

SITUATIONAL AND RISK ASSESSMENT REPORT FOR ONE HEALTH HAZARDS

A quarterly report by the One Health Intelligence Team

Our Story: One Health in Singapore

Established in 2012 and governed by the inter-agency One Health Co-ordinating Committee (OHCC), Singapore's One Health Framework aims to build a transdisciplinary multi-agency workgroup that can integrate One Health efforts across human, animal, water and environment health sectors. The ultimate goal is to learn, prevent, prepare, and respond to cross-sectoral public health threats using an integrated and collaborative One Health approach. The One Health framework comprises five agencies in Singapore - the Ministry of Health (MOH), the National Environment Agency (NEA), the National Parks Board (NParks), the Singapore Food Agency (SFA) and PUB, Singapore's National Water Agency.

Since then, the One Health agencies have made significant progress in developing joint response protocols for priority diseases, training and capacity building, risk communications and implementing surveillance programmes. The framework was instrumental in bringing local outbreaks of vector-borne and food-borne diseases under control (e.g. Zika virus infection, and invasive Group B Streptococcus infection associated with consumption of raw ready-to-eat fish).

A decade after the establishment of Singapore One Health framework, the One Health community stepped up its effort through the implementation of the Biosurveillance Framework. The national framework comprises four strategic thrusts of scanning and early detection, management of hosts and vectors, inter-agency information integration, and science and technology. Under this framework, One Health agencies work together towards enhancing the current biosurveillance and epidemic preparedness landscape.

The Situational and Risk Assessment Report for One Health Hazards is a product of the Biosurveillance Framework. The report aims to disseminate timely information to all One Health agencies and key stakeholders on epidemic trends impacting the animal-human-water-environment interface. Each report is co-developed by all five One Health agencies with the intent to facilitate a cohesive whole-of-government and whole-of-society response to global health threats.

Issue 1: November 2022

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One Health Ministries and Agencies



MONKEYPOX MULTI-COUNTRY OUTBREAK

- Monkeypox is a viral zoonotic disease that occurs primarily in central and west Africa in the past. The disease is enzootic in susceptible mammals, including non-human primates, in the tropical rainforests of Africa.
 - Zoonotic transmission occurs through exposure to infected animals such as from bites, scratches, or direct contact with bodily fluids and/or through consumption of insufficiently cooked meat that is contaminated.
 - The disease is characterised by symptoms such as fever, skin rash and lesions on mucous membranes.
 - The disease is usually self-limiting and mild, but severe infections occasionally occur. The case fatality ratio varies from 0 – 11%, depending on the virus strain and individuals affected in specific outbreaks.
 - In 2022, a worldwide multi-country outbreak was reported for the first time that was unrelated to travel or importation of infected mammals.
 - On 23 July 2022, the WHO declared the outbreak a Public Health Emergency of International Concern (PHEIC).
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SITUATION UPDATE

Since early May 2022 and as of 22 November 2022, over 80,600 human cases of monkeypox (MPX) have been reported from 110 countries/territories worldwide, with 53 deaths recorded (Case Fatality Ratio of 0.06%).

Globally, the weekly number of MPX cases reported peaked in July 2022 and a steady declining trend has been observed since. Multiple factors have been attributed to the decline of this outbreak, including the adoption of safer sexual behaviours among populations at higher risk; the seasonal reduction of large gatherings enhancing risk-taking sexual behaviours; the strong vaccine acceptance in affected communities and rising rates of pre- and post-exposure vaccination; possibly rising immunity following infection among populations at higher risk; and surveillance artifacts resulting from declining patient presentation and testing for less severe cases.

Despite a declining trend in the number of cases at the global level since August 2022, case incidence is still substantial in the Region of the Americas, with several countries including the United States, Brazil and Mexico reporting more than 100 new cases weekly.

In the current outbreak, most cases have been detected in adult males commonly between 25-40 years old, and primarily among men who have sex with men (MSM). The majority of cases have presented with mild to moderate symptoms including fever and rash that

differ from what has been described in past outbreaks in endemic countries. In Europe, only a small subset (<2%) of patients had required hospitalisation for clinical care, and an even smaller proportion (<0.5%) were admitted to intensive care.

