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Review Article

Monkeypox transmission risks in Indonesia

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Abstract

After half a century as a regional disease in Central and West Africa, Monkeypox reemerged in 2022 and spread on a transnational and transcontinental scale. The World Health Organization (WHO) classified it as a Public Health Emergency of International Concern due to its rapid spread caused by the ease of global mobilization, risk deviant behaviors, and potential for virus mutations. Through literature review and other secondary data sources, this study scrutinized the risk of Monkeypox disease in Indonesia. Given the country's various characteristics, such as geographical conditions, demographics, population mobility, and virus characteristics, it is most likely that there were Monkeypox cases in Indonesia, but they might not have been detected. Therefore, early vigilance must be owned by the community and accompanied by policy support and intervention to prevent Monkeypox transmission, particularly in surveillance efforts.

Keywords: disease; Indonesia; Monkeypox; outbreak risk; transmission

Background

With the world still reeling from the COVID-19 pandemic, the Monkeypox pandemic emerges. The World Health Organization, on 23 July 2022, declared a Public Health Emergency of International Concern (PHEIC) status because of the increasing number of cases in non-endemic areas (World Health Organization, 2022). Monkeypox is not a new disease but has been detected in monkeys since 1956 (Magnus et al., 1959). Then, in 1970, in Zaire (now Congo), Monkeypox was first identified in humans, so it was established as a zoonotic pathogen (Breman et al., 1980). From that time until before May 2022, Monkeypox cases were found in the Republic of Congo, with virus transmission from animal reservoir hosts to humans (Heymann et al., 1998; Ulaeto et al., 2022). However, there are also few and infrequent numbers of imported cases occurring in Europe and America.

The rise of Monkeypox cases in several countries indicates an increase in human-to-human transmission of the virus. For eight months (1 January 2022 – 9 August 2022), 31,800 confirmed cases of Monkeypox. Of this total, 98.8% of cases came from countries where Monkeypox had not previously been reported (Centers for Disease Control and Prevention, 2022b). Eighty nine countries have reported cases, up from just seven previously. During that period, most cases occurred in the United States (9,492), Spain (5,162), and

Germany (2,982). Until August 2022, there is no data on Monkeypox cases in Indonesia which should raise a critical question, is it zero cases, or is it not detected?

This is a narrative review with the desk study method. This research aims to study the risk of Monkeypox transmission in Indonesia since WHO declared it as PHEIC. Several aspects were looked into, such as virus characteristics, geographical conditions, demographics, and population mobility.

Monkeypox at a Glance

Monkeypox is caused by a DNA virus of the genus Orthopoxvirus in the same family as the Smallpox virus, namely Poxviridae. So far, two virus clades have been identified: the West African clade and the Congo Basin (Central Africa) clade (Mohapatra et al., 2022). The Congo Basin clade is more dangerous than the other clad, as seen from the consistently higher case fatality rate (CFR) than the West African clade. The outbreak that occurred in 2022 was caused by the West African clade.

The incubation period for this Monkeypox virus is usually 6-13 days but can range from 5 to 21 days. This disease forms skin eruption, which generally begins within 1-3 days of fever. Meanwhile, symptoms can last from 2 to 4 weeks. Therefore, Monkeypox can be detected when there are symptoms, and the transmission is highest at that time. Unlike COVID-19, which can be transmitted even though it is asymptomatic.

Monkeypox is also known as a disease that can heal by itself (self-limited). Even so, cases of death still occur, and the severity among patients can vary. The CFR varies from 1 to 11%; even in children, it can reach 15% (Jezek et al., 1987). Generally, Monkeypox is more severe in vulnerable groups.

Monkeypox is similar to other Smallpox, one of which is caused by the Varicella Zoster Virus. For an accurate diagnosis, the virus needs to be confirmed using real-time polymerase chain reaction (PCR) and sequencing. This is because the antibody and antigen detection methods do not provide specific confirmation of Monkeypox because orthopoxvirus is serologically cross-reactive (Mohapatra et al., 2022).

