

Marburg Virus Disease in Tanzania (2025)

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Prepared by the Pandemic PACT programme

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Background

On 20 January 2025, the United Republic of Tanzania and the World Health Organization (WHO) confirmed a positive case of Marburg Virus Disease (MVD) in the Kagera region in northwestern Tanzania¹. MVD is a highly virulent zoonotic infectious disease caused by the Marburg virus (MARV), belonging to the *Filoviridae* viral family, with a case fatality ratio of up to 88%². It is part of the human viral haemorrhagic fevers (VHFs) and shares clinical similarities with VHFs such as Ebola Virus Disease (EVD), within the same viral family as MARV^{3,4}. MVD was first discovered in 1967 after two simultaneous outbreaks occurred among laboratory workers in Marburg and Frankfurt (Germany) and Belgrade (Serbia (formerly Yugoslavia))^{2,5}. The laboratory workers had been infected via exposure to non-human primate tissue imported from Uganda for research purposes and the outbreak resulted in 31 confirmed cases and seven deaths^{5,6}. Since then, MVD outbreaks have occurred mainly in Africa, with imported cases, particularly among travellers who visited caves in Uganda with *Rousettus* bat colonies, reported outside of Africa (**Figure 1**)^{5,6}. The largest MVD outbreak reported to date was in 2004-2005 in Angola⁵. It resulted in 252 cases and 227 deaths (case-fatality rate (CFR): 90%)⁵.

The natural animal reservoir for MARV is believed to be the *Rousettus aegyptiacus* bat and several confirmed MVD cases had prolonged exposure to caves where these bats habituate^{2,7}. African green monkeys and pigs are known to be capable of contracting and spreading the disease to humans and can, therefore, act as intermediary hosts². Pigs are potential amplifier hosts and measures should be taken to prevent the infection of pigs by bats². While no other domestic animals have been associated with MVD outbreaks, the WHO recommends that as a precautionary measure, they should also be considered as potential intermediary hosts and amplifiers².

