EDITORIAL

Ebola Virus Disease: What We Know, How Deadly It is, and How It Spreads Compared to COVID-19?

Vivekanand Kattimani

Abstract

Ebola virus disease (EVD) remains one of the most lethal infectious diseases known to medicine, with an average case fatality rate (CFR) of approximately 50% and historical outbreak CFRs ranging from 25% to 90%, depending on virus species and health care context. Caused exclusively by Ebola virus (*Orthoebolavirus zairense*) within the family Filoviridae, EVD has been recognized since its first identification in the Democratic Republic of the Congo in 1976, with at least 34 outbreaks documented since then and evidence of increasing frequency after 1994. Meta-analyses of global outbreak data report pooled CFRs of approximately 60–65%, with Zaire ebolavirus consistently associated with the highest fatality among the species that infect humans.

Ebola virus disease is transmitted through close, direct physical contact with the blood, body fluids, or contaminated materials of symptomatic individuals or deceased persons; it is not an airborne infection. This fundamental distinction in transmission mode explains why EVD does not spread like COVID-19. While SARS-CoV-2 propagates via respiratory aerosols across distances in everyday settings, Ebola is constrained to contact-based routes, resulting in more limited but concentrated outbreak dynamics, with estimated basic reproduction numbers of 1.5–2.5 during the 2014 West Africa epidemic. Critically, EVD is not infectious before symptom onset, enabling a response architecture centered on rapid case identification, isolation, rigorous infection prevention and control, safe burial practices, and intensive contact tracing.

Significant therapeutic advances have strengthened outbreak response. Two WHO-prequalified vaccines–Ervebo and the Zabdeno/Mvabea regimen—and two strongly recommended monoclonal antibody treatments, mAb114 (Ansuvimab) and REGN-EB3 (Inmazeb), are now available for EBOV outbreaks. Preparedness planning must account for recurrent zoonotic spillover risk, survivor persistence of virus in immune-privileged sites, and ongoing gaps in diagnostic and response capacity in endemic regions.

Keywords: Bodily fluid transmission, Contact tracing, Filoviridae, Monoclonal antibody therapy, Outbreak containment, Zoonotic spillover.

Journal of Integrative Health Research (2026): 10.5005/jihr-11055-0035

Introduction

Ebola virus disease (EVD) is a severe, frequently lethal illness caused by the Ebola virus (EBOV).[1] Outbreaks usually begin with a single probable zoonotic introduction, followed by human-to-human transmission through direct contact with infected body fluids and contaminated materials, rather than through airborne spread.[1–3] Reported case fatality rates (CFRs) vary widely by outbreak and virus species, with the World Health Organization (WHO) summarizing an average of around 50% and a historical range of 25% to 90%.[4] Public health control relies on rapid case identification and isolation, rigorous infection prevention and control (IPC), safe handling of bodies, and intensive contact tracing, with vaccination and monoclonal antibody therapies now important response tools in some settings.[5–8]

What is Ebola?

Ebola virus disease is defined as a disease caused only by EBOV (Zaire ebolavirus).[1] EBOV belongs to the Filoviridae family, and filoviruses known to infect humans include ebolaviruses (Bundibugyo, Ebola, Reston, Sudan, Taï Forest) and Marburg viruses (Marburg and Ravn).[1]

EVD is characterized clinically by severe systemic illness with prominent gastrointestinal manifestations and can progress to multiple organ dysfunction syndrome with high case fatality.[1] Pathogenesis studies describe early targeting of mononuclear phagocytes (monocytes, macrophages, dendritic cells), with dissemination as these cells migrate, and broader infection of other cell types, including liver, adrenal, and endothelial cells.[9]

Department of Oral and Maxillofacial Surgery, Narsinhbhai Patel Dental College & Hospital, Sankalchand Patel University, Mehsana, Gujarat, India

Corresponding Author: Vivekanand Kattimani, Department of Oral and Maxillofacial Surgery, Narsinhbhai Patel Dental College & Hospital, Sankalchand Patel University, Mehsana, Gujarat, India, e-mail: drvivekanandkattimani@gmail.com

How to cite this article: Kattimani V. Ebola Virus Disease: What We Know, How Deadly It is, and How It Spreads Compared to COVID-19? J Integr Health Res 2026;3(1):1–4.

