

Reducing public health risks associated with the sale of live wild animals of mammalian species in traditional food markets

Interim guidance

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Executive summary

Traditional food marketsⁱ, rather than supermarkets, are the norm in many parts of the world. Such markets form part of the social fabric of communities and are a main source of affordable fresh foods for many low-income groups and an important source of livelihoods for millions of urban and rural dwellers worldwide.

Traditional food markets that are regulated by national or local competent authorities and that operate to high standards of hygiene and sanitation are safe for workers and customers.

Significant problems can arise when these markets allow the sale and slaughter of live animals, especially wild animals, which cannot be properly assessed for potential risks – in areas open to the public. When wild animalsⁱⁱ are kept in cages or pens, slaughtered and dressed in open market areas, these areas become contaminated with body fluids, faeces and other waste, increasing the risk of transmission of pathogens to workers and customers and potentially resulting in spill over of pathogens to other animals in the market. Such environments provide the opportunity for animal viruses, including coronaviruses, to amplify themselves and transmit to new hosts, including humans.

Most emerging infectious diseases – such as Lassa fever, Marburg haemorrhagic fever, Nipah viral infections and other viral diseases – have wildlife origins. Within the coronavirus family, zoonotic viruses were linked to the severe acute respiratory syndrome (SARS) epidemic in 2003 and the Middle East respiratory syndrome (MERS), which was first detected in 2012. The COVID-19 pandemic stems from the introduction of the novel coronavirus, SARS-CoV-2, into human populations. Although the specific mechanism of SARS-CoV-2 emergence has not been definitively identified, at some point or over time, interactions may have occurred that allowed for cross- and perhaps multiple-species pathogen transmission. The World Health Organization (WHO), the

Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and the United Nations Environment Programme (UNEP) recognize the repeated emergence of zoonotic diseases and the linkages of some of them along the value chain of the wildlife trade.¹

It should be noted that zoonotic disease risks vary among different animal species (e.g. terrestrial versus aquatic animal species) and different farming and marketing systems. Therefore, a risk assessment is required to determine appropriate risk management strategies. Captured wild mammals are likely to carry agents of zoonotic infections that may go undetected and affect humans who are exposed to them.²⁶

WHO works closely with FAO, OIE, UNEP and other international agencies to ensure that the global food system is sustainable, safe and secure and that technical support is available for the strengthening of national food control systems. The purpose of this document is to provide guidance for food safety and other relevant authorities to reduce the risk of transmission of COVID-19 and other zoonoses in traditional food markets. Although this document focuses on the risk of disease emergence in traditional food markets where live animals are sold for food, it is also relevant for other utilizations of wild animals. All these uses of wild animals require an approach that is characterized by conservation of biodiversity, animal welfare and national and international regulations regarding threatened and endangered species.

To reduce the public health risks associated with the sale of live wild animals for food in traditional food markets, WHO, OIE and UNEP recommend several actions that national governments should consider adopting urgently with the aim of making traditional markets safer and recognizing their

ⁱ A traditional food market is the term used throughout this document to include wet markets, informal markets and farmers' markets that sell foods of animal origin/non-animal origin/dried goods and where live animals are sometimes housed and slaughtered on site.

ⁱⁱ Means an animal that has a phenotype unaffected by human selection and lives independent of direct human supervision or control.
https://www.oie.int/index.php?id=169&L=0&htmlfile=glossaire.htm#teme_animal

central role in providing food and livelihoods for large populations.

