

Preplanned Studies

The Epidemiological Characteristics of Mpox Cases — China, 2023

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Summary**What is already known about this topic?**

Since May 2022, a global outbreak of mpox has emerged in more than 100 non-endemic countries. As of December 2023, over 90,000 cases had been reported. The outbreak has predominantly affected men who have sex with men (MSM), with sexual contact identified as the principal mode of transmission.

What is added by this report?

Since June 2023, China has faced an occurrence of mpox, predominantly affecting the MSM population. Approximately 90% of those affected reported engaging in homosexual behavior within 21 days prior to symptom onset, a trend that aligns with the global outbreak pattern. The prompt identification of cases, diligent tracing of close contacts, and the implementation of appropriate management strategies have successfully mitigated the spread of mpox virus in China.

What are the implications for public health practice?

We propose that mpox is transmitted locally within China. Drawing from our experiences in controlling the virus spread, it is crucial to investigate and formulate effective surveillance and educational strategies. Importantly, we must encourage high-risk populations to promptly seek medical care upon the onset of symptoms.

In May 2023, the WHO declared the termination of the Public Health Emergency of International Concern (PHEIC) initiated in July 2022 due to the mpox outbreak (1). During the PHEIC, China reported only one imported case in September 2022 (2). Subsequent to this, in June 2023, China reported its first local mpox cases. By December 31, 2023, there were 1,712 confirmed cases across 29 provincial-level administrative divisions (PLADs). Our study used national surveillance data, including all confirmed

mpox cases reported following a standardized protocol and unified epidemiological form, to delineate the key epidemiological characteristics of the mpox cases reported in China from June to December 2023, thereby enhancing the understanding of the outbreak's initial local transmission dynamics.

Case surveillance, diagnosis, contact tracing, and management were conducted in adherence to the Mpox Prevention and Control Protocol. Local CDCs supplied detailed epidemiological data through comprehensive investigations following the identification of suspected or confirmed mpox cases. All case information was collected in line with the “Law of the People’s Republic of China on Prevention and Treatment of Infectious Diseases,” under the provisions for emergency response, thereby exempting the study from requiring ethics approval and participant consent. Additionally, individual data were de-identified to ensure patient privacy and confidentiality.

Descriptive statistics were used to summarize the epidemiological characteristics of the mpox cases. An epidemic curve, constructed from the dates of illness onset and diagnosis, depicted the trend of the epidemic. Demographic and epidemiological attributes of confirmed cases were presented on a monthly basis, using both absolute and relative frequencies. It should be noted that variations in case numbers across different categories may arise from incomplete data.

Among the 29 PLADs that reported confirmed cases of mpox, the highest numbers were observed in Guangdong, Beijing, Zhejiang, Sichuan, and Jiangsu, with counts of 342, 258, 183, 142, and 123 cases, respectively. Together, these regions accounted for 61.21% of all reported cases. Additionally, 24 PLADs (approximately 80%) reported fewer than 100 cases each, and 8 reported fewer than 10 cases.

According to the onset date curve depicted in Figure 1A, the initial case of mpox likely occurred in late May, succeeded by a steady rise in case numbers through the first 20 days of June. From late June