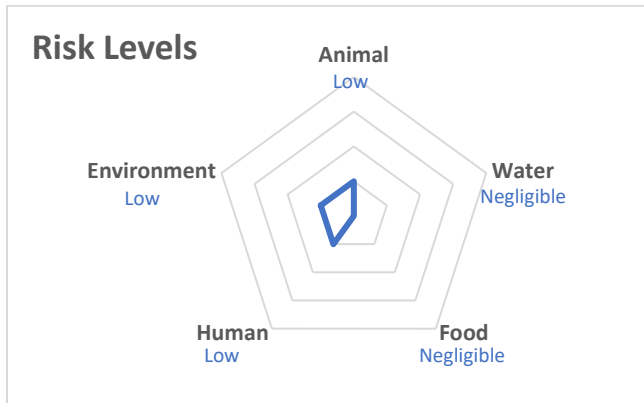
Thus far, the World Health Organization (WHO) had convened three International Health Regulations Emergency Committee (EC) meetings to discuss the global MPX outbreak, which was declared a PHEIC since the second EC meeting on 23 July 2022. In the latest meeting held on 20 October, the EC held a consensus view that the conditions that warranted the determination of the PHEIC still persist, as the MPX outbreak continued to constitute an extraordinary event which poses a public health risk through international spread, for which additional epidemic waves may yet be seen, and continues to require a coordinated international response to reduce the impact of the outbreak.

As of 11 November, WHO's assessment of risk globally remains at "Moderate" level, with risk in the Region of the Americas at "High", and in the Western Pacific Region as "Low".

The One Health agencies are closely monitoring the global monkeypox situation.



RISK ASSESSMENT



What is the risk of importation of a human case into Singapore?

Low. A total of 19 human MPX cases have been reported in Singapore between May and November 2022. All cases were reported before 10 September 2022 and no cases have been detected locally since. This reduction is likely attributable to the wide range of public health interventions implemented locally, and the ongoing decline in global MPX transmissions. Nonetheless, given that the WHO has cautioned that the risk of global case resurgence remains, it is paramount to maintain heightened vigilance for the early diagnosis and isolation of potential MPX cases. Effective contact tracing, supported by appropriate vaccination strategies remain key for the effective control of this outbreak.

In the event of human case importation, what is the expected public health impact to Singapore?

Low. Given that MPX spreads primarily through close intimate or prolonged contact with an infectious individual, the likelihood of widespread and sustained transmission in the general population remains **low**.

Monkeypox is a notifiable disease under the Infectious Diseases Act, and doctors and laboratories are required to inform the Ministry of Health of any suspected or confirmed cases. Guidance has been issued to medical practitioners and healthcare workers on appropriate infection prevention and control measures, and use of personal protective equipment.

The risk of serious public health impact is **low**, as the disease in the vast majority of cases globally has been mild. Medical management may be required for supportive care such as pain management. While there is a risk for serious health consequences among new-borns, the elderly or the immunocompromised, very few cases have been reported through community transmission without sexual contact.

What is the risk of spill-over to animal species?

Low. Presently, there is little real-world evidence to suggest that there is a risk of MPX spill-over from human to animal species.

There have been two reports of suspected human-to-dog transmission of the monkeypox virus in France and Brazil. In both instances, although virus was detected from samples taken from the dogs, there was insufficient evidence that they were infected with monkeypox virus – in the France case study, the dog also presented with a negative serological test.

In a study carried out in the United Kingdom¹, the authors reported surveillance results of pets living in the households of MPX patients between June – mid-September 2022, mainly through interview of MPX+ patients on pet ownership and any passive reporting from their veterinarians. Based on results from 40 households **it was concluded that no animals from these households with clinical signs of MPX were documented.**

¹ 154 animals from 40 households with MPX patients were reported to UK Animal and Plant Health Agency (APHA). That included 42 dogs, 26 cats, as well as 5 “rabbits or guinea pigs,” and other animals.

In local context, the risk of spill-over from humans to animal species is mitigated by ensuring that the infected persons do not come into close contact with animal species that are known to be susceptible to infection (rodents and rabbits).

In addition, the risk of importation of the virus via animals is mitigated by existing pre-border, border, and post-border biosecurity and biosurveillance measures.

What is the risk of transmission through the handling and consumption of foodstuffs?

Negligible. Only bushmeat (meat from hunted wildlife in Africa) has been suspected as a source of MPX virus in human cases of MPX. Food (other than bushmeat) was never identified as being associated with human cases of MPX. Thus, there is currently no evidence that food or food packaging is a likely source or route of transmission of the virus.

Nevertheless, the risk is mitigated by good personal hygiene and food safety measures. For instance, SFA requires all meat to be imported only from SFA-accredited sources and there are no SFA-accredited sources of bushmeat from Africa. Cooking food for at least 12 min at a temperature of 70°C could be considered effective in inactivating MPX virus in food. It is important to follow good cleaning and disinfection practices for both equipment and premises, to reduce contamination in areas where infectious human cases may be present.

