Monkeypox Epidemiology and Transmission Update

Dr Boris Pavlin
WHO HQ Monkeypox Epidemiology Pillar Lead

World Health Organization

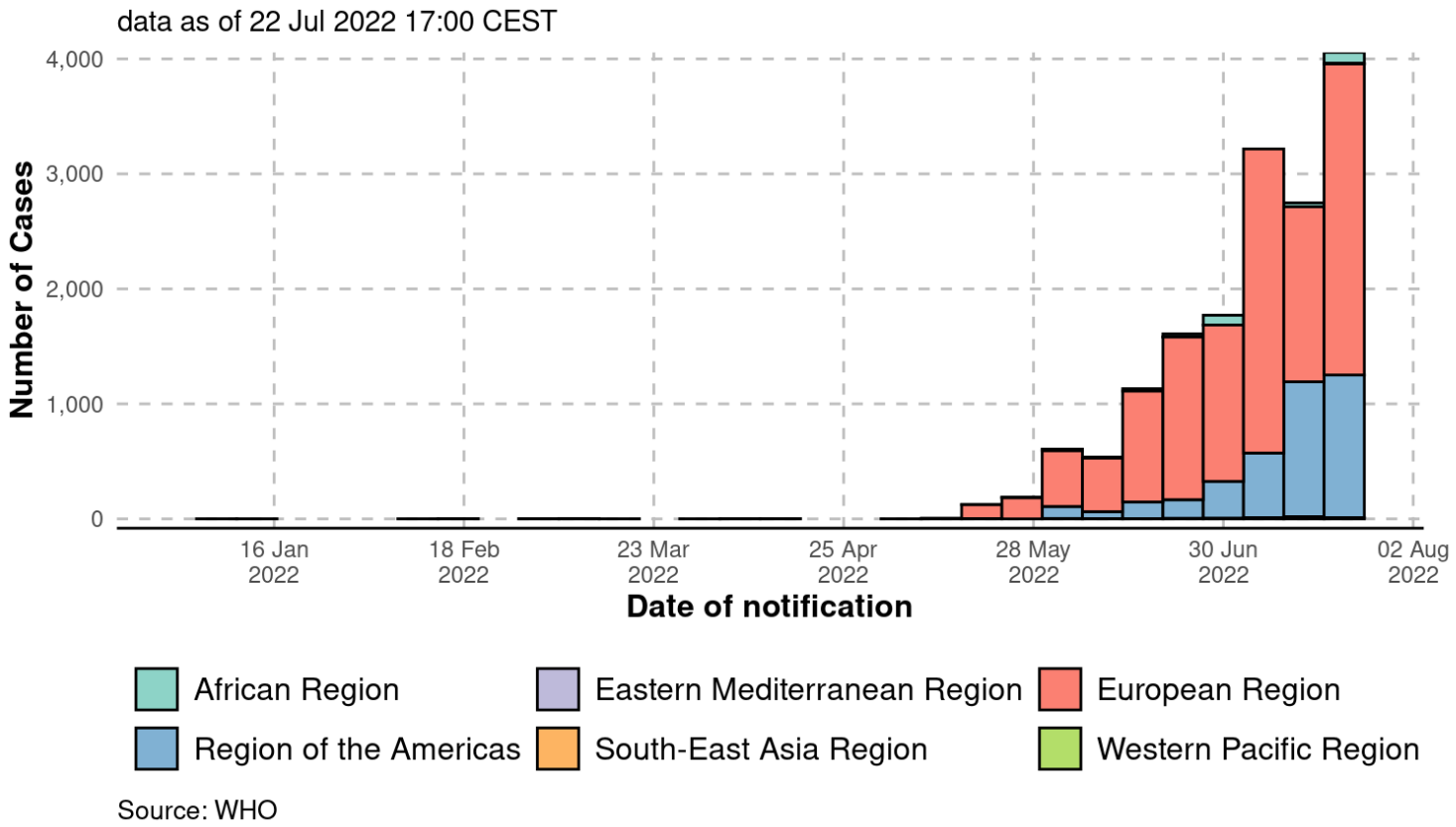
HEALTH EMERGENCIES programme

Global Epidemiological Situation

Confirmed cases by date of notification

- Since 1 Jan 2022, cases reported to WHO from **75 Member States /** territories across all **6 WHO regions**

- As of 22 July 2022, at 17h CEST, a total of **16016 laboratory confirmed cases**, including **5 deaths (Nigeria 3, CAR 2)**, have been reported to WHO



Number of cases and deaths by country reported to WHO

- Since 1 Jan 2022, cases reported to WHO from **72 Member States /** territories across all **6 WHO regions**

- As of 20 July 2022, at 17h CEST, a total of **14,533 laboratory confirmed cases**, including **5 deaths (Nigeria 3, CAR 2)**, have been reported to WHO