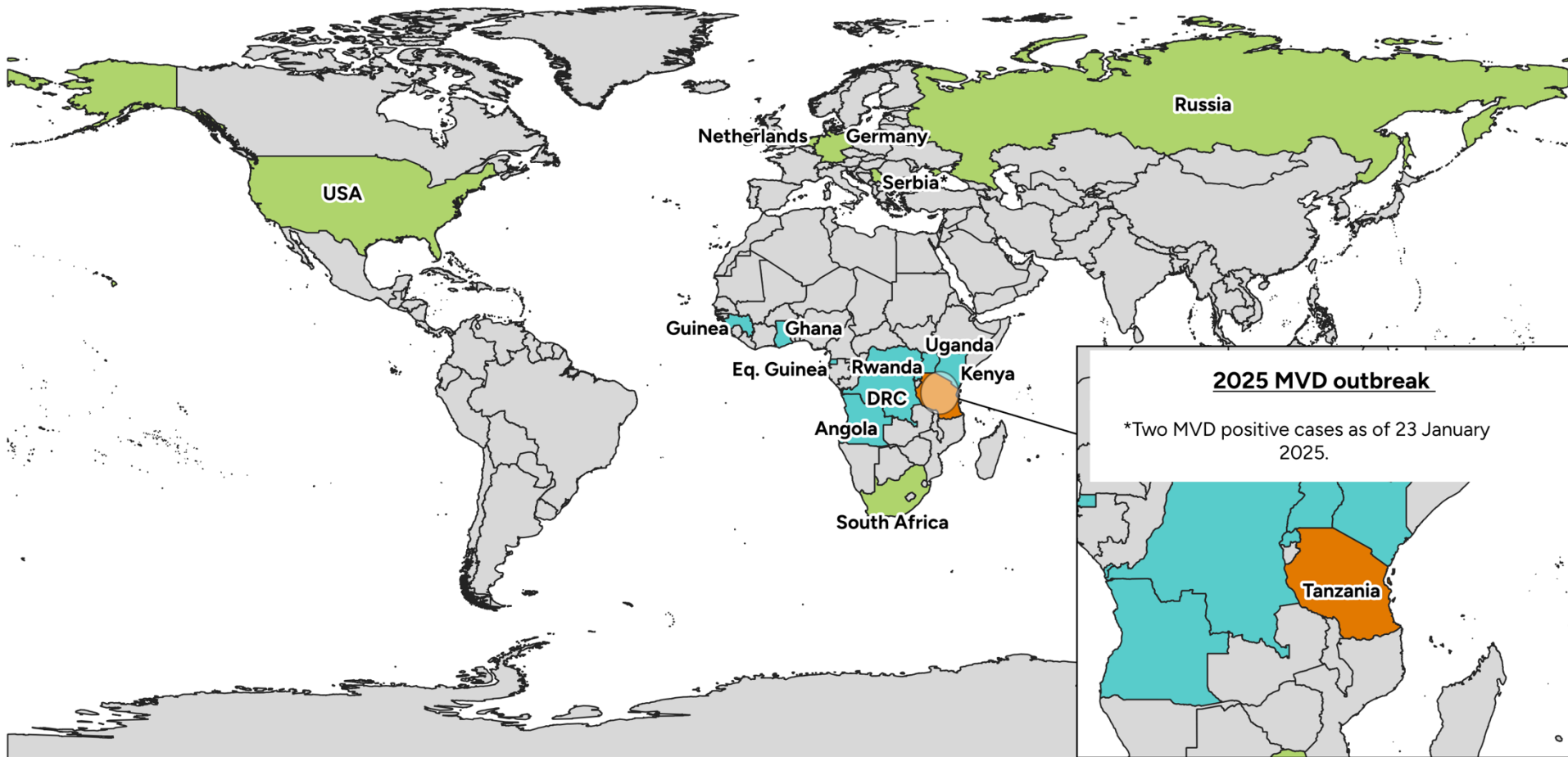


Figure 1: MVD outbreaks since 1967.

- 2025 MVD outbreak
- Pre-2025 MVD outbreaks
- Pre-2025 imported MVD outbreaks

Abbreviations: MVD (Marburg Virus Disease); DRC (Democratic Republic of Congo); Eq Guinea (Equatorial Guinea)

*Serbia, formerly Yugoslavia

Table: MVD outbreaks since 1967 and confirmed cases reported from each country (as of 23 January 2025)

| Country | Outbreak Year (YY) | | | | | | | | | | | | | | | | | Cases(N) |
|--------------|--------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|
| | 67 | 75 | 80 | 87 | 90 | 98 | 99 | 00 | 04 | 05 | 07 | 08 | 12 | 14 | 17 | 21 | 22 | |
| Germany | | | | | | | | | | | | | | | | | | 29 |
| Serbia* | | | | | | | | | | | | | | | | | | 2 |
| South Africa | | | | | | | | | | | | | | | | | | 3 |
| Kenya | | | | | | | | | | | | | | | | | | 3 |
| Russia | | | | | | | | | | | | | | | | | | 1 |
| DRC | | | | | | | | | | | | | | | | | | 254 |
| Angola | | | | | | | | | | | | | | | | | | 252 |
| Uganda | | | | | | | | | | | | | | | | | | 24 |
| USA | | | | | | | | | | | | | | | | | | 1 |
| Netherlands | | | | | | | | | | | | | | | | | | 1 |
| Guinea | | | | | | | | | | | | | | | | | | 1 |
| Ghana | | | | | | | | | | | | | | | | | | 3 |
| Tanzania | | | | | | | | | | | | | | | | | | 11 |
| Eq. Guinea | | | | | | | | | | | | | | | | | | 17 |
| Rwanda | | | | | | | | | | | | | | | | | | 66 |

Map made in QGIS using Natural Earth Data. Data on MVD cases from [Schnirring, L. \(2025\); US CDC \(2024\); Ristanovic et al \(2020\); Rwanda MOH \(2024\)](#)^{5,21,22}.

