s possible that not enough samples were taken to rule them out as a source of infection.

If frozen or thawed carcasses were infected with the virus, handling the animals could have posed an infection risk, says Andrew Breed, a veterinary epidemiologist at the University of Queensland in Brisbane, Australia. But he adds that little is known about the condition of food during transport. “Freezing and thawing will definitely really reduce viability for certain types of viruses, including coronaviruses,” he says.

Duizer and others argue that it’s more likely that SARS-CoV-2 first passed to people from a live animal. Most of the wild animals traded in China are live, says Chris Walzer, a veterinary physician with the Wildlife Conservation

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Society in New York City. Many of them arrive at markets from farms in China. “You bring all those naturally distant species to one location, so there are more chances to incubate and generate a new virus,” says QiuHong Wang, a virologist at the Ohio State University in Wooster.

Dwyer says it’s crucial to find out whether workers at wildlife farms that supplied products

to Wuhan markets have antibodies from SARS-CoV-2 infection. That, he says, will be key to homing in on the ultimate origin of the pandemic.

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CONTACT-TRACING APPS HELP TO REDUCE COVID INFECTIONS

Evaluations find apps are useful, but would benefit from better integration into health-care systems.

By Dyani Lewis

Since the beginning of the COVID-19 pandemic, dozens of countries have deployed digital apps that attempt to identify people exposed to the SARS-CoV-2 coronavirus and stop onward transmission. But evidence that these ‘contact-tracing’ apps work has been hard to come by. Now, evidence is mounting that apps can help prevent infections.

Contact-tracing apps are installed on smartphones, and many involve the Google/Apple Exposure Notification (GAEN) system, which uses the phone’s Bluetooth signal to detect when two app users are close to each other – typically, within 2 metres of one another for more than 15 minutes. Users are notified if someone they have come in contact with tests positive. The exposed user can then get tested or quarantine, which should help to prevent onward transmission.

The GAEN system prevents health authorities from gathering personal information about app users or their devices, thereby helping to address privacy concerns. (This is not the case for all contact-tracing apps. Singapore’s TraceTogether app has attracted criticism because the data that it collects could be used by police in criminal investigations.)

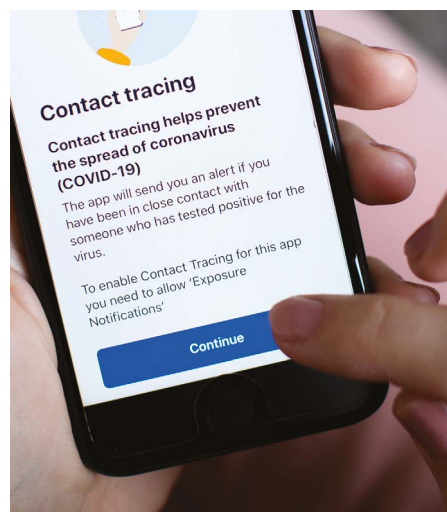
Emerging evidence

On 9 February, researchers in Britain released an evaluation¹ of the National Health Service (NHS) COVID-19 app, which was launched in England and Wales late last September. The evaluation, which has not yet been peer reviewed, found that the app sent out 4.4 exposure notifications for every user who tested positive for SARS-CoV-2 and agreed to the app notifying their contacts. That was more than twice the average of 1.8 contacts notified

through manual contact tracing.

The team estimated that the app might have helped to avert more than 224,000 infections between October and December 2020. The model assumed that about 61% of people who received an exposure notification and were instructed to quarantine for up to two weeks followed that advice. That is slightly lower than the results of a 13 January survey² in the United Kingdom, which found that about 80% of people directed to quarantine did so.

So far, the app has been downloaded on more than 21 million phones, with about 16.5 million regular users. That’s roughly 28% of the UK population, or 49% of people with compatible phones. The team estimates that every 1% increase in app users – above a minimum of 15% – reduces the number of infections by 0.8–2.3%. But epidemiologist Viktor von Wyl at the University of Zurich in Switzerland says it is difficult to conclude that



Contact-tracing apps are in widespread use.

infections and deaths were averted because people used the app. “Having people who are notified by the exposure notification doesn’t mean that they would not have ended up on the radar of manual contact tracing,” he says.

A pilot study³ of Spain’s Radar Covid app, conducted in the Canary Islands in July and published last month, also found that the app notified roughly twice the number of people exposed to simulated infections, compared with manual contact tracing. And an evaluation of the SwissCovid app, published as a preprint in February⁴, found that the app boosted the number of people in quarantine in Zurich last September by 5%.

Digital contact tracing is particularly effective at identifying contacts who don’t live together. Von Wyl and his team calculated that non-household contacts notified of exposure by the SwissCovid app entered quarantine a day earlier than did those notified through manual contact tracing⁵. The NHS COVID-19 app also shortened the delay to quarantine by 1–2 days, says infectious-diseases modeller Christophe Fraser at the University of Oxford, UK, who led the evaluation.

Integration crucial

But researchers have identified barriers to an app’s effectiveness, such as how well the app is integrated into the local health-care system.

In Switzerland, for instance, users of the SwissCovid app who test positive are given a code from their local health authority or doctor that they must then input into the app to alert their close contacts. This makes the system manual rather than automatic, says von Wyl. When COVID-19 infections surged at the end of 2020, overwhelmed health authorities had less time to generate these codes, says von Wyl. “This is a bottleneck,” he adds.

A similar situation exists in Spain, says Lucas Lacasa, a complex-systems mathematician at Queen Mary University of London, who led the Canary Islands pilot study. There are 17 autonomous communities across Spain, and not all promote Radar Covid’s use or promptly issue a code to people using the app who have tested positive, says Lacasa. This means that notifications aren’t always sent to app users who might have been exposed to infection. “It’s very disappointing,” he says.

The NHS COVID-19 app, by contrast, automatically issues codes to users who test positive, so they can initiate the notification process on their phone.

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