Total Monkeypox cases, by WHO region

From 1 Jan 2022. Data as of 22 Jul 2022

	Total Confirmed Cases	Total Probable Cases	Total Deaths
European Region			
Spain	3,125	0	0
Germany	2,268	0	0
The United Kingdom	2,137	0	0
France	1,453	0	0
Netherlands	712	0	0
Portugal	588	0	0
Italy	374	0	0
Belgium	312	0	0
Switzerland	216	0	0
Israel	105	0	0
Austria	91	0	0
Sweden	77	0	0
Ireland	69	0	0
Denmark	51	0	0
Norway	46	0	0
Poland	40	0	0
Hungary	33	0	0
Slovenia	27	0	0
Greece	20	0	0
Romania	19	0	0
Malta	17	0	0
Czechia	14	0	0
Luxembourg	14	0	0
Finland	13	0	0
Iceland	9	0	0
Croatia	8	0	0
Gibraltar	5	0	0
Serbia	5	0	0
Estonia	4	0	0
Bulgaria	3	0	0
Latvia	3	0	0
Slovakia	3	0	0
Bosnia and Herzegovina	1	0	0
Georgia	1	0	0
Russian Federation	1	0	0
Türkiye	1	0	0
Region of the Americas			
United States of America	2,316	0	0
Canada	615	71	0
Brazil	592	0	0
Peru	126	0	0
Mexico	52	0	0
Chile	20	1	0
Argentina	18	0	0
Puerto Rico	11	0	0
Colombia	10	0	0
Dominican Republic	3	1	0
Ecuador	2	0	0
Bahamas	1	0	0
Jamaica	1	0	0
Panama	1	0	0
Venezuela (Bolivarian Republic of)	1	0	0
Barbados	1	0	0
Martinique	1	0	0
Costa Rica	1	0	0
African Region			
Democratic Republic of the Congo	163	0	0
Nigeria	101	0	3
Ghana	19	0	0
Cameroon	7	0	0
Benin	3	0	0
Central African Republic	3	0	2
South Africa	3	0	0
Congo	2	0	0
Western Pacific Region			
Australia	42	0	0
Singapore	6	0	0
New Zealand	2	0	0
China	2	0	0
Republic of Korea	1	0	0
New Caledonia	1	0	0
Eastern Mediterranean Region			
United Arab Emirates	13	0	0
Lebanon	4	0	0
Saudi Arabia	2	0	0
Morocco	1	0	0
Qatar	1	0	0
South-East Asia Region			
India	2	0	0
Thailand	1	0	0
-			
Total	16,016	73	5

Source: WHO Data as of 18 July 2022 (17:00 CEST)

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Confirmed cases of Monkeypox

from 1 Jan 2022, as of 22 Jul 22

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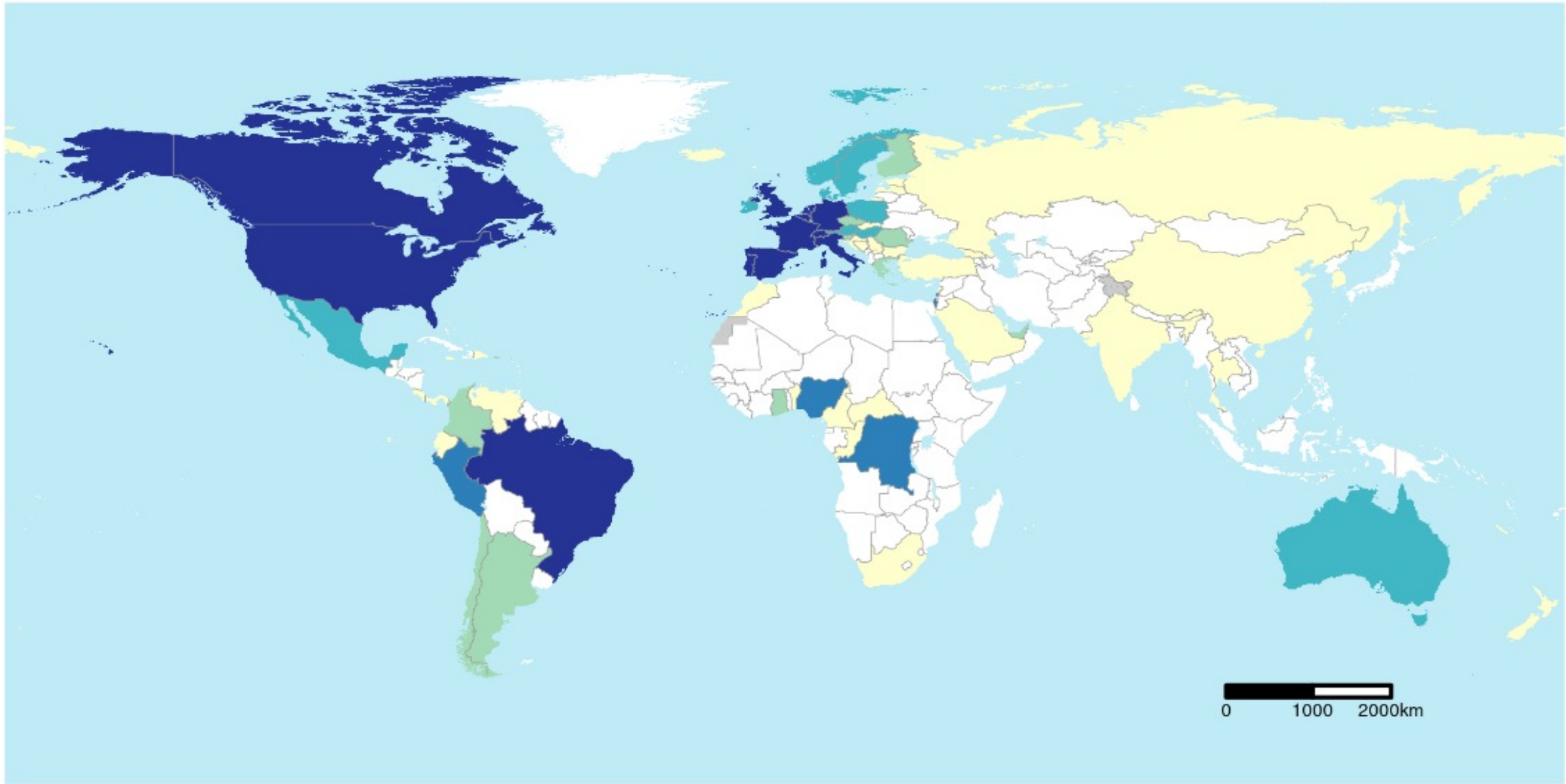
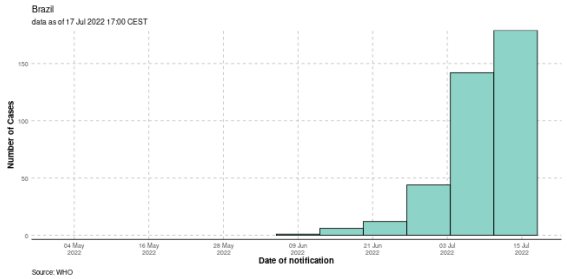


