

Ebola in Uganda (2025)

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Background

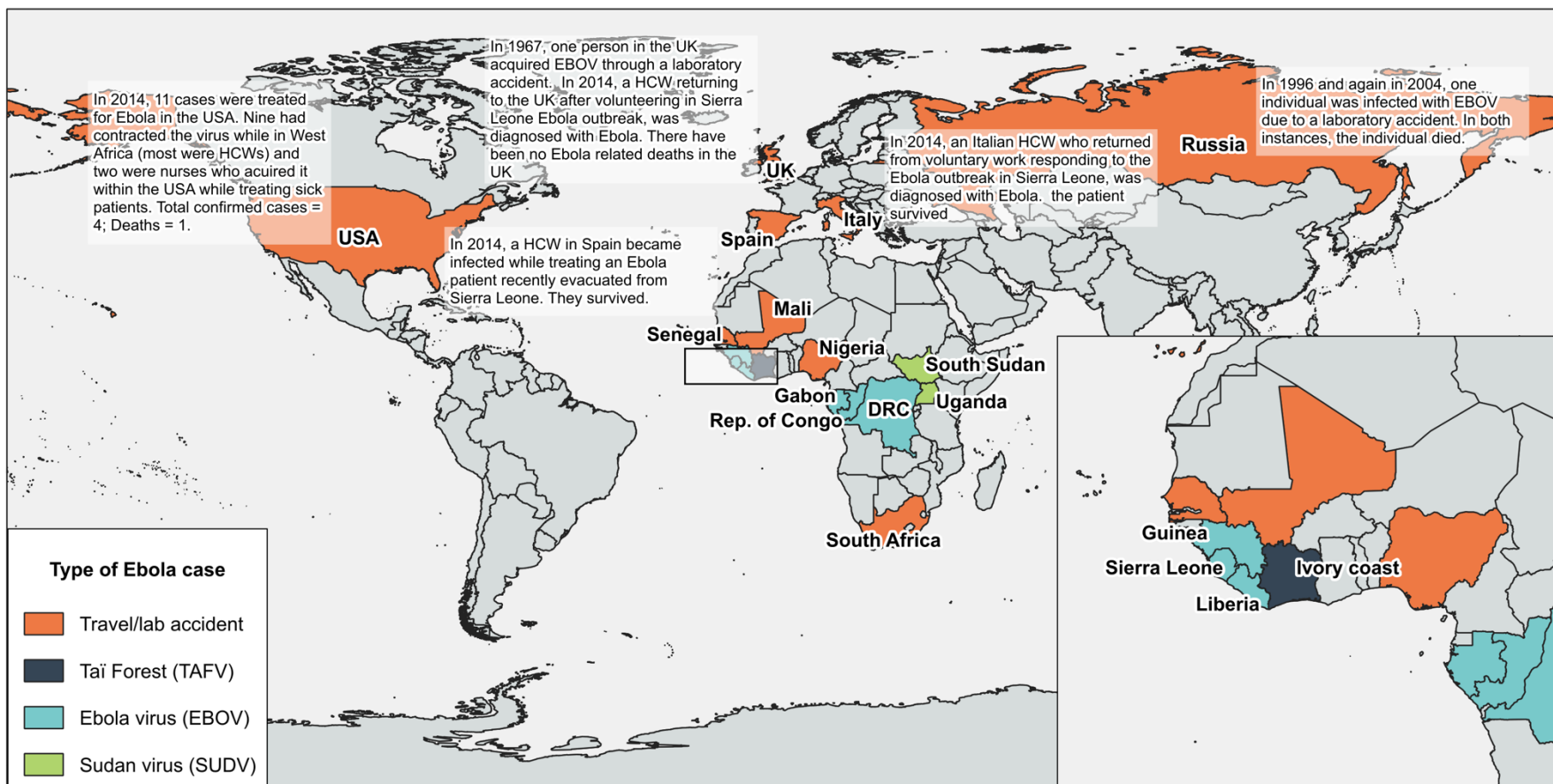
On 30 January 2025, Uganda announced one confirmed case of Sudan Virus Disease (SVD) after a nurse died in Kampala¹. SVD is a highly infectious, potentially lethal zoonotic disease caused by Sudan Virus (SUDV). It is part of the Orthoebolavirus genus (formerly ebolavirus) belonging to the *Filoviridae* viral family^{2–8}. There are six Orthoebolaviruses (**Table 1**)^{5,7}. The two main viral species responsible for infecting humans are orthoebolavirus zairense and sudanense, and the resulting disease is often referred to as Ebola.