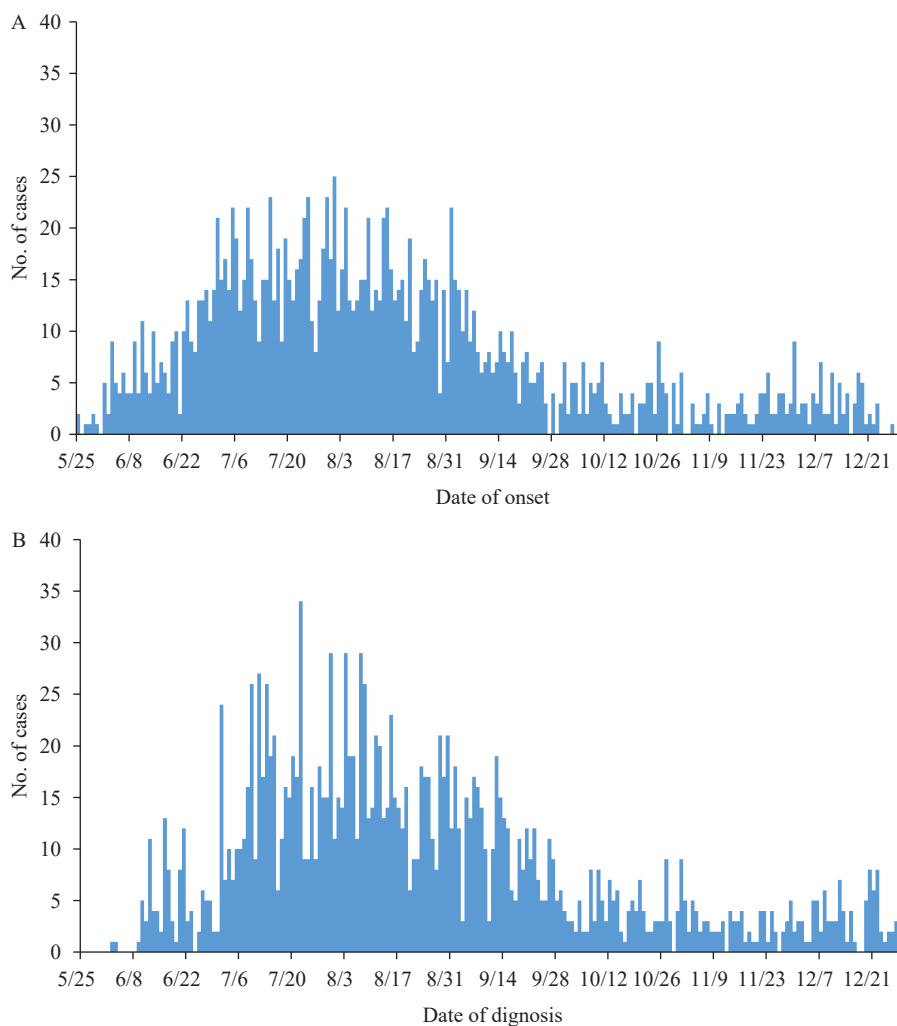


FIGURE 1. Epidemiological curves of confirmed mpox cases in China, June to December 2023. (A) Number of cases by date of onset; (B) Number of cases by date of diagnosis.

through the first week of July, there was a sharp increase in the number of incidences. Concurrently, the geographical spread of the cases widened. The incidence began to diminish in September, stabilizing at relatively low levels through November and December, with an average daily incidence of fewer than three cases. The diagnosis date curve, shown in Figure 1B, mirrored this trend.

Among the confirmed cases, 1,702 (99.42%) were male, while 10 (0.58%) were female. The median age of the affected individuals was 31 years, with a range from 15 to 71 years. Notably, 112 (6.54%) cases were individuals born before 1980, who, likely in accordance with the vaccination policies of China at that time, may have received the smallpox vaccine. The predominant demographic, representing 84.17% (1,441/1,712), comprised males aged between 18 and 39 years. Based on their current residential districts,

most cases were inferred to reside in urban areas, with only approximately 72 cases residing in towns or rural locations. Regarding occupation, the most frequently reported was “unemployed,” accounting for 39.54% of all cases (677/1,712). This was followed by positions in commercial services (23.01%, 394/1,712), office workers (8.53%, 146/1,712), and laborers (8.29%, 142/1,712). Additionally, there were 56 cases who were students; this group included 6 individuals under the age of 18, composed of 5 males and 1 female (Table 1).

Among the 1,654 male cases for which relevant information was provided, 94.68% (1,566/1,654) were identified as men who have had sex with men (MSM). Of these, 8.81% (138/1,566) reported being married to women. All 10 female cases reported being heterosexual.

Among the cases for which epidemiological data

TABLE 1. Characteristics of confirmed mpox cases in China, 2023.