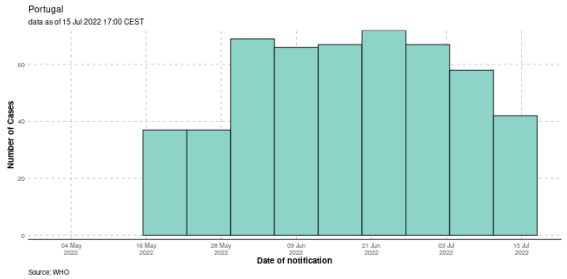
Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme

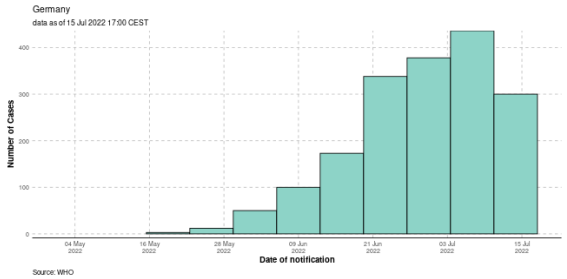
Top 10 countries epidemic curves by total reported cases

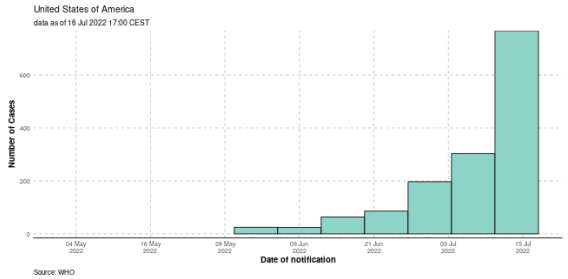
From event-based surveillance

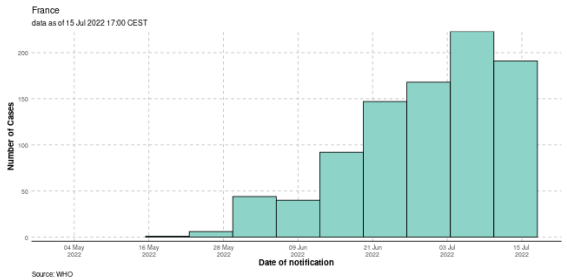
Note different y-axis scales

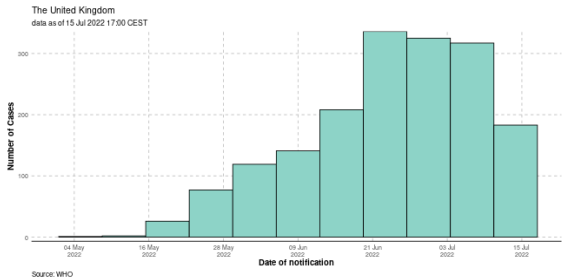


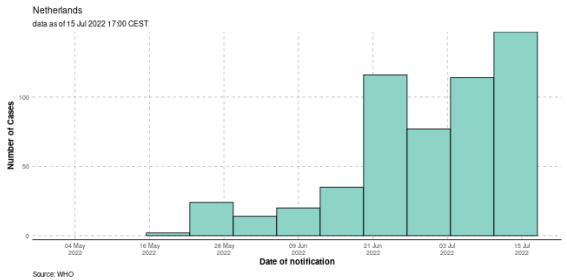


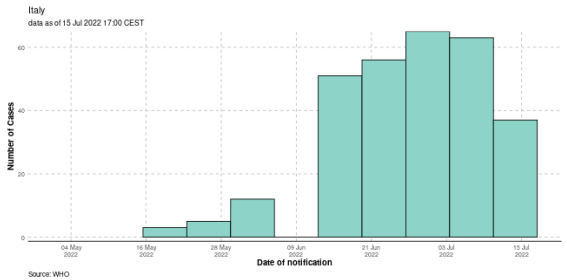


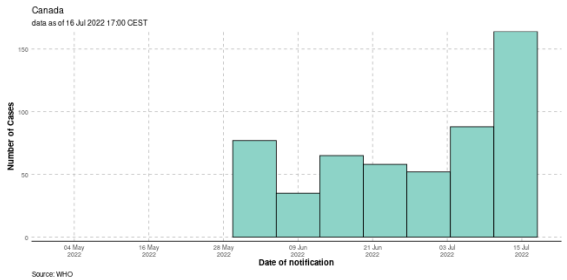


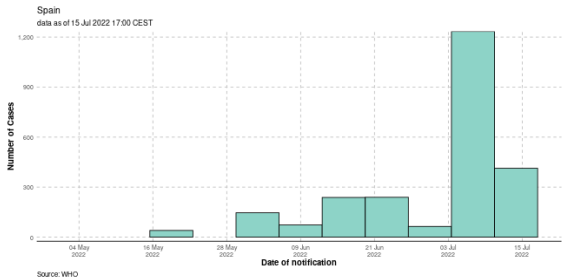












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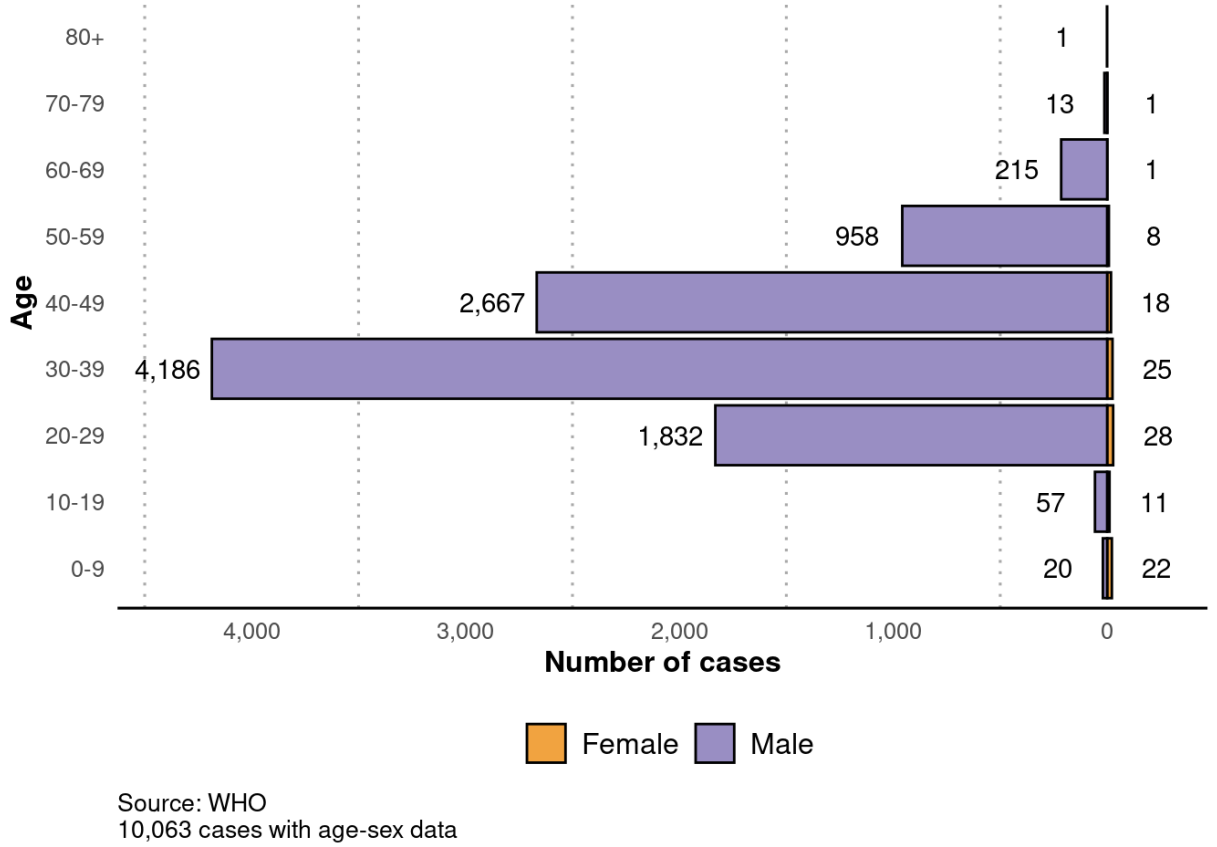