WHO, OIE and UNEP call on national competent authorities to take the following actions:

1. Suspend the trade in live caught wild animals of mammalian species for food or breeding purposes and close sections of food markets selling live caught wild animals of mammalian speciesⁱⁱⁱ as an emergency measure unless demonstrable effective regulations and adequate risk assessment^(a) are in place.
2. Strengthen the regulatory basis for improving standards of hygiene and sanitation in traditional food markets to reduce the risk of transmission of zoonotic diseases. During the current pandemic, additional measures for crowd control and physical distancing, hand washing and sanitizing stations as well as education on respiratory hygiene should be introduced in market settings to limit the possibility of person-to-person transmission of disease.
3. Conduct risk assessments to provide the evidence base for developing regulations to control the risks of transmission of zoonotic microorganisms from farmed wild animals and caught wild animals that are intended to be placed on the market for human consumption. Regulations should address the traceability of farmed wild animals to ensure that they are distinguished from caught wild animals and should include strict biosecurity measures.
4. Ensure that food inspectors are adequately trained to ensure that businesses comply with regulations to protect consumers' health and are held accountable. In addition, competent authorities responsible for managing traditional food markets should be adequately resourced, so that regulations focused on food animal production, processing and marketing are consistently enforced.
5. Strengthen animal health surveillance systems for zoonotic pathogens to include both domestic and wild animals. This will provide early warning for pathogen emergence and provide the evidence base for the development of controls to prevent risks to human health, in association with public health surveillance systems.
6. Develop and implement food safety information campaigns for market traders, stall holders, consumers and the wide general public. These campaigns should communicate the principles of food safety and the risks of transmission of zoonotic pathogens at the human-animal interface and the risks associated with the consumption and trade of wildlife. The campaigns should also disseminate information to all stakeholders about the importance of biodiversity and the need for any use of wildlife to be legal, sustainable, safe and responsible.

WHO, OIE and UNEP are committed to assisting governments to strengthen food safety regulations to prohibit

(a) Effective regulation is defined as risk based measures that achieve the risk reduction intended to protect the health of consumers and workers and ensure food security

the marketing and sale of captured live wild animals as food in the absence of effective regulations and to control the safety of all animals and animal products intended for human consumption.

Introduction

Public health risks

The COVID-19 pandemic is a public health emergency that requires a coordinated, multisectoral response. There is no evidence that the consumption of food is implicated in the transmission of this disease. Similarly, there is no evidence that the virus responsible for the current COVID-19 pandemic is carried by domestic food-producing animals, such as poultry, pigs, sheep or cattle.^{2,28} It is likely that the virus that causes COVID-19 originated in wild animals, as it belongs to a group of coronaviruses normally found in bats.^{3,4} One hypothesis is that the virus was initially transmitted to humans through an intermediary animal host that is, as yet, unknown. Another possibility is that the virus was transmitted directly from a host species of animal to humans.

Some of the earliest known cases of COVID-19 had a link to a wholesale traditional food market in Wuhan City, People's Republic of China, and some did not. Many of the initial COVID-19 patients were stall owners, market employees or regular visitors to this market. Environmental samples taken from the market in December 2019 tested positive for SARS-CoV-2, further suggesting that the market in Wuhan City might be the source of the outbreak and/or that it played a role in the initial amplification of the outbreak. Determining whether or not and which wildlife species contributed to an initial animal-to-human transmission of the virus remains a critical research question. The answer may help us prevent the virus from reappearing once the current pandemic is under control.

During the SARS epidemic in 2003,⁵ SARS-CoV-1-like viruses were isolated from live wild animals sold in traditional food markets in China⁶. This suggested that traditional food markets provided an environment conducive for animal coronaviruses to amplify and transmit to new hosts, including humans⁶. Evidence of infection with SARS-CoV-1 was found in humans working at a live animal market, and several of the known initial cases were chefs or restaurant workers handling wild captured animals prepared for food,^{5,6,27} suggesting a link between the marketing and preparation of wild animals and the transmission of SARS-CoV-1.

While SARS-CoV-1 and SARS-CoV-2 belong to a group of coronaviruses found in mammals, other viruses can transmit through non-mammals in traditional markets. During the human outbreak of avian influenza A (H5N1) in 1997,⁷ a visit to a retail poultry stall or a market selling live poultry in the

ⁱⁱⁱ Discussion on wild animals in the present document refers to animals of mammalian species excluding aquatic ones.

week before onset of illness was significantly associated with the risk of becoming infected.