Ebola was first discovered in 1976 after two almost simultaneous outbreaks occurred in South Sudan and the Democratic Republic of the Congo (DRC), resulting in over 500 cases^{2,4,9–11}. South Sudan, which was affected by SUDV, had a mortality rate of 53%. The outbreak is believed to have originated in cotton factory workers in Nzara before spreading to nearby Maridi, where transmission was intensified among healthcare workers in active hospitals^{10,11}. Since 1976 and before the announcement of the recently confirmed SVD case in Uganda, there were eight reported outbreaks of SVD in South Sudan (n=3) and Uganda (n=5) (**Figure 1**)^{4,11}.

Table 1: Types of orthoebolaviruses according to the International Committee on Taxonomy of Viruses (ICTV)

Virus name	Virus name Abbreviation	Virus species	Human disease caused by virus (if applicable)
Ebola Virus	EBOV	Orthoebolavirus zairense	Ebola Virus Disease (EVD)
Sudan Virus	SUDV	Orthoebolavirus sudanense	Sudan Virus Disease (SVD)
Bundibugyo virus	BDBV	Orthoebolavirus bundigyoense	Bundibugyo virus disease
Taï Forest Virus	TAFV	Orthoebolavirus taiense	There has only been one reported case of non-lethal human disease in the Ivory Coast after close contact with chimpanzees ^{7,11,12}
Reston Virus	RESTV	Orthoebolavirus restonense	Not known to cause human disease
Bombali Virus	BOMV	Orthoebolavirus bombaliense	Not known to caused human disease

The animal reservoir for orthoebolaviruses is yet to be confirmed however, fruit bats are believed to be the natural hosts for orthoebolavirus zairense specifically³. Ebola viruses in general have affected non-human primates, but the source of infection remains unknown³.



Abbreviations: HCW (Healthcare worker);
 USA (United States of America); UK (United Kingdom); DRC (Democratic Republic of the Congo); Rep. of Congo (Republic of Congo).

Table: Ebola outbreaks in Africa

B= Bundibugyo virus outbreak
 * = 2 outbreaks in the same year

Note: All travel/lab accident cases were affected by EBOV

		Year of outbreak (YY)																				
Options	try	76	77	79	94	95	96	00	01	03	04	05	07	08	11	12	14-16	17	18	20	21	22
																B			*		*	*
	South Sudan																					
	Gabon						*															
	Ivory coast																					
	South Africa																					
	Uganda																*					
	Rep. of Congo									*				B								
	Guinea																					
	Sierra Leone																					
	Liberia																					
	Senegal																					
	Nigeria																					
	Mali																					
	Total cases	602	1	34	52	315	93	425	124	178	17	12	395	32	1	55	28,708	8	3,524	130	46	170
	Total deaths	431	1	22	31	254	67	224	97	157	7	10	229	15	1	20	11,371	4	2,320	55	27	61

Figure 1: Geographical spread of Ebola

Map made in QGIS using Natural Earth data. Data on Ebola outbreaks obtained from US CDC 'Outbreak History'. Available from: <https://www.cdc.gov/ebola/outbreaks/index.html>

Transmission, Clinical Presentation, and Diagnosis of Ebola

Ebola is transmitted to humans through close contact with the blood and bodily fluids of infected animals such as fruit bats, monkeys, apes, or antelopes found in the rainforest^{2,13}. The virus enters via broken skin or mucous membranes². Human-to-human transmission occurs through direct contact with the blood and bodily fluids of an infected, symptomatic human or objects they may have contaminated². There is also evidence that sexual transmission can occur after recovery while the virus is still present in an individual's blood^{2,13}. The virus is also known to be present in breast milk and it is recommended that individuals with Ebola or those who recently recovered, should avoid breastfeeding¹⁴.