Geography

Indonesia is a strategically located country. It has numerous ports of entry via various routes, increasing the risk of Monkeypox outbreaks. In addition, Indonesia's position at the crossroads of two continents, Asia and Australia, and two oceans, the Pacific and the Indian Ocean, makes Indonesia a transportation route, especially for trade transportation. Ninety percent of world trade is transported by sea, and almost half through Indonesia (Ministry of Transportation of The Republic of Indonesia, 2018). Not to mention that Indonesia's export and import activities increase the epidemiological risk of disease agents being transmitted to humans at ports, airports, and other transportation hubs.

Borders with other countries also increase the risk of disease transmission through the mobility of people. Indonesia shares land borders with Malaysia, Papua New Guinea, and Timor Leste. Meanwhile, its maritime areas are directly adjacent to Singapore, Malaysia, Thailand, Vietnam, the Philippines, India, Palau, Australia, Papua New Guinea, and Timor Leste. In some neighboring countries, Monkeypox cases have been reported, including Singapore (15 people), Thailand (4 people), Philippines (1 person), India (9 people), and Australia (58 people) (Centers for Disease Control and Prevention, 2022a).

The diversity of landscapes with high biodiversity also increases the potential risk of zoonoses, including Monkeypox, in Indonesia. This is mainly related to the increasing population forcing the conversion of wild animal habitats into settlements, land, and other infrastructures to support human life, thereby increasing the potential for contact between humans and animals (Breithaupt, 2003).

Demographics and Population Mobility

In the past, people who were infected with Monkeypox were children under the age of ten. More than 80% of the cases recorded in the 1970s to 1990s cohort were under the age of 15, while less than 50% of the population was under 15 during that period (Beer & Rao, 2019). The pattern of disease incidence then started shifting to adults aged 25 to 40 cases, including the outbreak in 2022. Male

cases outnumber female cases when gender is considered (Beer & Rao, 2019).

The Monkeypox outbreak in 2022 brought the community known as LGBTQ+ to the forefront as the group with high number of cases. The sufferers in the reported cases are men who have sex with men (MSM) and bisexuals (Jang et al., 2022; Thornhill et al., 2022). Most of them had sexual intercourse before being diagnosed with Monkeypox (Thornhill et al., 2022). This pattern of sexual transmission is considered unusual because there have been no previous reports of sexual transmission of the disease (Adegboye et al., 2022; Pan et al., 2022). The LGBTQ+ community, in this case, is a high-risk group. In Indonesia, the LGBTQ+ community has grown quite large; in 2013, it consisted of 2 national networks and 119 organizations in 28 provinces (Oetomo et al., 2013).

Monkeypox is not a lethal disease. However, deaths from Monkeypox, which were recorded, occurred in several high-risk groups, including infants, young children (less than ten year old), pregnant women, patients with complications, and immunocompromised individuals, suggesting this is a high-risk group (Beer & Rao, 2019). Indonesia's population of more than 270 million people automatically makes the proportion of these vulnerable groups bigger.

The potential import of Monkeypox cases in Indonesia is linked to human mobility as a risk factor for disease transmission in terms of the number of international flights arriving and departing from Indonesia. According to data from the Indonesian Central Statistics Agency (BPS), international flights to and from Indonesia increased gradually between 2015 and 2019 (Badan Pusat Statistik, 2019). However, in 2020 when the COVID-19 pandemic occurred, a number of international flights decreased to approximately one-fifth of a number in 2019. The data for 2021 and 2022 have not yet been released by BPS, but based on the Government of Indonesia's (GoI) statement in news articles, the number of flight passengers has increased in 2022. The increase in flight frequency has also occurred in many other countries, considering that all of them have loosened restrictions due to COVID-19 cases, which have gradually subsided.