Case demographics (as of 19-Jul-2022)

- Detailed case data available for 11,315/13,884(87.4%) of confirmed cases
- **9,984 male (98.8%)**, 114 female
- **3,434 (98.1%) MSM**, 65 non-MSM
- **253 health workers** (including MSM; unreliable denominator)
- 2,580 (94.2%) of cases with known mode of transmission sexual, 160 transmission not sexual
- **Common exposure settings include parties, bars, and large gatherings**

N.B. Denominators above vary



Source: WHO
10,063 cases with age-sex data

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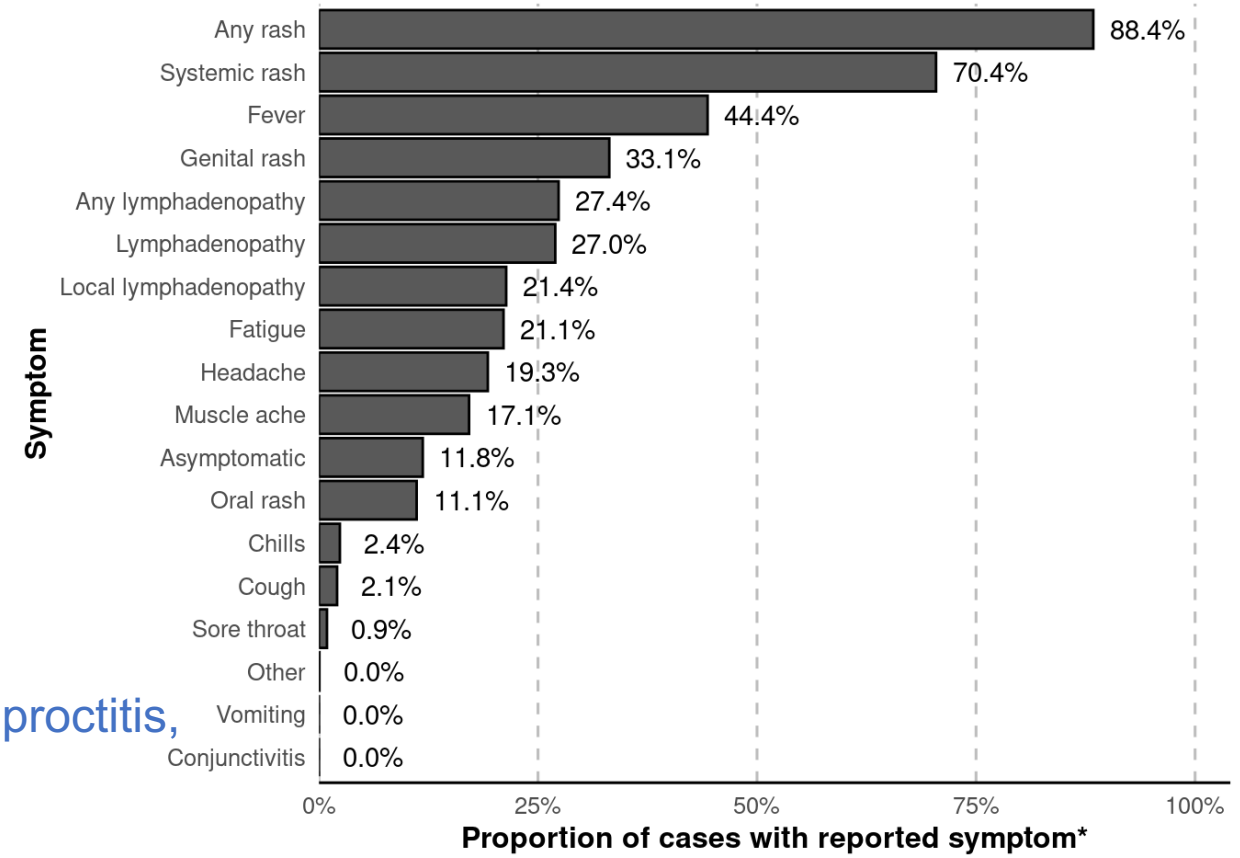
Symptoms and severity as of 19-7-2022

