



Monkeypox disease has spread to 34 countries in the current outbreak that started in May 2022

POX RETURNS

Monkeypox spreads to new geographies as the world experiences its worst ever outbreak of the zoonotic disease

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HUMANS DREAD the family of poxviruses. One of its members—the smallpox—killed over 300 million in just eight decades before being eliminated in 1977. So, when one of its cousins—the milder monkeypox virus—infected a person in the UK on May 6, 2022, the world took note of it.

Human cases of monkeypox are considered rare outside Africa, and only eight cases had been reported in non-endemic areas till the start of 2022. This trend changed in May. In less than one month after the UK case was confirmed, 34 countries across Africa, Asia, Australia, Europe, South America and North America reported 824 confirmed and 1,408 suspected

cases of monkeypox virus infection (see 'Blow beyond Africa', p22).

Even India, which has never reported monkeypox cases, has rolled out an extensive surveillance in response to the current outbreak. The World Health Organization (WHO) has classified the public health risk of the current outbreak as "moderate" citing its concurrent outbreaks in geographical areas without known epidemiological links to endemic countries in west or central Africa. By far, this is the most geographically widespread outbreak of the virus in 50 years. On June 1, Tedros Adhanom Ghebreyesus, director-general, WHO, said that the sudden appearance of monkeypox in multi-

ple countries across the world indicates that the virus has been spreading undetected for some time. "It is unclear how long the virus has been spreading undetected outside Africa," says Rosamund Lewis, monkeypox technical lead for WHO. "We don't really know whether it's too late to contain."

A study published in PLOS on February 11, 2022, found that monkeypox cases (confirmed, probable, and/or possible) have increased 10-fold over the past five decades—up from 48 cases in the 1970s to 520 in the 1990s. The study, based on 48 peer-reviewed articles and 18 grey literature sources, notes that the Democratic Republic of Congo remains the largest contributor to this trend, with cases almost doubling to over 18,000 in 2010-2019, from more than 10,000 in 2000-2009. Nigeria saw a surge of a similar magnitude—to 181 cases in 2017-2019, up from three in the 1970s. Cases of monkeypox outside Sub-Saharan Africa have been reported in the last 50 years only from four countries—the US, UK, Singapore and Israel. The paper,

The changing epidemiology of human monkeypox—A potential threat? A systematic review, notes that there are "mounting concerns about the geographical spread and further resurgence of monkeypox."

OLD VIRUS, NEW TRAITS

The current outbreak of the zoonotic disease has caused a stir among epidemiologists because most of the infected people never travelled to the endemic countries, the primary reason for the past outbreaks. The disease usually spreads only among people in close contact with animals, and human-to-human transmission happens rarely, and even if it does, it happens between people in close contacts.

Early epidemiology of initial cases notified to WHO by countries shows that the current cases have been mainly reported among men who have had sex with other men. "This seems to be a major driver of the spread outside Africa. Such contacts have never been identified as a major route of transmission in endemic countries," says James O Lloyd-Smith, professor of ecology and evo-

Visible shift

In 2022, non-endemic countries reported 780 human cases while endemic countries reported 44 cases

1958: Monkeypox virus identified for the first time in a macaque colony in Denmark

1971: First human case reported in the Democratic Republic of Congo in 1970 and in Nigeria in 1971. The number of human cases increased from 48 in 1970-79 to 520 in 1980-89. Cases found only in Africa

2003: The US records the first human case of monkeypox outside Africa. In 2000-09, Africa records 10,117 human cases and the rest of the world records 47 cases. In 2010-19, Africa records 19,065 human cases. The rest of the world's tally remains just six

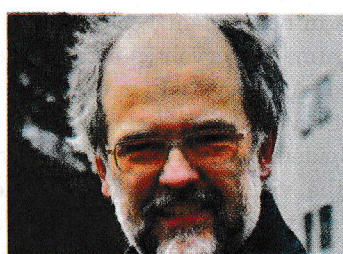
2022: On May 6, the United Kingdom records fresh human outbreak. By June 2, human cases were reported in 27 non-African and seven African countries. The world records 824 human cases, almost 95% of the cases reported outside Africa

Source: World Health Organization and PLOS, as on June 2, 2022



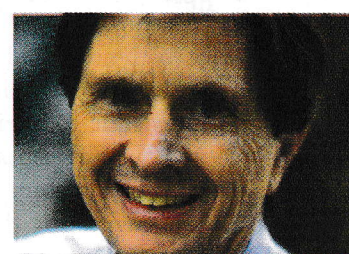
"The long transmission chains between humans in current outbreak is uncharacteristic"

