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## Correspondence

## The 2022 monkeypox outbreak: Lessons from the 640 cases in 36 countries



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## Dear Editor,

Since the beginning of 2020, the world has been grappling with the ongoing COVID-19 pandemic. Coincidentally, in May 2022, at least 640 suspected or confirmed cases of the monkeypox virus (MPXV) were documented in 36 countries of different continents (Table 1) [1]. This virus was first discovered in 1958 by Preben von Magnus in laboratory crab-eating Macaques, *Macaca fascicularis* [2–4]. MPXV is an enveloped, double-stranded DNA virus of genus *orthopoxvirus* and family *Poxviridae* which are all antigenically interrelated and cause relatively similar symptoms. MPXV can infect, and be detected in, a large range of hosts including non-human primates, African squirrels, and rodents [4,5]; its spillover occasionally causes sporadic infections among humans [6].

## Implications of the 2022 monkeypox outbreak

The transition of endemic monkeypox into an epidemic has intensified public-health concerns. The rapid spread of MPXV among distant WHO regions has also reignited debate about its exact transmission routes, especially that cases with the present viral clades have emerged outside the endemic African countries (Fig. 1, Table 1). This is concerning also because travel links were not found between positive cases in the UK or other countries [7,8], suggesting that MPXV particles may have disseminated by asymptomatic carriers in some regions until they have become detectable as symptomatic cases. Subsequent cases confirm that close contact causes viral transmission.

Clinical symptoms due to zoonotic monkeypox are similar to those caused by the smallpox virus in humans. Nevertheless, MPXV cases are slightly less severe or even sub-clinical compared to smallpox cases. Some patients infected with MPXV, especially immunocompromised individuals, will need hospital care. A considerable proportion of the patients, however, will experience mild symptoms for 2–4 weeks. The case-fatality ratio due to MPXV infections historically has been 1–10%; no fatality has been officially reported during the 2022 outbreak so far.

Though the present ongoing outbreak seems to be containable, the case numbers will expectedly increase soon, and this epidemic will grow [9].

Consequently, the priority should be to halt further MPXV transmission and spread to other countries [10]. Investigators should determine if a cluster of mutations may have facilitated efficient recombination to allow MPXV to gain high transmission capability in human hosts [11,12] because MPXV is a DNA virus, and a high mutation rate to facilitate its evolution is inconceivable. Sufficient sequencing evidence will confirm emergence of any new MPXV clade, and expansive sequencing programs will better facilitate the management of the outbreak. Tecovirimat is a useful antiviral against MPXV at least for patients at risk of severe prognoses [11,13–15]; however, this medication is not widely available. Smallpox and monkeypox vaccines are formulated based on a vaccinia virus and confer cross-protection due to immune response to *orthopoxviruses*. Emergence of the 2022 MPXV outbreak is likely due to abandonment of the global smallpox vaccination programs, rendering a massive proportion of the world population vulnerable to monkeypox because of loss of immunity against *orthopoxviruses*. Thus, clinical, public-health, and vaccination strategies against members of *orthopoxviruses* should be revisited and reinvestigated.

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**Table 1**

Distribution of the 641 reported cases of monkeypox among 36 countries (a 30-day profile of monkeypox epidemic; detailed data are available at <https://ourworldindata.org/monkeypox>).

Countries	May 30, 2022	Absolute Change
Argentina	2	+2
Australia	2	+2
Austria	1	+1
Belgium	9	+9
Bolivia	1	+1
Brazil	1	+1
Canada	65	+55
Czechia	5	+5
Denmark	2	+2
Ecuador	1	+1
Finland	1	+1
France	16	+16
French Guiana	2	+2
Germany	23	+23
Greece	1	+1
Iran	6	+6
Ireland	2	+2
Israel	4	+4
Italy	16	+16
Malaysia	0	+0
Malta	1	+1
Mexico	1	+1
Morocco	3	+3
Netherlands	32	+32
Pakistan	1	+1
Peru	1	+1
Portugal	96	+76
Slovenia	2	+2
Spain	210	+187
Sudan	1	+1
Sweden	2	+2
Switzerland	4	+4
Thailand	3	+3
United Arab Emirates	4	+4
United Kingdom	106	+97
United States	14	+13
World	641	+578

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This article does not require any human/animal subjects to acquire such approval.

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**Author contribution**

**Amin Talebi Bezmin Abadi:** Conceptualization, Data Curation, Writing – Original Draft, Writing – review & editing.

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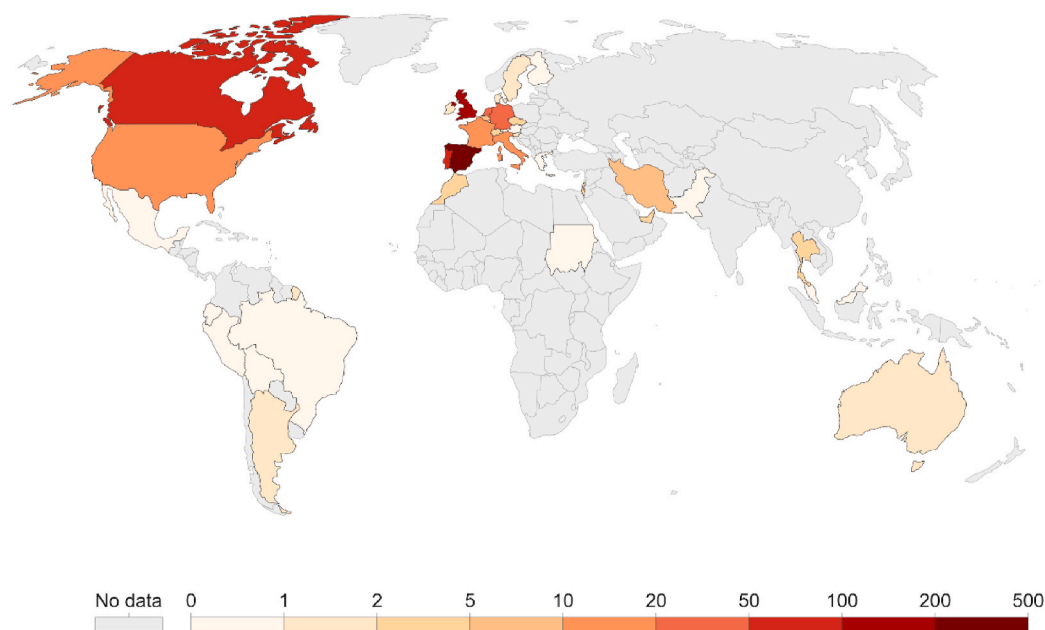
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**Fig. 1.** Global distribution of the 641 confirmed or suspected cases of MPXV recorded until 30 May 2022 (<https://ourworldindata.org/monkeypox>).

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijss.2022.106712>.

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