Avian influenza viruses are not transmissible through well-cooked foods, but they can be transmitted from infected animals to humans during handling and slaughter in the traditional market setting. It is therefore important to limit, as far as possible, close contact between live animals, slaughtering operations and humans in such markets.

Successful control interventions to reduce the risk of zoonotic disease transmission during the marketing of live animals require a One Health approach. This means collaboration between human health authorities, food safety authorities, veterinary public health agencies; and wildlife, forestry and environmental agencies.⁸

WHO, OIE and UNEP have developed this interim guidance for national food safety competent authorities on how they can reduce the risk of human infection and contain the potential spread of COVID-19 and other zoonoses from traditional food markets or live animal markets.

Traditional food markets

Traditional food markets, sometimes referred to as “wet markets”, vary widely from country to country and even from province to province, depending on the local culture, socioeconomic conditions, food varieties and dietary preferences. In many countries, such markets are the main source of affordable fresh food, especially for many low-income groups. Traditional food markets have an important economic, cultural and social role and are a source of livelihoods for millions of people in both urban and rural areas. However, all traditional food markets should have one major thing in common: they should provide the community with safe and nutritious food.

A typical traditional market is a semi-open space with vending stalls organized in rows with narrow aisles. Water is used for washing fresh produce, for food preparation, such as filleting fish, and dressing of animal carcasses after slaughter, and for cleaning work surfaces, floors and drains. Water from melting ice used to chill foods also contributes to the “wet market” environment.

Traditional food markets are usually divided into sectors that sell different categories of food products. Some areas of the market, for instance, where fish are sold, will be designated wet and those selling dried spices or cereals will be designated as dry. Cooked foods are also frequently sold for consumption in the market area and as take-away foods. As space is usually expensive, stalls may be very close to each other, with little or no physical separation.

Traditional food markets are usually governed by complex administrative structures with multiple overlapping responsibilities between different regulatory and law enforcement agencies. Such markets may also be characterized by the inadequate allocation of financial

resources for maintenance and improvements. These factors can impede the coordinated approach that is essential for improving hygiene standards and food safety in markets.

Recommended measures

WHO, OIE and UNEP recommend several actions that national governments should take urgently to reduce the risk to humans of the transmission of zoonotic pathogens in the food production and marketing chain associated with traditional food markets.

1. Emergency regulations to suspend live wild animal sales in traditional food markets

WHO, OIE and UNEP call on all national competent authorities to suspend the trade in live caught wild animals of mammalian species for food or breeding and close sections of food markets selling live caught wild animals of mammalian species as an emergency measure unless demonstrable effective regulations and adequate risk assessment are in place.

There is a strong association between the marketing and sale of live wild animals and the emergence of novel zoonotic pathogens.⁸ Animals, particularly wild animals, are reported to be the source of more than 70% of all emerging infectious diseases in humans,^{9,10,12} many of which are caused by novel viruses. Traditional markets, where live animals are held, slaughtered and dressed, pose a particular risk for pathogen transmission to workers and customers alike. To mitigate this risk, an immediate emergency measure for regulatory authorities would be to introduce regulations to close these markets or those parts of the markets where live caught wild animals of mammalian species are kept or sold to reduce the potential for transmission of zoonotic pathogens.

These emergency measures should be of a temporary nature while responsible competent authorities conduct a risk assessment of each market to identify critical areas and practices that contribute to the transmission of zoonotic pathogens. Any such new regulations should include provisions for identifying the source of animals to ensure that live caught wild animals are not illegally introduced to wildlife farms, thus increasing the risk of transmission of zoonotic pathogens circulating in wild populations.

These emergency regulations should be timebound, specifying the date and stipulating the conditions when they no longer apply, when they should be revised or their application should be renewed. The conditions for closure or re-opening of a market or section of a market should be included in the emergency regulations. Competent authorities should work with market managers to introduce measures to mitigate identified risks. Markets or section of markets should be allowed to reopen only on condition that they meet

required food safety, hygiene and environmental standards and comply with regulations.