Photos: © UK Health Security Agency

a) early vesicle, 3mm diameter
b) small pustule, 2mm diameter
c) umbilicated pustule, 3-4mm diameter
d) ulcerated lesion, 5mm diameter
e) crusting of a mature lesion
f) partially removed scab



Source: WHO
*6585 cases with at least one reported symptom from a country where at least two uni used as denominator

Clinical features and severity

- New clinical syndromes being described: severe proctitis, urethritis and urinary retention
- 9% hospitalised (approx half for clinical care)
- Severe pain and secondary infections
- Encephalitis, few cases in ICU

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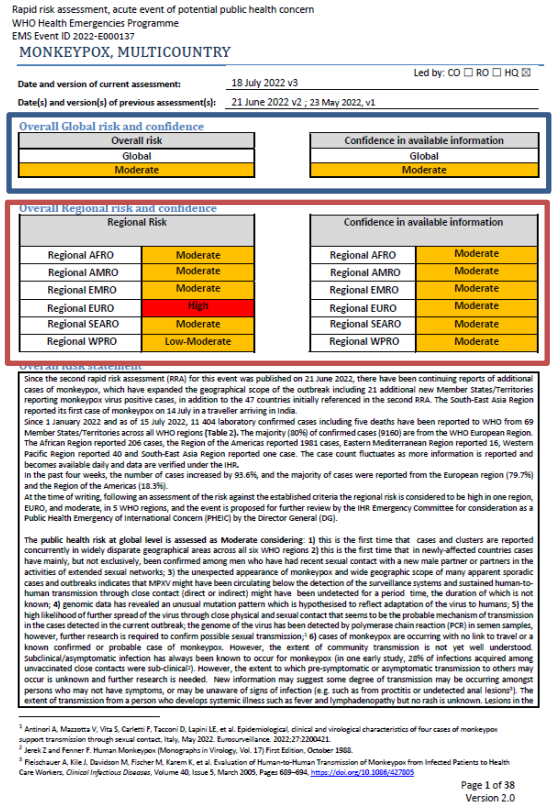
RRA update, version 3 (18 July; update to RRA version 2 on 21 June)



Rapid risk assessment, acute event of potential public health concern
WHO Health Emergencies Programme
EMS Event ID 2022-E000137

MONKEYPOX, MULTICOUNTRY

Led by: CO ☐ RO ☐ HQ ☒

Date and version of current assessment: 18 July 2022 v3

Date(s) and version(s) of previous assessment(s): 21 June 2022 v2 ; 23 May 2022, v1

Overall Global risk and confidence

Overall risk	Confidence in available information
Global	Global
Moderate	Moderate

Overall Regional risk and confidence

Regional Risk		Confidence in available information	
Regional AFRO	Moderate	Regional AFRO	Moderate
Regional AMRO	Moderate	Regional AMRO	Moderate
Regional EMRO	Moderate	Regional EMRO	Moderate
Regional EURO	High	Regional EURO	Moderate
Regional SEARO	Moderate	Regional SEARO	Moderate
Regional WPRO	Low-Moderate	Regional WPRO	Moderate

Since the second rapid risk assessment (RRA) for this event was published on 21 June 2022, there have been continuing reports of additional cases of monkeypox, which have expanded the geographical scope of the outbreak including 21 additional new Member States/Territories reporting monkeypox virus positive cases, in addition to the 47 countries initially referenced in the second RRA. The South-East Asia Region reported its first case of monkeypox on 14 July in a traveller arriving in India.
Since 1 January 2022 and as of 15 July 2022, 11 404 laboratory confirmed cases including five deaths have been reported to WHO from 69 Member States/Territories across all WHO regions (Table 2). The majority (80%) of confirmed cases (9160) are from the WHO European Region. The African Region reported 206 cases, the Region of the Americas reported 1981 cases, Eastern Mediterranean Region reported 16, Western Pacific Region reported 40 and South-East Asia Region reported one case. The case count fluctuates as more information is reported and becomes available daily and data are verified under the IHR.
In the past four weeks, the number of cases increased by 93.6%, and the majority of cases were reported from the European region (79.7%) and the Region of the Americas (18.3%).
At the time of writing, following an assessment of the risk against the established criteria the regional risk is considered to be high in one region, EURO, and moderate, in 5 WHO regions, and the event is proposed for further review by the IHR Emergency Committee for consideration as a Public Health Emergency of International Concern (PHEIC) by the Director General (DG).