Transmission, Clinical Presentation, Diagnosis, and Treatment

MVD does not spread easily but can be transmitted from animal to human or human to human through direct contact with infected blood, secretions, organs, or bodily fluids^{2,7}. MVD can also spread through contact with contaminated surfaces, e.g., bedding². The MARV enters via broken skin or mucous membranes^{2,7}. Transmission has occurred among healthcare workers exposed to sick individuals and those handling bodies for burials^{2,7}. Among those who survive MVD, the MARV has been shown to persist in immune-privileged sites, including the testes². Transmission via infected semen has been reported up to seven weeks post-recovery². The MARV has also persisted in the placenta, amniotic fluid, foetus, and breast milk². Aerosol transmission of MARV has not been demonstrated yet however, respiratory inhalation from bat urine and faeces has been suspected and raises significant concerns⁷.

The incubation period ranges from approximately 2 to 21 days but, on average, is between 5 to 9 days^{2,8}. Clinical presentation of MVD can be divided into three phases: the generalisation phase, the early organ phase, and the late organ or convalescence phase (**Figure 2**)⁸. During the generalisation phase, individuals develop high-grade fever, headache, myalgia, and malaise with severe diarrhoea, abdominal pain, nausea, and vomiting beginning on approximately the third day^{2,8}. The early organ phase occurs approximately five to 13 days after symptom onset and clinical signs and symptoms include dyspnea, a skin rash, abnormal vascular permeability, and haemorrhagic manifestations such as bloody diarrhoea^{2,8}. During the late organ or convalescence phase, individuals can suffer seizures, shock, coma, hepatitis, severe dehydration, and ocular disease^{2,8}. Spontaneous abortion has also been documented⁸. Death from MVD usually occurs between 8 to 9 days after symptom onset^{2,8}. Survivors of MVD do not usually develop the signs/symptoms that occur in the late phase⁸. The CFR for MVD ranges from 24% to 88% with an average CFR of 50%².