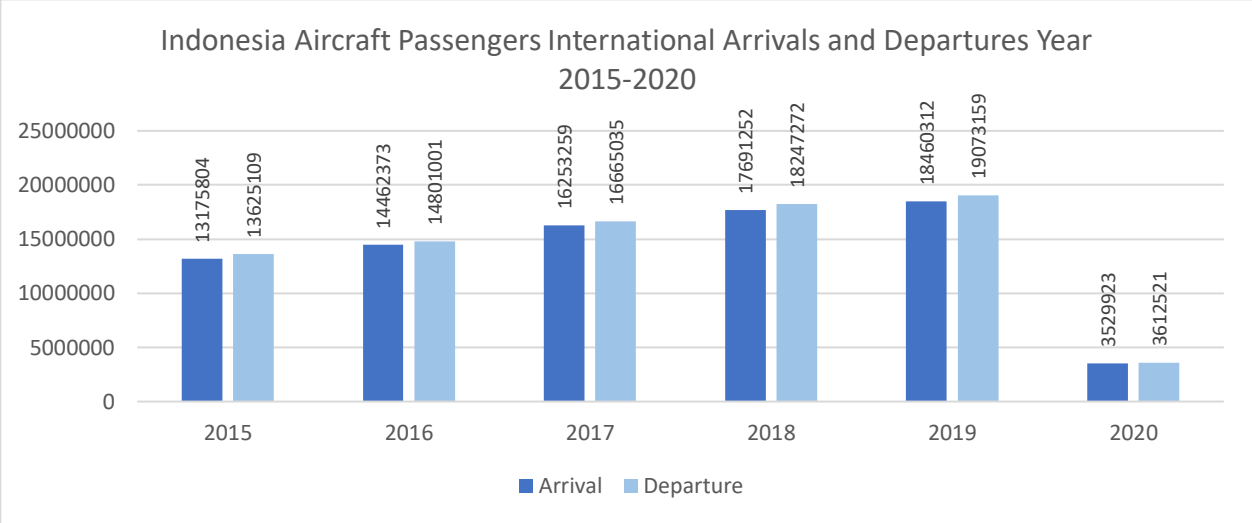

Figure 1 Number of International Flight Passengers (to and from Indonesia)
Source: Indonesian Central Statistics Agency (BPS)

Flights from Monkeypox endemic areas have also increased. For example, the number of international flight departures through Nigerian airports increased by 54.7 percent from 2021 (717,261 to 1,109,525). The number of arrivals of international passengers also rose from 690,765 to 1,109,621 (Olowookere, 2022).

Efforts to Prevent Transmission and Treatment of Monkeypox

Until today, there is no specific medicine for Monkeypox disease. However, to provide protection and reduce the severity, the Smallpox vaccine and antiviral drugs (Tecovirimat and Brincidofovir) can be used (Centers for Disease Control and

Prevention, 2022d). Smallpox vaccination is estimated to provide up to 85% cross-protection against Monkeypox with an unknown duration of protection (Centers for Disease Control and Prevention, 2022c). The Centers for Disease Control and Prevention (CDC) recommends vaccination within four days of exposure to prevent illness or up to 14 days after exposure to reduce disease severity. Meanwhile, the use of both antivirals for the treatment of Monkeypox has only been tested in vitro and animal studies, so further clinical testing is needed.

Access to vaccines is still very limited. Currently, the United States is a country that has a large stock of vaccines. The vaccine, under the trade name JYNNEOS, will be distributed to high-risk people in the United States (The White House, 2022). The availability of the vaccines is the result of early anticipation of Monkeypox disease after several cases occurred a few years ago.

Despite the limitations of such clinical interventions, the international community has begun to take steps to mitigate the outbreak. Several countries have begun to work together to detect and isolate people with Monkeypox. Belgium, for example, has implemented a mandatory 21-day quarantine for Monkeypox patients. In addition, as a detection effort, Brazil and other Latin American countries are increasing laboratory capacity by establishing skilled molecular biology and genome sequencing laboratories that routinely perform RT-PCR and phylogenetic studies (Cimerman et al., 2022).

Discussion

It is very likely that Monkeypox cases in Indonesia already exist but have not been detected and reported. Given the magnitude of Indonesia's potential for disease transmission from various aspects that have been studied in this paper. From the demographic aspect, Indonesia is the 4th largest country by population (274,790,244 people). When compared with the two countries with the most reported Monkeypox cases as of August, the United States and Brazil, these countries have slightly different number of the population to Indonesia, respectively, 332,975,770 and 214,962,388. If both countries have thousands of Monkeypox cases, how many should be in Indonesia?