It is important to note that there is no evidence to suggest that SARS-CoV-2 is transmitted by the consumption of meat from wild animals that is hygienically handled and adequately cooked.^{2,11} There is, however, a risk of direct transmission to humans from contact with the saliva, blood, urine, mucus, faeces or other body fluids of an infected wild animal. Furthermore, there is an additional risk of becoming infected in areas where animals are housed in markets or from contact with objects or surfaces that have been contaminated with SARS-CoV-2.^{12,28,29}

These new regulations should be introduced as part of an overall strategy to encourage behaviour change with regard to live wild animal markets. Incentives should be considered to encourage safer practices, and risk communication will play an important role in getting buy-in from key stakeholders. There is always the risk that prohibition will not deter all traders in the marketplace and that trade may continue illegally. Penalties for infringement of the new regulations should be sufficiently punitive to encourage compliance, and resources for enforcement must be considered. Additional measures should be considered to support or encourage traders and others involved in the trade of live wildlife for food to find new sources of livelihood.

2. Improving standards of hygiene and sanitation in traditional food markets to reduce the risk of transmission of zoonotic diseases and person-to-person transmission of disease

WHO, OIE and UNEP call on national competent authorities to strengthen the regulatory basis for improving standards of hygiene and sanitation in traditional food markets to reduce the risk of transmission of zoonotic diseases. During this pandemic, additional measures for crowd control and physical distancing, hand washing and sanitizing stations as well as education on respiratory hygiene including on use of face masks should be introduced in market settings to limit the possibility of person-to-person transmission of disease.

Traditional food markets have often been associated with the spread of zoonotic diseases and major foodborne disease outbreaks.⁸ Conditions in some traditional food markets represent both food safety and occupational health risks that can be addressed only by improving hygiene and sanitation conditions. Examples of such improvements that have reduced the spread of disease are the interventions taken to reduce the spread of avian influenza and other emerging zoonotic pathogens in China, Indonesia and Thailand, among other countries.^{15,16} Competent authorities with responsibilities for managing traditional food markets must learn from these lessons of the past, adopt the concept of Healthy Food Markets⁸ and develop integrated strategies for improving standards of hygiene and sanitation.

Such strategies envisage phasing out live animal marketing and slaughter in proximity to the public or physically separating such activities to reduce the risks of transmission of zoonotic diseases. Slaughter and dressing should be carried out in suitable facilities under control of the official veterinary service for ante- and post-mortem inspections²⁵. Key areas needed for inclusion in plans to upgrade hygiene and sanitation standards are sanitary facilities (toilets, hand washing), pest control, waste management and disposal (solid and liquid wastes), drains and sewage disposal. Food handling and marketing activities should be moved to well-maintained stalls where surfaces can be easily washed and disinfected.

WHO has developed guidelines that national governments can use to improve hygiene and sanitation standards in traditional food markets^{15,17} and is further refining these guidelines in light of the COVID-19 pandemic. Measures recommended by WHO to prevent the spread of infection should be followed when customers are visiting traditional food markets.¹⁶ These measures include regular hand washing with soap and potable water after touching animals and animal products, but preferably, customers should avoid touching animals and touching their own eyes, nose or mouth. It may seem more challenging to implement WHO-recommended physical distancing measures in crowded market settings, but market authorities can design one-way systems for customers to move between stalls and remain at least one metre apart. Competent authorities responsible for food safety should develop communication campaigns to inform consumers about the risks associated with the handling, slaughter and marketing of live caught wild animals and the rationale for better regulation of such practices. Such campaigns would also present an opportunity to educate individuals whose livelihood depends on wild animals and the general public on the adverse effects of unsustainable use of wildlife on biological diversity and the integrity of ecosystems.