The incubation period ranges from 2 to 21 days however, the average time till symptom onset is 8 to 10 days after exposure to the virus^{2,15}. Common initial symptoms include fever, muscle pain, headache, and weakness^{2,15}. Symptoms then progress to unexplained bleeding and a maculopapular rash, vomiting, diarrhoea, and abdominal pain^{6,15}. Complications include multisystem organ failure, haemorrhage, shock, and spontaneous abortion in pregnancy^{6,16}. Ebola survivors can have persistent symptoms lasting two years or longer and these include vision problems, loss of appetite, weight gain, depression and anxiety, memory loss, and fatigue^{2,15}. There is a range of diagnostic methods including reverse transcriptase polymerase chain reaction assay (RT-PCR), antibody-capture enzyme-linked immunosorbent assay (ELISA), antigen-capture detection tests, serum neutralizing tests, electron microscopy, and cell culture virus isolation².

Laboratory detection is necessary for an accurate Ebola diagnosis due to its clinical similarities to other diseases such as malaria, yellow fever, and Lassa fever^{2,17}. However, there are several challenges to diagnostics. There is a lack of laboratories in rural settings which can lead to a delay in diagnosis and ultimately mismanagement of cases and further spread of the disease¹⁷. This highlights a need for rapid diagnostic tests but unfortunately, many rapid diagnostic tests stopped being produced at the end of the West Africa Ebola outbreak^{17,18}. They are also costly and there is a lack of clarity on approval pathways for their use in non-outbreak periods^{17,18}. This has led to a lack of rapid diagnostic tests in endemic regions¹⁷. Co-infections and the need for diagnostics to differentiate between pathogens is also a challenge¹⁷. Diagnostic tools need a high specificity however, the point-of-care tests suggested for use by the WHO in the 2014 West Africa Ebola outbreak were unable to achieve a specificity of over 90% and did not meet the 'desired' or 'acceptable' criteria listed in the WHO target product profile^{17,18}. There are other rapid diagnostic tests currently under development that may be able to address this challenge¹⁷.

Therapeutics and Prevention

Ebola is a fatal disease. The time from onset of symptoms to death is roughly 10 days¹⁹. Of those who recover, they may experience persistent symptoms lasting 2 or more years after their recovery². While there are vaccines and therapeutics available for EBOV, there are no licensed vaccines or therapeutics for SUDV^{20,21}.

Access to early optimal supportive care improves chances of survival and includes oral and intravenous fluids, blood transfusions, and medicines to treat other infections and/or pain and gastrointestinal symptoms². Beyond vaccination, preventative measures include a) hand hygiene, b) avoiding contact with people who are sick or died from Ebola including safe burial, c) reducing the risk of wild animal to human transmission, d) preventing sexual transmission, and e) ensuring safe handling of Ebola viruses in laboratories². Healthcare workers are particularly at risk for contracting Ebola as they care for Ebola patients and should therefore ensure that they always follow standard infection control precautions for all patients regardless of their diagnoses².

Therapeutics and vaccines in development for Sudan Virus Disease

After a 2022 outbreak of Sudan Virus Disease in Uganda, the WHO identified two therapeutic products as top priority based on evidence from nonhuman primate studies (NHPs): MBP134 (developer: MappBio) and remdesivir (developer: Gilead)^{22,23}. MBP134 is a monoclonal antibody cocktail with efficacy data in NHPs and safety data from a human trial²³. Remdesivir is an antiviral with reported efficacy in NHPs however, in the PALM trial evaluating therapeutics for EBOV, remdesivir did not improve mortality compared to other therapeutics and was subsequently not recommended for use by the WHO^{22,23}. In 2022, the Ugandan National Regulatory Authority authorized MBP134 and remdesivir for compassionate use²³. No therapeutics have sufficient clinical data on efficacy²³. Therefore, the WHO started a “SOLIDARITY-trial Ebola disease therapeutics” in Uganda in 2022 to evaluate the efficacy and safety of MP134, remdesivir, and corticosteroids²². However, the trial came to a halt as the outbreak was declared over in January 2023. The trial may resume with future SUDV Ebola outbreaks²².