— ISABELLA ECKERLE
Geneva Centre for Emerging
Viral Diseases



"If we can trace it back far enough, the outbreak likely began after a zoonotic event in West Africa"

— PAUL HUNTER
University of East Anglia's
School of Medicine



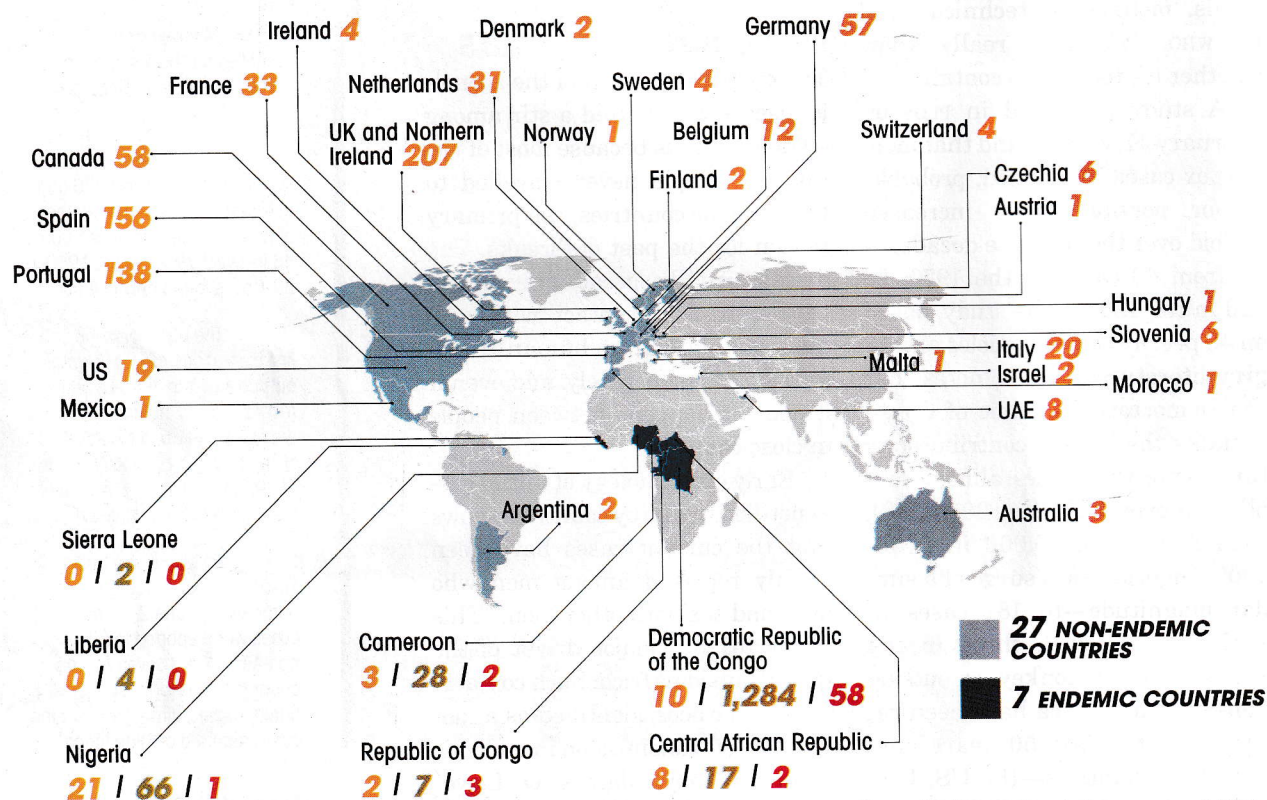
"We will need to inoculate contacts of those infected. Nothing more should be done for now"

— DAVID HEYMANN
Former head of WHO's
emergencies department

BLOW BEYOND AFRICA

While Africa, the only continent where monkeypox is endemic, has reported 44 confirmed human cases, the rest of the world has recorded 780 confirmed cases in 2022. The virus has spread to seven African and 27 non-African countries

0 Confirmed, **0** suspected human cases and **0** deaths due to monkeypox between January and June 2, 2022



Source: World Health Organization, as on June 2, 2022

lutionary biology, University of California, Los Angeles, the US.

The majority of the caseload in the current outbreak is being reported in non-endemic countries and in people without any contact with animals or travel history to endemic countries, suggesting that the virus is now moving from one human to another. This longer transmission chain between humans is an uncharacteristic trait, says Isabella Eckerle, professor at the Geneva Centre for Emerging Viral Diseases, Switzerland. Even though there is no evidence at present, the other possibility could be that monkeypox

is already circulating in animal hosts in non-endemic countries. "If an animal reservoir is established outside Africa, we will never be able to get rid of it," says Eckerle.