Characteristics	June	July	August	September	October	November	December	Total
Sex (N)	106	491	501	305	127	80	102	1,712
Male	106	491	496	303	125	80	101	1,702
Female			5	2	2		1	10
Age (years), % (n)	106	491	501	305	127	80	102	1,712
15–17	0	0.2 (1)	1 (5)	0	0	1.25 (1)	0.98 (1)	0.47 (8)
18–29	39.62 (42)	38.7 (190)	41.52 (208)	40 (122)	47.24 (60)	30 (24)	40.2 (41)	40.13 (687)
30–39	51.89 (55)	45.82 (225)	44.11 (221)	42.3 (129)	40.94 (52)	47.5 (38)	39.22 (40)	44.39 (760)
40–49	6.6 (7)	12.83 (63)	11.38 (57)	15.08 (46)	8.66 (11)	21.25 (17)	18.63 (19)	12.85 (220)
50–59	1.89 (2)	2.24 (11)	1.6 (8)	2.62 (8)	1.57 (2)	1.25 (1)	0.98 (1)	1.93 (33)
≥60	0	0.2 (1)	0.4 (2)	0	0.79 (1)	0	0	0.23 (4)
Sex orientation in men, % (n)	106	490	490	294	111	71	92	1,654
MSM	95.28 (101)	96.53 (473)	93.88 (460)	93.88 (276)	92.79 (103)	94.37 (67)	93.48 (86)	94.68 (1,566)
Self-denial MSM	4.72 (5)	3.47 (17)	6.12 (30)	6.12 (18)	7.21 (8)	5.63 (4)	6.52 (6)	5.32 (88)
Self-reported HIV-status (n)	106	491	495	296	113	71	94	1,666
HIV-positive	45.28 (48)	47.25 (232)	38.79 (192)	42.23 (125)	37.17 (42)	46.48 (33)	39.36 (37)	42.56 (709)
Case-relationship available (n)	106	491	495	296	113	71	94	1,666
No. of clusters	13	38	29	13	3	1	2	99
Cases included in clusters	26.42 (28/106)	16.50 (81/491)	12.12 (60/495)	10.81 (32/296)	6.19 (7/113)	2.82 (2/71)	4.26 (4/94)	12.85 (214/1,666)
Hospital visit history available (n)	92	428	447	273	108	66	82	1,496
1 visit before diagnosis	43.48 (40)	49.07 (210)	51.68 (231)	52.01 (142)	50 (54)	50 (33)	48.78 (40)	50.13 (750)
2 visits before diagnosis	34.78 (32)	32.48 (139)	29.98 (134)	30.77 (84)	29.63 (32)	31.82 (21)	19.51 (16)	30.61 (458)
At least 3 visits before diagnosis	21.74 (20)	18.46 (79)	18.34 (82)	17.22 (47)	20.37 (22)	18.18 (12)	31.71 (26)	19.25 (288)
Time interval available (n)	105	479	499	303	126	80		1,537
Median time interval between onset and report (days, IQR)	7 (5.25–9)	7 (5–9)	7 (5–9)	7 (4–11)	8 (5–11.25)	7 (5–9.5)	7 (5–9)	7 (5–10)
Median time interval between onset and diagnosis (days, IQR)	8 (6–10)	8 (5–12)	7 (5–10)	7 (5–11)	8 (6–12)	7 (5–10)	7 (5–10)	8 (5–11)

Abbreviation: MSM=men who have sex with men; IQR=interquartile range.

were available, only 4.02% (67/1,666) had traveled outside China within three weeks prior to the onset of illness. Additionally, 42.56% (709/1,666) tested positive for human immunodeficiency virus (HIV). None of the cases reported a history of blood transfusion within the 21 days preceding the onset of their symptoms.

Among the 1,566 cases identified as MSM, 1,419 (90.61%) confirmed engaging in homosexual activities, with each case involving an average of 1.5 partners (as

reported by 1,242 cases with available data) in the 21 days preceding symptom onset. The majority of these sexual encounters involved partners who met through social media apps or other online platforms (74.88%, 450/601) or were random encounters in public venues such as bars or bathhouses (8.49%, 51/601). Among the 88 male patients who did not identify as MSM, 17 reported sexual contact with women, and 5 with men, within 21 days before becoming ill. The remaining individuals declined to disclose their sexual activity.

Among the 10 female mpox cases examined, four reported having sexual contact with their male partners, all of whom were confirmed cases and had recently engaged in homosexual activities. Three other cases involved women who had sexual contact with their male partners; among these, two partners developed rashes that, while suggestive of mpox, had not been confirmed by laboratory tests. The third partner denied exhibiting any symptoms associated with mpox. Additionally, two cases occurred in women who were family members of confirmed mpox cases, likely acquiring the infection via general household contact. The final case involved a nurse who contracted the infection through direct exposure while providing medical care to a confirmed mpox patient, representing a probable instance of occupational transmission among healthcare workers.