There is limited data on whether the licensed vaccines for EBOV provide any cross-protection against SUDV²⁴. A more recent study demonstrated that Ervebo can elicit an immune response in guinea pigs, but further evidence is needed from NHPs and humans²⁴. The Janssen two-dose Ebola vaccine is believed to provide cross-protection against SUDV due to the incorporation of SUDV glycoproteins in the second dose however, there is limited clinical data, and the vaccine is not suitable for an outbreak response^{24,25}. During the 2022 SUDV outbreak in Uganda, the WHO published a list of vaccine candidates in development²⁶. Most candidates were in the preclinical phase however two had reached phase I clinical trials²⁶. In November 2022, the WHO vaccine prioritization working group recommended using three vaccines in a planned ring vaccination trial in Uganda after promising results from the TokomezaPlus Ebola Phase I/II randomised control trial²⁷. These were, in order of priority: 1) VSV-SUDV from the International Aids Vaccine Initiative (IAVI), 2) ChAd3-SUDV from the Sabin Institute, and 3) biEBOV from Oxford University/Jenner Institute²⁷.

The VSV-SUDV vaccine is a live attenuated vaccine based on the licensed Ervebo vaccine used for EBOV^{22,27}. It was prioritised by the WHO mainly due to the well-documented safety of the Ervebo vaccine which is now recommended for use in children and pregnant women^{22,27}. The VSV-SUDV protected NHPs against disease, and initial findings from a Phase I clinical trial demonstrate the vaccine is well tolerated and elicits an immune response^{22,27,28}. The ChAd3-SUDV vaccine is an adenovirus 3 vector vaccine^{22,27}. Pre-clinical and Phase I trials demonstrate protection in NHPs for 12 months and safety in human adults and children^{22,27}. A Phase II trial with healthy volunteers in Uganda was launched in July 2024²⁹. The biEBOV vaccine is an attenuated adenovirus vector vaccine using the same platform used to develop the COVID-19 vaccines^{22,27}. A study on mice demonstrated an antibody response to the vaccine and a Phase I study in the UK and Tanzania demonstrated the safety and tolerability of the vaccine^{22,27}. However, a study published in March 2024, stated that the vaccine does not protect NHPs³⁰.

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Sudan Virus Disease in Uganda

Epidemiology

The first confirmed case of SVD announced on 30 January was a male nurse who worked at the Mulago National Referral Hospital³³. He developed symptoms including fever, bleeding, and difficulty breathing, on 19 January 2025 and died from the disease ten days later after seeking treatment at several healthcare facilities and a traditional healer in Kampala, Wakiso, and Mbale districts^{33,34}. As of 5 February 2025, there were nine confirmed cases of SVD (four healthcare workers and five family members), one death, and over 200 contacts from four districts in Uganda (Jinja, Kampala, Mbale, and Wakiso)³⁵. Contacts identified come from two clusters: healthcare workers and family members of the index case³⁶. On 18 February 2025, the eight surviving SVD cases were discharged from hospital³⁷. The CFR for this outbreak so far is 11.1%. As of

20 February, there remain 58 contacts in quarantine being monitored³⁵. If all are negative for SVD, Uganda may declare the end of the outbreak 42 days after the last negative test (18 February)³⁵.

Uganda has experienced five previous outbreaks of SVD¹¹. Before 30 January 2025, the most recent SVD outbreak in Uganda occurred in November 2022 and resulted in 164 cases and 55 deaths (CFR: 33.5%)¹¹.

Public Health and Research Response

Resource Allocation

The identification of SVD in Uganda's densely populated city, Kampala, is concerning³⁴. The World Health Organization (WHO) has advised that in the absence of licensed vaccines and therapeutics, the risk to public health is high³⁵. They have rapidly deployed a team of public health experts to support Uganda in its response to this outbreak³⁴. They have also allocated \$1 million US dollars from the Contingency Fund for Emergencies³⁴.