The public health risk at global level is assessed as Moderate considering: 1) this is the first time that cases and clusters are reported concurrently in widely disparate geographical areas across all six WHO regions 2) this is the first time that in newly-affected countries cases have mainly, but not exclusively, been confirmed among men who have had recent sexual contact with a new male partner or partners in the activities of extended sexual networks; 3) the unexpected appearance of monkeypox and wide geographic scope of many apparent sporadic cases and outbreaks indicates that MPXV might have been circulating below the detection of the surveillance systems and sustained human-to-human transmission through close contact (direct or indirect) might have been undetected for a period time, the duration of which is not known; 4) genomic data has revealed an unusual mutation pattern which is hypothesised to reflect adaptation of the virus to humans; 5) the high likelihood of further spread of the virus through close physical and sexual contact that seems to be the probable mechanism of transmission in the cases detected in the current outbreak, the genome of the virus has been detected by polymerase chain reaction (PCR) in semen samples, however, further research is required to confirm possible sexual transmission;[1] 6) cases of monkeypox are occurring with no link to travel or a known confirmed or probable case of monkeypox. However, the extent of community transmission is not yet well understood. Subclinical/asymptomatic infection has always been known to occur for monkeypox (in one early study, 28% of infections acquired among unvaccinated close contacts were sub-clinical[2]). However, the extent to which pre-symptomatic or asymptomatic transmission to others may occur is unknown and further research is needed. New information may suggest some degree of transmission may be occurring amongst persons who may not have symptoms, or may be unaware of signs of infection (e.g. such as from proctitis or undetected anal lesions[3]). The extent of transmission from a person who develops systemic illness such as fever and lymphadenopathy but no rash is unknown. Lesions in the

[1] Antinori A, Mazzotta V, Vita S, Carletti F, Tacconi D, Lapini LE, et al. Epidemiological, clinical and virological characteristics of four cases of monkeypox support transmission through sexual contact, Italy, May 2022. Eurosurveillance. 2022;27:2200421.
[2] Jeek Z and Fenner F. Human Monkeypox (Monographs in Virology, Vol. 17) First Edition, October 1988.
[3] Fleischauer A, Kile J, Davidson M, Fischer M, Karem K, et al. Evaluation of Human-to-Human Transmission of Monkeypox from Infected Patients to Health Care Workers. *Clinical Infectious Diseases*, Volume 40, Issue 5, March 2005, Pages 689–694, https://doi.org/10.1086/427805

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Version 2.0

- Overall global risk remains **Moderate (Moderate in all regions except High in EUR)**
- **Main factors in level of risk:**
  - First time that cases and clusters are reported **concurrently in widely disparate locations**
  - First time cases are mainly in MSM in extended **sexual networks**
  - Many apparent sporadic cases indicates that MPXV **may have circulated undetected for some time**
  - Mutations suggest **adaptation to human host**
  - High risk if MPXV exploits **ecological niche of smallpox**
  - **Low population immunity**
  - Possible **pre-symptomatic or asymptomatic transmission**
  - **Limited surveillance and clinical experience**
  - **Limited diagnostics, therapeutics and vaccines**
  - Presently **low mortality but could increase** if reaches groups at high risk for severe disease

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Monkeypox

- **Transmission – Considerations for declaring a Public Health Emergency of International Concern (PHEIC)**

IHR – Emergency Committee – Considerations

	Consideration	Source(s) data/information	Assessment	Level of confidence
1	Increase in the rate of growth of cases reported in the next 21 days, both among and beyond the population groups currently affected	• Quantitative — Case Reporting Forms shared by States Parties — 87.4% of cases with CRF, reported from 01 Jan 2022 to 19 Jul 2022 (n=11,315)	• **MINIMAL** — Growth in MSM – 3434 vs 730 (+2704 cases) — Growth outside MSM – >65 vs 4 (at least +61 cases) — The ratio is 98.1% MSM for known orientation (increased from last EC) — R0 >1 in high contact settings	High

IHR – Emergency Committee – Considerations

	Consideration	Source(s) data/information	Assessment	Level of confidence
2	Significant spread within and to additional countries	• Quantitative — Notifications by States Parties to WHO	• **YES** — At last EC, 3040 cases from 47 Members States and territories in five WHO regions. — As of 19 July, 13,884 (+357%) from 71 MS/territories (+51%) from **six** WHO regions (SEARO reported on 14/7) — New countries in AFR since 21 June: Benin , South Africa; — Jan to 21 June 2022: Ghana — Prior to 2022: Cameroon, CAR, Congo, DRC, Nigeria — Continued spread within large countries: Spain, UK, USA	Moderate
3	Significant increases in number of cases and spread in endemic countries	• Quantitative — Notifications by States Parties to WHO	• **YES** — Countries with confirmed cases: Number of cases increased in Cameroon, CAR, Congo, DRC and Nigeria.	Moderate