Competent authorities responsible for market management should implement appropriate interim biosecurity measures during the pandemic, including:

- limiting the number of customers who enter the traditional food market to avoid overcrowding
- ensuring queue control by painting floor markings, where feasible, consistent with physical distancing advice on entry to the traditional food market
- providing hand sanitizers, spray disinfectants and disposable paper towels at market entry points
- ensuring compliance with the use of face masks as per national and local rules or recommendations
- using floor markings inside the market to facilitate compliance with physical distancing
- installing plexiglass barriers to avoid direct exposure of consumers to live animals
- encouraging the use of contactless payments

- ensuring that daily cleaning and sanitation of the market, including waste management, meet rigorous standards.
- 3. Food regulations to control the farming and sale of wild animals that are intended to be placed on the market for human consumption**

WHO, OIE and UNEP call on all national competent authorities to conduct risk assessments to provide the evidence base for developing regulations to control the risks of transmission of zoonotic microorganisms from farmed wild animals and caught wild animals intended for breeding or human consumption. Regulations should address the traceability of farmed wild animals to ensure that they are distinguished from caught wild animals and should include strict biosecurity measures.

The farming of wild animals is common practice in many parts of the world.¹³ National food regulations should include strict on-farm biosecurity measures to prevent the introduction or spread of zoonotic diseases. As with all foods of animal origin, specific hygiene requirements for the production, processing and marketing of foods of animal origin must be included in all national food regulations. Such food regulations should include provisions for adopting a risk-based systematic approach to assess and control microbial hazards across the food chain to enhance food safety. Competent authorities for veterinary controls that are responsible for overseeing and enforcing regulations related to foods of animal origin and zoonoses will need to inspect wild animal farms and the places where such animals are processed for food, distributed and marketed to ensure compliance. Several other adjustments may be needed. First, specific national regulations relating to animal health and welfare should apply on the farm. Second, ante- and post-mortem inspection should apply at the time of slaughter. Third, hygiene and sanitation requirements should apply at all stages of production, processing and marketing. Last, traceability requirements are necessary.

Farmed wild animals present an occupational hazard for all workers in the food chain¹⁴ because the animals may be the source of zoonotic pathogens. Animal health inspections are a valuable means to identify the clinical signs caused by these microorganisms and to exclude animals displaying such signs from the food chain. However, not all zoonotic agents produce outward signs of disease in the animal hosts. Many microbiological hazards, particularly those that are carried only in the gastrointestinal tract, may not cause animal disease. Pathogens present in the gastrointestinal tract of an animal may contaminate food products and the immediate environment. Thus, strong surveillance of farming and husbandry practices and good hygiene practices in the

slaughter, dressing, handling and preparation of both domestic and wild animals are essential.

Farms that produce wild animals need to be registered, approved and inspected for animal health and welfare standards by relevant competent authorities^{iv}. In situations where live farmed wild animals are sold in traditional food markets, a set of food regulations, structural hygiene and sanitation standards should be developed and enforced for the markets. These food regulations should focus on removing public access to the areas where animals are slaughtered and dressed. The slaughtering process should be supervised by veterinary inspectors and conducted in a separate hygienic area with restricted access. This separation and oversight are essential because the location where animals are held, slaughtered, and dressed can become contaminated with faeces and other secretions, thus risking transmission of pathogens to workers and customers.

4. Training of food and veterinary inspectors in the compliance and enforcement of new regulations

WHO, OIE and UNEP call on national competent authorities to ensure that food inspectors are adequately trained to ensure that businesses comply with regulations to protect consumers' health and are held accountable. In addition, competent authorities responsible for managing food markets should be adequately resourced, so that regulations focused on food animal production, processing and marketing are consistently enforced.

Food inspection is a critical component of a national food safety control system, since it aims to ensure that food being sold meets the safety requirements defined by food legislation. To meet this goal, food and veterinary inspectors must be trained, qualified and free from conflicts of interests.¹⁸ Competent authority staff carrying out inspections of wildlife farms or markets that sell farmed wild animals must be adequately trained to enable them to undertake their duties competently and independently and to perform food safety controls in a consistent manner. The competent authority should prepare an annual training plan and maintain training records for each food inspector and ensure that these records are kept up to date. Enforcement practices should be documented. Food and veterinary inspectors should work closely with wildlife authorities under clear protocols to identify illegally traded wild species and to enforce relevant national and international regulations.