Epidemiologists are also studying the virus for mutations. The strain currently circulating across the world belongs to the West African clade, the less lethal cousin of the Congo Basin clade not found outside of Africa till date, as per the Department of Infectious Diseases at the National Institute of Health Doutor Ricardo Jorge in Lisbon, Portugal. The country has studied the strain from one of the patients in the current outbreak and found

slight mutational changes in its amino acids, compared to the UK outbreak in 2018.

Oyewale Tomori, former regional head virologist, WHO-Africa, told *Down to Earth* (DTE) that monkeypox is a double-stranded DNA virus with a big genome pool and, as a result, has a low rate of mutation.

Smith agrees that genomic analyses till date have not shown any sign of an important mutation event, but warns that it is too early to completely rule out the potential influence of mutations. "Since the virus has a very big genome, it is impossible to know whether particular point mutations have some

effect on its behaviour. The longer the virus circulates in humans, the greater the risk that it might find some beneficial mutations that allow it to start adapting to humans," Smith says.

Initial studies also suggest certain other variations in the current outbreak. The general progression of monkeypox symptoms begins with fever, chills and swollen lymph nodes one-two weeks after exposure, followed by a rash a few days later, which develops into blister-like lesions and turns into scabs, both of which last around a day each. Healthy tissue typically emerges two to four weeks after the onset of symptoms. What we are witnessing now is a more milder presentation of the symptoms leading up to the rash, and they are often missed, according to a report published in medical news website JAMA Network on May 27.

Another difference is the placement of these lesions. They typically begin with the head and spread to the arms and legs. But now, lesions are first appearing in the genital or perianal region.

CURTAILMENT PLAN

Smallpox is the only disease that has ever been eradicated by a massive vaccination drive. A similar vaccine is being pushed to tackle this emerging epidemic as the smallpox vaccine is 85 per cent effective against monkeypox. WHO has approved only one monkeypox-specific vaccine (MVA-BN) and a treatment (tecovirimat) in 2019 and 2022, respectively. Neither of these is widely available. In Europe, Germany, Denmark and Spain are stocking up on the vaccines while the UK and France have begun offering them. In North America, the US and Canada are considering re-

leasing some doses.

WHO also has a stockpile of some 31 million doses "for use in times of international need".

"We will probably need to conduct ring vaccinations—inoculating contacts of those infected. Aside from that, nothing more could or should be done for now," says David Heymann, former head of WHO's emergencies department. If ring vaccinations fail to bring the outbreak under control, a wider group can be vaccinated, says Paul Hunter, professor of virology at the University of East Anglia, the UK. WHO has also recommended ring vaccinations with monkeypox or smallpox vaccines.

The current outbreak has highlighted concerns about emerging diseases behaving abnormally. Cases of unseasonal respiratory syncytial virus (RSV) have been reported from Australia, while reports reveal the US' flu season peaked after


INDIA'S POX PROBLEM

THE RECENT spread of monkeypox to non-endemic countries has trained the spotlight on reemerging viruses such as buffalopox, which was first isolated in India in 1934.

The zoonotic disease endemic to India has its roots in smallpox vaccines. Live viruses used to inoculate buffaloes to produce the smallpox vaccine in India evolved into buffalopox over time. India has recorded several sporadic outbreaks of the disease. Human cases were reported across five districts in Maharashtra between December 1985 and February 1987. The next major outbreak was recorded in three Maharashtra districts in 1992-96. In 2008-2009, Maharashtra's Sholapur and Kolhapur districts recorded 21 human cases. The last outbreak was recorded in 2018 when 28 human cases of buffalopox were diagnosed in the state's Dhule district. A majority of the infected people were milkers and had close contact with buffaloes. Recent trends suggest that increasing numbers of outbreaks in the Indian subcontinent are being recorded, but awareness about diagnosis, treatment, and preventive measures in humans is much lower, according to a study published in the *Clinical Dermatology Review* journal in August 2020.

March for the first time in 10 years. "Most years, we see one or two new cases of emerging infectious diseases. But habitat loss, climate change effects, and the illegal wildlife trade increase the risk of such outbreaks," says Hunter. Globalisation and climate change could potentially be driving this unprecedented outbreak, Brian Wahl of the Johns Hopkins Bloomberg School of Public Health told DTE. "These factors will almost certainly lead to outbreaks of other emerging or re-emerging diseases. Coming out of the pandemic, we should recognise the impact of surveillance systems and respond in a timely manner," Wahl says.

Hunter and Eckerle warn that diseases such as Hantavirus, Japanese encephalitis, and mosquito-borne West Nile Virus, dengue, chikungunya and other poxviruses could go the same route as monkeypox. **DTE**

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