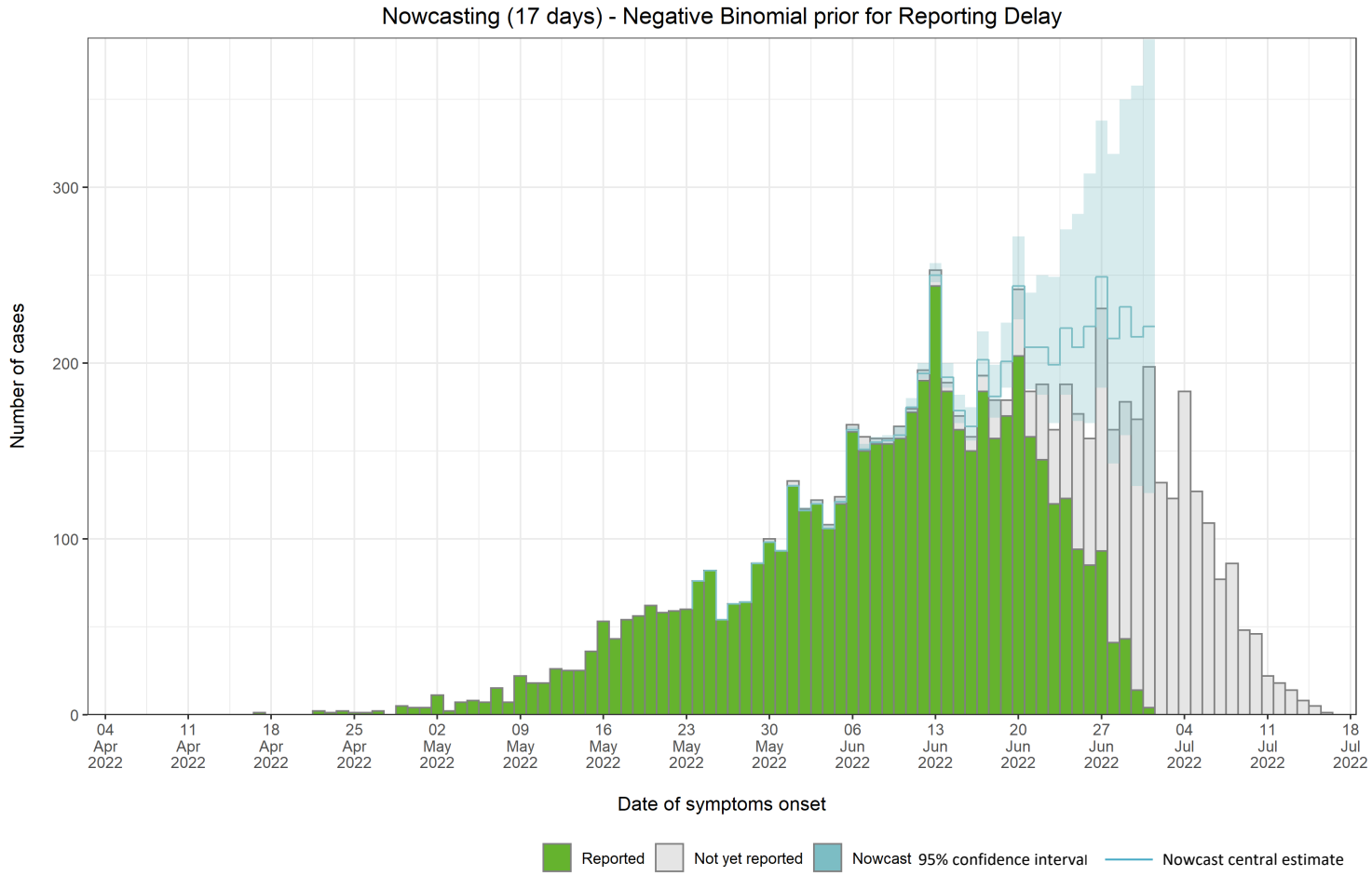
IHR – Emergency Committee – Considerations

	Consideration	Source(s) data/information	Assessment	Level of confidence
4	Occurrence of cases among sex workers	• Quantitative — Case Reporting Forms shared by States Parties • Qualitative — Event-based surveillance — Social media listening	• **NO /Uncertain** — No sex workers reported amongst cases with info — No other high-risk settings/populations reported through EBS — *Twitter: Anecdotal info from health care provider on continuing sexual services 2x/day in meth user with MPX to enable continuing purchase of meth. June 2022* — *Twitter: 'And don't believe the whole 'we just found the first woman with monkeypox' thing. The medical establishment isn't listening to women, especially sex workers, on this issue'*	Moderate
5	Increase in number of cases in vulnerable groups, such as immunosuppressed individuals, including with poorly controlled HIV infection, pregnant women, and children	• Quantitative — Case Reporting Forms shared by States Parties • Qualitative — Event-based surveillance	• **MINIMAL outside Africa** — Cases in vulnerable groups: Relatively few to date — 42 persons under 10 years old, — One pregnant woman, confirmed MPX reported few days after delivery; infant developed symptoms after birth — HIV+ 40% among mpx+ but no info on HAART • PATTERN SUSTAINED in Africa — Deaths (3) among confirmed cases in Nigeria (1 renal illness; 2 no further details) — No info on deaths among 2 confirmed cases in CAR — No info on >70 deaths among suspected cases in DRC	High outside Africa Low in Africa (case data not yet received from several countries)

IHR – Emergency Committee – Considerations

	Consideration	Source(s) data/information	Assessment	Level of confidence
6	Increased severity in reported cases (i.e. increased morbidity or mortality and rates of hospitalization)	• Quantitative — Case Reporting Forms shared by States Parties • Qualitative — Event-based surveillance	• **MINIMAL /Uncertain** — Severity: Minimal change to date — Hospitalisations for pain, secondary infections — Encephalitis (new: USA: 1) — ICU admission (Can (new): 1 adult; UK 2 adult/infant) — No deaths outside Africa	High
7	Reverse spillover to the animal population	• Qualitative — Event-based surveillance — World Animal Health Information System (WAHIS)	• **NO** — None identified/reported — None identified/reported	Moderate
8	Significant change in viral genome associated with phenotypic changes, leading to enhanced transmissibility, virulence or properties of immune escape, or resistance to antivirals, and reduced impact of countermeasures	• In silico analysis • Laboratory experiments	• **Under investigation**	Low
9	Clusters of cases associated with clades of greater virulence detected in new countries	• Published case reports; IDSR (AFRO)	• **NO** All confirmed cases in newly- affected countries are of WA/2 clade. No cases of CB clade have been reported	Low

Nowcasting of cases with delay in reporting – Global



Source: ECDC

Clinical and IPC - emerging evidence

Continue to monitor emerging evidence

- Environment; surface and air sampling was RT –PCR positive
  - Further studies are needed to evaluate significance of this for transmission of Monkeypox.