Competent authorities responsible for managing traditional food markets should also be adequately resourced so that regulations focused on food animal production, processing, and marketing are consistently enforced.

^{iv} The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requires that operations that breed

Appendix-I animal species for commercial purposes are registered with the CITES Secretariat in order for the specimens to be traded internationally (<https://www.cites.org/eng/resources/registers.php>)

5. Strengthening surveillance systems for zoonotic pathogens

WHO, OIE and UNEP call on national competent authorities to strengthen animal health surveillance systems for zoonotic pathogens and to include both domestic and wild animals. This will provide an early warning for pathogen emergence and provide the evidence base for the development of controls to prevent risks to human health, in association with public health surveillance systems.

Disease surveillance is an information-based activity involving the collection, analysis and interpretation of data for action relating to diseases in animals and humans. During the current pandemic and the management of other zoonotic events, it is critical that all national agencies responsible for surveillance cooperate to ensure coherent and appropriate risk communication and risk management responses.¹⁹ Currently, human health surveillance is the responsibility of the public health sector and surveillance in domestic animals is the responsibility of the veterinary services.

Wildlife disease surveillance, when it exists, is usually the responsibility of veterinary services and the forestry, environment or wildlife sectors. It is important that the national domestic animal and wildlife surveillance systems for zoonotic pathogens, which give early warning for pathogen emergence, are closely coordinated with public health surveillance to provide opportunities to control such pathogens before they can affect human health.²⁰ Wildlife disease surveillance systems are not yet common but need urgently to be developed and coordinated with domestic animal health surveillance programmes.

A working group or committee should be established at national level to share information on surveillance systems in humans, domestic animals and wildlife. This committee would need to determine practical ways to coordinate human and animal disease surveillance at the national level, including data management, communication networks and national and regional laboratory networks using One Health approaches.

6. Food safety information campaigns for market traders, stall holders and consumers

WHO, OIE and UNEP call on national competent authorities to develop and implement food safety information campaigns for market traders, stall holders, consumers and the wider general public. These campaigns should communicate the principles of food safety and the risks of transmission of zoonotic pathogens at the human-animal interface and the risks associated with the consumption and trade of wildlife. The campaigns should also disseminate information to all stakeholders about the importance of biodiversity and the need for any use of wildlife to be legal, sustainable, safe and responsible.

WHO, together with FAO and OIE have gained considerable experience over the years through collaborative efforts with

countries to improve standards of hygiene and sanitation in traditional food markets where live animals are sold.^{17,21} During the avian influenza and SARS outbreaks in China, high-risk practices in market settings were identified, and interventions were implemented.²¹ Communication and training programmes aimed at reducing the risk of disease transmission in traditional food markets in a low-cost and sustainable manner and adapted to local contexts were also developed.²² However such interventions need to be scaled up.

To successfully implement an information campaign aimed at reducing the risk of transmission of SARS-CoV-2 and emerging zoonoses in traditional food market settings, the first step is an assessment of market workers' knowledge on issues related to food hygiene, food safety, COVID-19 and its transmission and emerging zoonoses and their current behaviours related to this. Surveys and knowledge, attitude, practice (KAP) studies will be needed to collect and evaluate relevant data to tailor subsequent information campaigns to the needs of market workers and market customers and thus raise their awareness of the risks associated with handling live wild animals and the measures that can be taken to reduce or mitigate these risks.

Traditional food markets are frequented regularly by large numbers of people, providing opportunities to convey messages aimed at educating workers and visitors on food safety and the risks of transmission of zoonoses. In addition, formal training sessions for market workers and stall holders should be developed and designed to minimally disrupt work schedules. Easy to understand messages should be tailored for dissemination across several platforms, including social media channels and mobile phones, to encourage behavioural change.

The "five keys to safer food" educational material developed by WHO provides readily available basic food safety information.²³

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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