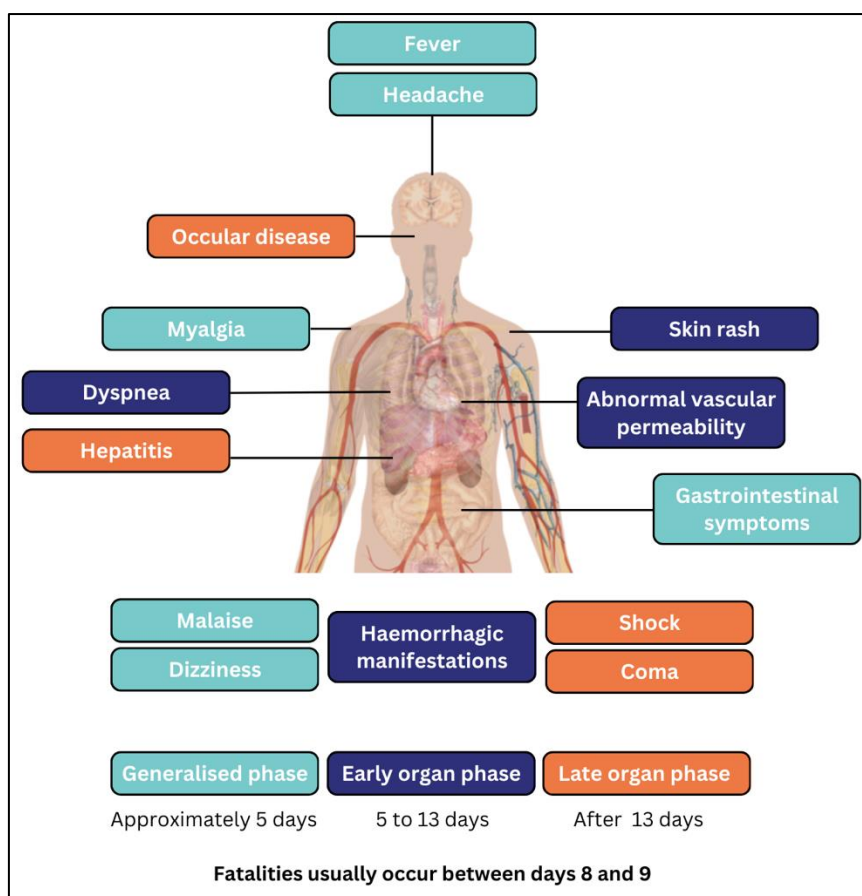


Figure 2: Clinical presentation and phases of MVD^{2,8}

Diagnostic tests for MARV include antibody-capture enzymelinked immunosorbent assay (ELISA), antigen-

capture detection tests, serum neutralization test, reverse transcriptase polymerase chain reaction (PCR) test, electron microscopy, and virus isolation by cell culture². Laboratory confirmation is necessary as MVD is difficult to distinguish from similar diseases such as malaria, meningitis, and other VHFs². There are no licensed vaccines or therapeutics against MARV therefore, optimal supportive care is paramount². A systematic review by Rigby et al (2023) identified only two clinical management guidelines for MVD, both of which were limited in scope and quality⁴.

Some promising therapeutic candidates against MVD include monoclonal antibodies and Remdesivir both of which have demonstrated efficacy in non-human primate models (NHPs) and have been considered for compassionate use^{2,9}. Monoclonal antibodies (MAPP Bio MBP091) have demonstrated up to 100% survival in NHPs¹⁰. Pan-filoviral small-molecule antivirals have also shown efficacy in late-stage disease in NHPs¹⁰. Other therapeutics such as Galidesivir and Favipiravir (T-705) have demonstrated efficacy in mouse models, and further research is needed to demonstrate their effectiveness against MARV⁹. Combining therapies such as remdesivir and monoclonal antibodies is also a promising therapeutic approach^{9,10}. Compared to EVD, therapeutic development for MVD has been slower¹⁰. However, recent efforts such as the WHO Core Trial Protocol released in 2023 may help to accelerate the assessment of effective treatments¹¹. The Solidarity PARTNERS WHO Core Trial Protocol outlines a plan to introduce a Phase 3 Platform Adaptive Randomised Trial for New and Repurposed Filovirus Treatments (PARTNERS)¹¹. Interventions could include monoclonals, antivirals, and host-directed therapies i.e. steroidal treatments¹². The protocol emphasises the importance of developing ‘pan-filovirus’ protocols as opposed to protocols developed for each single filovirus outbreak¹¹. This intends to speed up the research process, ensure large sample sizes across multiple outbreaks, and capture therapeutics that may be effective against multiple filoviruses¹¹.

In 2022, the MARVAC WHO-coordinated consortium was founded to promote the development of MVD vaccines¹⁰. Numerous vaccines have been demonstrated in rodent models, but few have demonstrated positive efficacy in NHPs¹⁰. Four MARV-specific vaccines in development have been considered by the WHO for inclusion in a clinical trial¹³. These include two Vesicular Stomatitis Virus vector vaccines and two non-replicating chimpanzee adenovirus vector vaccines ([Table 1](#))¹³. The licensed Zabdeno and Mvabea vaccines against EVD may protect against MVD, but this is yet to be demonstrated in clinical trials². To support vaccine development, a protocol was developed by the Marburg Vaccine Trial Core Protocol Working Group for an international, randomized clinical trial platform based on a ring vaccination trial design¹⁴. In addition, MARVAC is developing clinical trial designs that assess evidence accumulated by multiple outbreaks¹⁰. These trials will be under three categories that will be under an overall platform trial¹⁰.

| Type of vaccine | Lead institution; Country | Evidence available |
|------------------|--|--------------------|
| VSV-vectored | Public Health Vaccines; USA | Pre-clinical |
| VSV vectored | International AIDS Vaccine Initiative; USA | Pre-clinical |
| ChAd3-vectored | Sabin Vaccine Institute; USA | Phase 1 |
| ChAdOx1-vectored | University of Oxford; UK | Pre-clinical |

Table 1: Vaccine candidates being considered by the WHO Technical Advisory Group (as of April 2023)¹³.