- Clinical features and bodily fluids
  - New clinical syndromes being described: severe proctitis, urethritis and urinary retention
  - Detection of monkeypox viral DNA in clinical samples such as saliva, semen (Spain), also nasopharyngeal swabs, faeces

- Subclinical / asymptomatic MPXV infection
  - Subclinical infection is known to occur (28% of unvaccinated cases in DRC, 1988)
  - New identification of possible asymptomatic infection (Belgium)
  - Limitations: small sample size (3 men)
  - Implications unclear

- Asymptomatic transmission
  - Prodromal period 'presumed infectious period'
  - Otherwise not known

EURO Database of Upcoming Mass Gatherings/Large Events: Targeted Events in Week 29

- From 17 to 23 July 2022, **17 events** will take place in 12 countries in the Region including 7 pride festivals, 7 music festivals and 3 international sport events. Each of these gatherings attract on average between 10,000 to 250,000 participants.

- June was Pride month

- **Pride events in the Region** still taking place
  - **July (22 events, 11 MS)** and
  - **August (15 events, 10 MS)**

Start date	End date	Event Name	Event Type	Event City	Host Country/Area
1-Jul	17-Jul	FIH Women's Hockey World Cup	Sports	Amsterdam & Terrassa	Netherlands & Spain
8-Jul	17-Jul	Umbria Jazz	Music Festival	Perugia	Italy
10-Jul	17-Jul	The Open Championships	Sports	Fife	United Kingdom (Scotland)
12-Jul	17-Jul	Jazz de Vitoria-Gasteiz	Music Festival	Vitoria-Gasteiz	Spain
14-Jul	17-Jul	Benicassim	Music Festival	Valencia	Spain
14-Jul	17-Jul	Brighton Bear Festival	Pride	Brighton	United Kingdom (England)
15-Jul	17-Jul	CSD Munich	Pride	Munich	Germany
15-Jul	17-Jul	CSD Frankfurt	Pride	Frankfurt	Germany
15-Jul	17-Jul	Ok Fest	Music Festival	Tjentiste	Bosnia and Herzegovina
15-Jul	17-Jul	Kol Festival	Music Festival	Bokonbaevo	Kyrgyzstan
16-Jul	17-Jul	Stadtfest Berlin 2022	Pride	Berlin	Germany
21-Jul	23-Jul	Hills of Rock Plovdiv	Music Festival	Plovdiv	Bulgaria
21-Jul	24-Jul	Latitude Festival	Music Festival	Suffolk	United Kingdom (England)
22-Jul	24-Jul	Berlin Pride/CSD Berlin	Pride	Berlin	Germany
22-Jul	31-Jul	Belfast Pride	Pride	Belfast	United Kingdom (Northern Ireland)
22-Jul	31-Jul	Police and Fire Games	Sports	Rotterdam	Netherlands
23-Jul	23-Jul	Budapest Pride	Pride	Budapest	Hungary

Human-animal interface

- **Evidence of animal infection/susceptibility:**
  - Several non-human primates, rodents and other small mammals (e.g. shrews)
  - No documented evidence of domestic animals or livestock being affected
  - Transmission from humans to animals has not been documented

Zoonotic transmission >>> H2H transmission

Disease in the wild

Increasing use of the forest

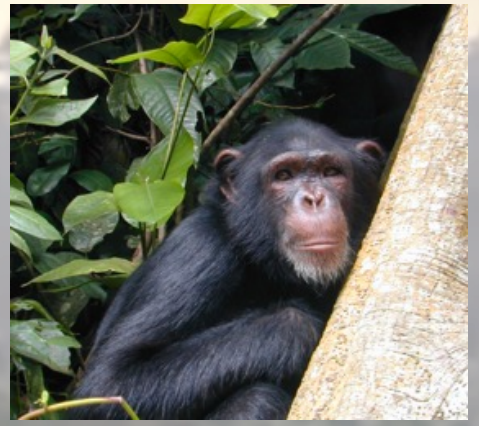
Intense use of the forest
Demography, urbanisation

Urbanisation and promiscuity
Very low remaining vacc. coverage

Human-animal interface: looking for the reservoir

Butiaba naked-tailed shrew
Crocidura littoralis

Thomas's rope squirrel
Funisciurus anerythrus



African dormice
Graphiurus lorraneus

Lunda rope squirrel
Funisciurus bayonii

Giant pouched rats
Cricetomys sp,

target rat
Stochomys longicaudatus

Human-animal interface: risks with fauna in newly infected countries

Type of anl	Species	Suscept	contact	risk	Comments
Livestock	Cattle, small rum	-	++++	-	
Usual pets	Cats, dogs, ferrets	-	++++	-	
Exotic / new pets	Rabbit	+/- (new borne)	+++	-	
	Rats, mouse	- (+++ nb)	++++	- (++ nb)	
	Hamster, guinea pigs	- (+++ nb)	++++	- (++ nb)	
	Siberian chipmunk	+++	+++	+++	In theory but no trade
Wild synanthropic fauna	Rats, mouse	- (++ nb)	++	-	
	Dormice, hedgehog	+	+	-	
Wild non synanthropic fauna	Red squirrel	+++	-	-	
	Grey squirrel	+++	++	+++ TBC	

Adapted from N. Haddad, Vet School Maisons Alfort, https://www.youtube.com/watch?v=Vjvji3k2GIw

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Questions:

- How do we know if the animal is infected with monkey pox? is there any signs & symptoms which can be seen on the animals
- Is there any risk for pandemic spread?
- Is it necessary to start the vaccination for the high risk population?
- What are the most important international precautions which may help in preventing transboundary spread?
- Why is monkeypox spreading among MSM?
- Is there any asymptomatic monkeypox infection reported? Can it happen?
- How can vaccines prevent monkeypox infection?
- What is the efficacy for a vaccine to prevent monkeypox infection?
- Whether there are Asymptomatic cases ? whether they transmit the virus?
- During Pre-symptomatic phase, does the case transmit the virus ?
- Will the Monkey Pox transmitted through aerosol
- Will the Monkey Pox transmitted through food