Clinical Management and Trials

By 3 February 2025, within five days of the SVD announcement in Uganda, participants of a ring vaccination trial using the IAVI vaccine candidate had already been vaccinated (**Figure 2**)²⁸. The rapid deployment of vaccines as part of this WHO-led trial was partly made possible due to Uganda having vaccine doses available in the country since its outbreak in 2022²⁸.

Travel Restrictions

The WHO has stated that it advises against any travel restrictions to Uganda so far¹. The US CDC has issued a Level 2 Travel Health Notice to Practice Enhanced Precautions when travelling to Uganda and has issued a Health Alert Network advising healthcare workers of the situation and providing recommendations for managing potential SVD cases in the US^{33,38}.

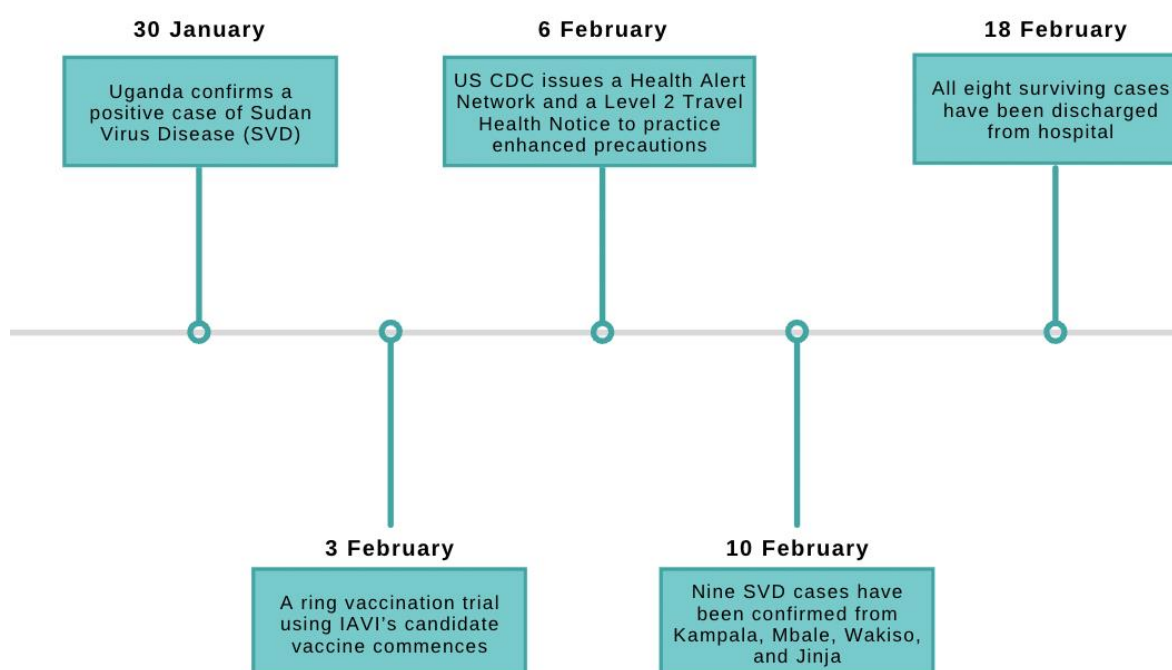


Figure 3: Timeline of events related to the Ebola outbreak in Uganda

Useful Resources

- The Pandemic PACT grant tracker allows users to obtain information and analyses on active Ebola research and funding globally since 2020. The tracker can be accessed on the [Pandemic PACT website](#) and it can be filtered to include only Ebola-related activities.
- The [WHO-Strategic Research Agenda for Filovirus Research and Monitoring \(WHO-AFIRM\) Roadmap 2021 – 2031](#) lists strategic goals, key knowledge gaps, challenges, and key needs for Filoviruses.
- The WHO Research & Development (R&D) [Ebola/Marburg Roadmap](#) (2019) prioritises research for the development of medical countermeasures against Ebola and Marburg viruses.
- Further resources including ‘Target product profiles (TPPs)’, ‘Trial Designs’, and ‘Roadmaps’ can be found on the WHO R&D [webpage](#) dedicated to Ebola and Marburg.

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