The omission of Monkeypox cases in Indonesia and several other countries is most likely due to the ability to detect and diagnose the disease. Countries with reported Monkeypox cases in the 2022 outbreak, especially the high ones, have good health systems to deal with health emergencies. Countries such as America, Spain, Germany, and many of those close to Indonesia, like Singapore, Australia, and Thailand, are ranked quite well in the aspects of handling the outbreak, which is summarized in the Global Health Security Index (Bell & Nuzzo). Meanwhile, Indonesia's position is still far behind in ranking compared to these countries.

The GoI needs to strengthen surveillance for Monkeypox disease. If there is a confirmed case of Monkeypox, it is necessary to do tracing and treatment immediately. Similar to the experience of dealing with the COVID-19 pandemic, the 3T concept (testing, tracing, and treatment) still applies. Things that need to be emphasized more may be related to making a diagnosis which will be a bit tricky, given the clinical overlap between Monkeypox and other Smallpox diseases. Beer and Rao (2019), in their study, they mention that a portion of the identified but unconfirmed Monkeypox cases reported in the literature are likely to be Varicella-zoster virus (VZV).

In the past, the GoI had a national vaccination program for Smallpox, but in 1980 it was stopped since Indonesia successfully got rid of Smallpox disease (Ministry of Health of the Republic of Indonesia, 2017). The Smallpox vaccination program was organized by the GoI starting in 1956 and the colonial government in the 19th century (Santoso, 2015). Therefore, the implementation of Smallpox vaccination may be considered by looking at the condition of public health status in this epidemic era and accompanied by appropriate strategies (e.g., targeting high-risk groups).

Despite limited access to Monkeypox vaccines and antivirals, physical distancing and the application of clean and healthy living behavior are still effective solutions to prevent Monkeypox transmission. Given the transmission of Monkeypox through physical contact with patient lesions. Indirect transmission with patients still needs to be further investigated. The following two cases can serve as a basis for thinking about the need for further research. First, Atkinson et al. (2022) tried to examine

environmental samples carried out in two adjoining rooms occupied by a Monkeypox patient and his siblings. Although Monkeypox virus DNA was found in several locations in both properties (after three days since the last occupancy), the patient's relative did not get Monkeypox. Another case is the transmission of Monkeypox to health workers who were infected when handling patients with full-body personal protective equipment (PPE) except respiratory PPE.

In addition to all of these risk factors, the Monkeypox virus itself needs to be studied further. The rapid changes in virus transmission, from animal-to-human to human-to-human, raises the need to be aware of possible viral mutations. Although Monkeypox virus is a DNA virus, which is characteristically more difficult to mutate than RNA viruses, mutations can still occur (Duffy, 2018; Peck & Lauring, 2018; Sanjuán & Domingo-Calap, 2016).

Implications for Public Health Policies and Practices

According to this study, Indonesia is at high risk of Monkeypox transmission. Zero cases of monkeypox in Indonesia thus far (from the 1970s to early August 2022) should be cause for alarm. This paper was written to raise awareness of the risks, in relation to efforts and risk mitigation, particularly by healthcare providers and the community. In other words, encouraging people to be aware and more vigilant in their behavior (e.g., by doing a clean and healthy lifestyle (PHBS)) and GoI to conduct testing and tracing for the disease.

Some policy recommendations would be to, first, prepare healthcare facilities for Monkeypox testing (capable of running the PCR), particularly in areas with international gateways such as North Sumatra, Bali, North Sulawesi, DKI Jakarta, and Surabaya. As a result, the facility is not only in the Ministry of Health's laboratory. Second, epidemiological investigators must be trained to handle Monkeypox cases. Early preparation is a better way to anticipate the possibility of widespread transmission.

This research is also relevant in encouraging sustainable efforts to anticipate other re-emerging diseases in Indonesia. As a country with a large population and areas with high biodiversity, acceleration towards an “independent country” in producing medical equipment, developing drugs and vaccines and providing high-quality treatment for any possible new disease (Saputra et al., 2022)

Declaration of Conflicting Interest
The author declares no conflict of interest in this study.

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Author Contribution
All authors contributed to the whole research process. Each of them had particular main duties: HS, research team leader, study conception and design, analysis and interpretation of the results, approve the final manuscript; NS, data collection (literature review), analysis and interpretation of the results, writes the paper; SRA, research administration management.

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