Among the 1,666 cases for which epidemiological information was available, 99 clusters were identified across 22 PLADs, accounting for 12.85% (214/1,666) of the total cases. These clusters included 85 clusters with two cases, 12 clusters with three cases, and two clusters with four cases. Notably, no instances of third-generation transmission were observed within these 99 clusters. In five of these clusters, it is suspected that the initial case contracted the infection while traveling abroad, subsequently leading to local transmission. However, in the remaining 94 clusters, the definitive sources of infection could not be identified. From June to December, the proportion of cases included in these clusters displayed a decreasing trend, falling from 26.4% in June to 2.8% in November and 4.3% in December.

Among the 1,655 cases for which data were available, 92.93% (1,538/1,655) were diagnosed with mpox upon seeking medical care for their symptoms. An additional 5.26% (87/1,655) were diagnosed as close contacts of confirmed cases during testing initiatives. Moreover, 23 individuals self-reported as potential mpox infections, three cases were identified through active screening surveillance targeting high-risk populations, three cases emerged from health declarations at customs upon entry, and one case was detected during routine physical examinations. Among the 1,537 cases with detailed timelines, the median interval between the onset of symptoms and reporting was 7 days, while the interval between symptom onset and diagnosis was 8 days. These intervals remained relatively consistent from June to December.

DISCUSSION

Our research indicates that the majority of mpox cases in China occurred among middle-aged males, predominantly identifying as MSM. The primary transmission route identified was contact between cases, mainly through sexual activities, aligning with findings from prior research (3–5). Based on the data, we hypothesize that the virus may have been circulating undetected within the MSM community since late May 2023. In contrast to the outbreak dynamics observed in Europe and the United States from May to August 2022, the spread in China did not exhibit a rapid or substantial increase in cases (6). This disparity may stem from cultural differences influencing sexual behavior patterns among MSM in various regions. For instance, the World Health Organization has noted that common exposure settings for mpox involve gatherings at parties that include sexual contact. However, in China, a significant number of cases were associated with smaller, more intimate interactions facilitated through social media platforms and other online methods, rather than large public gatherings. This behavioral pattern might mitigate the peak of the cases but extend its duration. Furthermore, our findings suggest that mpox transmission has largely been confined to MSM and their immediate contacts in China. Nonetheless, given the high number of married MSM identified in this study, there exists a potential risk of transmission to women — a scenario observed in other countries (7). This underlines the importance of continued surveillance and targeted public health interventions to prevent the broader spread of the infection.

Despite significant efforts by local CDCs to investigate and identify close contacts, analyze exposure histories, and establish epidemiological links, fewer than 15% of total cases were found to have connections to other confirmed cases, consistent with a previous study in Beijing (5). This outcome is anticipated, as individuals may be reluctant to disclose sensitive information about their sexual partners. Consequently, there is a potential bias in self-reporting, which suggests that the extent of clustering identified in this study may be underestimated. The challenges in accurately tracing the sources of infection and managing close contacts emerged as significant obstacles in controlling the mpox virus spread in China, posing a considerable risk of ongoing, possibly undetected transmission within the MSM group.

To expedite the control of the virus, various health departments have implemented an extensive range of strategies. These strategies include enhanced

surveillance through multiple channels, rigorous contact tracing, training programs for CDC personnel and healthcare providers, and communication and educational campaigns aimed at high-risk populations. The implementation of these measures likely contributed to the observed decline in cases in China post-September. Nonetheless, from October to December, the number of mpox cases exhibited a persistently low-level trend, suggesting a need for more precise and effective strategies. Research (8–9) has highlighted that behavioral changes play a crucial role in mitigating the transmission of diseases such as mpox. It is therefore essential to further explore and develop targeted educational strategies that encourage high-risk groups to alter risky behaviors. Moreover, it is vital to promote prompt medical consultation among high-risk individuals upon symptom onset, enhancing the likelihood of early case detection.

The study is subject to some limitations. First, the reliance on self-reported data to investigate mpox cases raises the potential for information bias. Second, the study's exclusive focus on cases identified through the surveillance system may exclude undiagnosed and unreported cases, potentially resulting in selection bias.

Conflicts of interest: No conflicts of interest.

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