For more information:

<https://www.sfa.gov.sg/monkeypox-and-food-safety/monkeypox-and-food-safety>

What is the risk of environmental transmission?

Low. A study conducted by NEA and NCID with environmental sampling around a MPX case showed the presence of live virus on surfaces of the toilet seat, the patient's chair, and dust samples from the patient's linen. The findings suggest a higher risk of contamination of these surfaces and the need to

thoroughly disinfect seats (including toilet and chairs) and beddings, on top of the general disinfection of surfaces. The study also detected MPX genetic material in air particles. Though no viable virus was detected and the infectious dose is unknown, precaution for respiratory protection (PPE) for healthcare workers and cleaners attending to a case or case room is recommended. The need to pay attention to high-risk surfaces and the need for respiratory protection has been incorporated into cleaning advisories.

The results of the study done in a local setting are consistent with current knowledge on the transmission modes of MPX where transmission may occur via contact with body fluid and lesion material from infected individuals, or indirect contact via contaminated surfaces.

Although there is a likelihood of environmental transmission, thorough disinfection of case rooms will help to mitigate transmission risks.

What is the risk of occurrence of MPX virus in water?

Negligible. There is no evidence to date that suggest the presence of MPX virus in water sources used for drinking water production. In addition, the multi-barrier water treatment process chemically treats, filters, and disinfects raw water to remove harmful bacteria and viruses, to produce safe drinking water. There is therefore negligible risk of MPX virus contaminating our drinking water supply.

Update on wastewater surveillance of MPX virus

NEA and NCID's study found MPX virus DNA in the gully trap of the patient's room, providing direct evidence to support wastewater surveillance for MPX.

NEA has conducted wastewater testing of more than 470 wastewater samples collected from 77 sites across Singapore from June-October 2022. MPX genetic material was not detected in wastewater samples. These sites include water reclamation plants, ports of

entry, and community testing points, providing situational assessment of MPX virus transmission in Singapore. More importantly, the risk of transmission through wastewater is negligible as there is no evidence of infectious MPX virus present in wastewater.

Special feature: Epidemic Intelligence from Open Sources Workshop for One Health Agencies

The Epidemic Intelligence from Open Sources (EIOS) initiative, led by the WHO's Health Emergencies Programme, is a unified all-hazards, One Health approach to early detection, verification, assessment and communication of public health threats using publicly available information. It is supported by the EIOS system, a web-based platform for public health intelligence activities, that collates hundreds of thousands of articles from a broad range of sources and categorizes them by topic, country, language, source, and contextual indices. Registered users can interact with EIOS individually and collaboratively with others within organisations, navigating the ocean of publicly available information and assessing them, identifying public health events in a fraction of the time it would otherwise take.

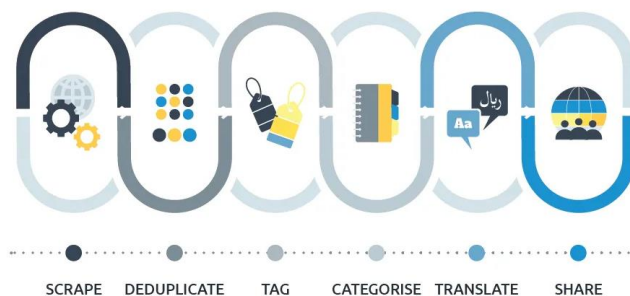


Figure 1: EIOS system technology and process (Source: EIOS)



Figure 2: EIOS Workshop for One Health agencies, 26-29 April 2022

Twenty-five officers from One Health Agencies comprising the Ministry of Health, the National Environment Agency, the National Parks Board, the Singapore Food Agency, and PUB, Singapore's National Water Agency participated in a face-to-face training on the EIOS system from 26-29 April 2022. The workshop was conducted by members of the EIOS core team, alongside experts from the World Organisation for Animal Health (WOAH) and the Food and Agriculture Organization (FAO) who joined remotely. Participants were trained on key principles of PHI and event-based surveillance, the EIOS system and application in their respective agencies. Discussions were held on identifying areas and ways for collaboration among the agencies to improve One Health coordination at the national level.

References

1. Shepherd *et al.* (2022). The risk of reverse zoonotic transmission to pet animals during the current global monkeypox outbreak, United Kingdom, June to mid-September 2022. *Euro Surveillance* 27(39): 2200758
2. Marimuthu *et al.* (2022). Viable monkeypox virus in the environment of a patient room. *medRxiv* 2022.09.15.22280012. *Preprint*.

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