Source of support: Nil

Conflict of interest: None

The natural reservoir host has not been definitively identified; however, multiple lines of evidence indicate a direct or indirect role for bats in EBOV ecology, while EBOV has not been isolated from wild animals, and near-complete EBOV genomes have not been detected in any wild animal to date.[1]

Major Outbreaks

Ebola disease was first identified in 1976 after an outbreak in what is now the Democratic Republic of the Congo (DRC).[10] Since its recognition in 1976, repeated outbreaks have been reported in Africa, with one analysis summarizing 34 outbreaks since 1976 and another review noting increasing frequency since 1994 (after a period with no detected human cases from 1979 to 1994) (Table 1).[11,12]

© The Author(s). 2026 Open Access. This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (https://creativecommons.org/licenses/by-nc/4.0/). This license permits non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited, a link to the license is included, and any changes are indicated.

Table 1: Showing relevant outbreaks with reported case and death totals

Outbreak and location	*Time period*	*Reported cases*	*Reported deaths*	*Approx. CFR*	*Notes for preparedness*
West Africa (Guinea → wider West Africa)	2013–2016	28,652 infections[1]	11,325 deaths[1]	~39.5% (11,325/28,652)[1]	Described as the largest outbreak to date; intense urban transmission reported in 2014–2016[10,12]
Eastern DRC (North Kivu)	2018–2020	3,470 cases[10]	2,287 deaths (66%)[10]	66%[10]	WHO declared the outbreak over on June 25, 2020[10]
Eastern DRC (Ituri, Nord-Kivu, Sud-Kivu)	As of January 28, 2020	3,418 infections[1]	2,240 deaths[1]	~65.5%[1]	Reported as second-largest by cases and deaths at that timepoint[1]
DRC (Équateur Province, Mbandaka)	2020	130 cases[10]	55 deaths (42.3%)[10]	42.3%[10]	Declared over on November 18, 2020 by DRC Ministry of Health and WHO[10]
Uganda (Mubende District, Sudan virus)	2022–2023	164 cases[10]	55 deaths (34%)[10]	34%[10]	Declared over on January 11, 2023 with 142 confirmed cases (and 22 probable) and 55 confirmed deaths[10]
Uganda (Kampala, Sudan virus)	2025	12 confirmed; 2 probable[10]	4 deaths (30%)[10]	30%[10]	Outbreak declared over on April 26, 2025[10]

Table 2: Transmission comparison

Pathogen	*Dominant transmission route*	*R_0 range*	*CFR range*	*Presymptomatic spread?*	*Healthcare worker risk*	*Approved countermeasures*
Ebola	Direct contact: blood/bodily fluids, contaminated objects/surfaces	1.51–2.53	25–90% (avg ~50%)	No	High when IPC not practiced	2 vaccines; 2 mAbs
Marburg	Direct contact: blood/bodily fluids, contaminated materials; burial risk	~1.59 (Angola 2005)	24–88% (avg ~50%; pooled 61.9%)	No	High when IPC not practiced	None approved
Lassa	Primarily rodent-to-human; human-to-human *via* blood/secretions; nosocomial	Not established	0–50%/year (avg 20–30%)	Up to 80% asymptomatic + shedding	High (nosocomial)	

How Deadly is It?

Severity is driven by both the clinical syndrome and the historically high fatality rate, with the Centers for Disease Control and Prevention (CDC) noting that, without treatment, up to 90% of cases can be fatal.[10] Across outbreaks, the WHO summarizes an average CFR of around 50% and emphasizes wide variability (25–90%) in past outbreaks.[4]

Syntheses of multiple outbreaks also find high overall lethality. A meta-analysis covering 42 outbreaks (1976–2022) reported a pooled CFR of 60.6% (95% CI 51.6–69.4) and estimated that the CFR declined over time but stabilized at around 61.0% (95% CI 52.0–69.0) between 2014 and 2022.[13] Another meta-analysis reported an overall CFR estimate of 65.4% (95% CI 54.6–75.5), with substantial variation among outbreaks.[14] The European Centre for Disease Prevention and Control (ECDC) similarly cites a weighted CFR of 65.0% (95% CI 54.0–76.0) and highlights higher fatality for Zaire ebolavirus (75%) than for Sudan ebolavirus (53%).[2]

Lethality differs by virus species. In the 1976–2022 meta-analysis, Zaire virus had the highest CFR estimate (66.6%), followed by Sudan virus (48.5%), Bundibugyo virus (32.8%), and Taï Forest virus (0%).[13]

Clinical features associated with mortality (useful for triage and clinical monitoring) have been summarized in pooled analyses; fatal cases more often had bleeding events, vomiting, diarrhea, and abdominal pain than survivors in one meta-analysis of clinical findings.[15]