Marburg Virus Disease in Tanzania

Epidemiology

On 13 January 2025, the WHO notified its Member States of a suspected MVD outbreak in Tanzania using their Event Information Site (EIS) designed to deliver public health alerts with possible international

consequences¹⁵. The WHO received information on 10 January about suspected MVD cases in Tanzania¹⁵. By 11 January 2025, there were nine suspected MVD cases and eight deaths (CFR 89%) from two districts (Biharamulo and Muleba) within the Kagera region, which borders Uganda, Burundi, and Rwanda¹⁵. Healthcare workers are among the suspected cases raising concerns about further nosocomial spread¹⁵. By 20 January 2025, the United Republic of Tanzania and the WHO confirmed a positive case of MVD¹. As of 23 January, there are two confirmed cases in the Biharamulo district and eight probable cases¹⁶. Nine cases have died including one of the confirmed MVD cases¹⁶. This is Tanzania's second MVD outbreak. The first MVD outbreak in Tanzania occurred between March and May of 2023¹⁷. The outbreak resulted in nine cases (eight confirmed) and six deaths (CFR 67%) in the Bukoba district within the Kagera region¹⁷.

The source of the suspected 2025 MVD outbreak remains unknown¹⁵. *Rousettus aegyptiacus* bats, believed to be the natural animal reservoir for MVD, are endemic to Tanzania¹⁵. Before this MVD outbreak, the most recent MVD outbreak occurred in Rwanda between September and December 2024¹⁸. The source of the 2024 outbreak was linked to the likely exposure to infected bats within a cave where *Rousettus aegyptiacus* bats are known to habituate¹⁸.

Public Health Response

The WHO has assessed the public health risk at a national level, within Tanzania, as high¹⁵. At a regional level, the WHO has also assessed the risk as high¹⁵. There are significant cross-border movements between Kagera and the surrounding countries it borders¹⁵. The WHO has assessed the global risk as low¹⁵. There is no sign of international spread yet, and Kagera does not have an international airport¹⁵. However, it is well-connected to Tanzania's largest city, Dar es Salaam, which has an international airport¹⁵.

Generally, MVD outbreaks are concerning due to the high CFR and lack of medical countermeasures. The WHO states that national rapid response teams have been deployed, and surveillance activities have intensified¹⁵. To support rapid efforts to control the outbreak, the WHO has also allocated \$3 million from the Contingency Fund for Emergencies¹⁹. Africa CDC has committed \$2 million to support the immediate response in addition to deploying a multidisciplinary team of public health experts and technical assistance to strengthen diagnostics and genome sequencing²⁰.

Useful Resources

- Pandemic PACT has a dedicated [Marburg Virus Disease page](#) in the Outbreak section of the website which provides information and analyses of active mpox research and funding globally since 2020.
- The WHO Research & Development (R&D) Blueprint for Epidemics team has developed several Roadmaps, vaccine and therapeutic trackers, and other technical work for MVD, which can be found on their [webpage](#) titled 'Ebola virus and Marburg'.
- The R&D Blueprint for Epidemics Team convened a consultation of the MARVAC Consortium to discussed how to prepare for the next Marburg outbreak. The meeting aimed to generate structures and mechanisms to rapidly facilitate initiation of clinical research in future Marburg outbreaks. Outputs from this meeting can be accessed [here](#).
- The WHO held a workshop, 'Building research readiness for a future filovirus outbreak', from February 20-22, 2024, in Uganda. Presentations are available on their [website](#).
- The WHO R&D blueprint team [published](#) a Strategic Research Agenda for Filovirus Research and Monitoring (WHO-AFIRM) which outlines a long-term global strategy for filovirus research and monitoring between 2021-2031.

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