How It Spreads

Human-to-human transmission occurs through close, direct physical contact with infected bodily fluids, with the WHO emphasizing that the most infectious fluids are blood, feces, and vomit[3] (Table 2). The ECDC similarly notes transmission by direct contact with blood (including *via* mucous membranes or broken skin) or other bodily fluids (including saliva, urine, and vomit), as well as *via* surfaces and materials soiled by infectious fluids.[2] The CDC also describes infection *via* contact with the body fluids of an infected person or with contaminated objects.[16]

Multiple public health agencies emphasize that Ebola is not an airborne infection. The WHO states that EVD is not an airborne infection, and the ECDC states that Ebola disease is not

an airborne disease.[2,3] Guidance for clinical management also states that there is no evidence of airborne transmission, while noting that precautions are warranted if aerosol-generating symptoms occur or aerosol-producing high-risk procedures are performed (e.g., intubation).[17]

EVD is generally not considered contagious before the onset of symptoms, which has major operational implications for screening and contact monitoring approaches during outbreaks.[2] Operationally, this underpins a response focused on rapid identification and isolation of symptomatic cases and the close monitoring of exposed contacts to catch symptom onset early.[6,17]

Persistence and special transmission scenarios matter for preparedness planning. The ECDC notes that ebolaviruses can persist in immune-privileged sites (including testicles, central nervous system, and aqueous humor) in some survivors, creating potential for new transmissions, notably through sexual transmission.[2] Viral RNA has been detected in multiple body fluids days to months after illness onset, including saliva, stool, urine, sweat, and semen, supporting the need for survivor follow-up and risk communication even after the acute illness has resolved.[18]

Ebola and Covid Comparison

Available evidence in these sources indicates that Ebola transmission is constrained primarily to direct physical contact with infectious body fluids, rather than to routine airborne spread, which leads to different outbreak dynamics and different control priorities than diseases dominated by airborne transmission.[3,19]

This difference is reflected in estimates of transmission potential during the 2014 West Africa epidemic. In analyses of early exponential growth, estimated basic reproduction numbers (R_0) were around 1.71 for Guinea, 1.83 for Liberia, and 2.02 for Sierra Leone, with confidence intervals roughly spanning ~1.4 to ~2.3, depending on the country estimate.[5] Another modeling analysis from the same epidemic estimated an R_0 of 1.51 (Guinea), 2.53 (Sierra Leone), and 1.59 (Liberia).[20] A comparative framework also summarizes EVD as having an $R_0 \approx 1.7$, with a mean generation time of about 15 days, underscoring a relatively slower epidemic tempo compared with fast-spreading respiratory viruses that have short generation times.[19]

Transmission potential can also change rapidly with interventions. One analysis estimated "current" reproduction numbers (R) of 1.81 (Guinea), 1.51 (Liberia), and 1.38 (Sierra Leone) during part of the West Africa epidemic, while also reporting doubling times on the order of weeks rather than days.[5] A broader analysis across completed outbreaks estimated an effective reproductive ratio slightly below 1 (posterior R_t = 0.88, with an interval of 0.64–0.96), consistent with many outbreaks being containable when response measures interrupt chains of transmission.[21]

For a direct answer to "Does it spread like COVID," the key point supported by these sources is that Ebola is not an airborne infection and is primarily transmitted through direct contact with body fluids; therefore, it does not spread *via* the same every day, distance-mediated routes that characterize airborne transmission.[3]

Response Measures

Control strategies described in the epidemiologic literature emphasize that because Ebola is spread mainly through contact with the body fluids of symptomatic patients, transmission can be stopped by combining early diagnosis, contact tracing, patient isolation and care, infection control, and safe burial practices.[5] This framing aligns with field reports in which chains of transmission were stopped through early detection of new cases, effective identification and monitoring of contacts (with support in acceptable settings), effective triage, and rapid isolation of symptomatic contacts.[6]

Contact tracing is a central operational pillar. ECDC guidance describes contact tracing as a means to identify symptomatic (and therefore infectious) individuals among contacts as early as possible for isolation, laboratory testing, and treatment, and it defines a contact person as someone without symptoms who had contact with a confirmed EVD case, bodily fluids, or a contaminated environment, with exposure occurring within the prior 21 days.[17] The ECDC also summarizes the incubation period as 2–21 days, with a median of 9–10 days, which informs the length of contact follow-up windows.[17]

Experience from outbreak responses illustrates the scale and impact of this work. In Liberia (January–February 2015), contact tracing identified 745 contacts over 6 weeks, including 166 healthcare workers from 10 healthcare facilities, and the response report attributes stopping the chain of transmission to early detection, contact identification/monitoring/support, triage, and rapid isolation of symptomatic contacts.[6] In another Liberia cluster response, investigators identified 165 contacts (with over 150 identified within 48 hours) and reported that no contacts developed the disease under close monitoring, with prompt testing of symptomatic individuals.[22]

Vaccines and Treatments

Vaccination has become a key component of outbreak response for some EVD scenarios. The WHO states that there are currently two licensed Ebola vaccines prequalified by the WHO for EVD caused by the EBOV (*Orthoebolavirus zairense*): Ervebo (one dose) and the Zabdeno/Mvabea two-dose regimen.[7] The WHO further notes that Ervebo is recommended for use in outbreak settings and is currently the only vaccine available in the global stockpile, and that countries can request vaccines through the International Coordinating Group, which can provide vaccines and operational cost support to eligible countries during confirmed outbreaks.[7]

The WHO describes vaccination strategies designed for containment, including ring vaccination of close contacts and potential contacts of confirmed or probable cases, and targeted geographic vaccination of entire neighborhoods or villages when cases are geographically contained or when contact tracing is difficult or not feasible.[7] Operationally, the WHO notes that it takes about 10–14 days to develop a complete immune response and that no vaccine is 100% effective, which supports continued emphasis on IPC and avoidance of contact with infectious body fluids even among vaccinated people.[7]

Therapeutics have also advanced, particularly for EVD caused by EBOV (Zaire ebolavirus). The WHO published guidance with strong recommendations for two monoclonal antibody treatments, mAb114 (Ansuvimab; Ebanga) and REGN-EB3 (Inmazeb), based on a systematic review and meta-analysis of randomized clinical trials.[8] The WHO notes that early diagnosis and optimized supportive care (including fluid and electrolyte repletion and symptom treatment) significantly improve survival, and recommends giving these neutralizing monoclonal antibodies as soon as possible after laboratory confirmation of diagnosis, while also highlighting that access remains challenging in resource-poor areas.[8]

Preparedness and Future Risks

Preparedness planning should assume recurrent outbreak risk, given the documented history of repeated outbreaks since 1976 and evidence that outbreaks have been recognized with increasing frequency since 1994.[11,12] Because outbreaks typically start from a single probable zoonotic transmission event followed by human-to-human spread through direct contact with bodily fluids or contaminated fomites, surveillance and rapid field investigation at the human–animal interface and in healthcare settings remain central to prevention and early containment.[1]

Operational readiness benefits from integrating diagnostics, IPC, and response operations. Diagnostic confirmation commonly relies on case definitions plus laboratory testing, such as real-time reverse transcription polymerase chain reaction (PCR) to detect viral RNA or rapid diagnostic tests based on immunoassays for EBOV antigens, supporting the need for accessible laboratory capacity and specimen referral networks.[1] Additionally, because guidance emphasizes no evidence of airborne transmission but the need for enhanced precautions during aerosol-generating procedures, preparedness should include protocols and supplies that can escalate personal protective equipment (PPE) and engineering controls when high-risk clinical care is needed.[17]

Conclusion

Ebola virus disease remains one of the world's most lethal infectious diseases, with CFR estimates commonly ranging around 50% on average, but varying widely by outbreak and virus species, and reaching very high levels in some events and settings.[4,13] The epidemiology in these sources consistently indicates that Ebola spreads mainly through close, direct contact with infectious body fluids and contaminated materials and is not an airborne infection, which shapes both its outbreak dynamics and the core containment toolkit.[2,3] Effective preparedness and response therefore prioritize rapid diagnosis, isolation, and IPC, contact tracing, safe handling of deceased persons, and—in EBOV outbreaks where available—use of vaccines and monoclonal antibody therapies alongside optimized supportive care.[5–8]

Orcid

Vivekanand Kattimani https://orcid.org/0000-0002-9812-7207

References

1. Jacob ST, Crozier I, Fischer WA 2nd, et al. Ebola virus disease. Nat Rev Dis Primers 2020;6(1):13. DOI: 10.1038/s41572-020-0147-3
2. European Centre for Disease Prevention and Control. Factsheet about Ebola disease [Internet]. Stockholm: ECDC; [cited 2026 Jun 1]. Available from: https://www.ecdc.europa.eu/en/infectious-disease-topics/ebola-disease/disease-information/factsheet-about-ebola-disease
3. World Health Organization. What we know about transmission of the Ebola virus among humans [Internet]. Geneva: WHO; 2014 Oct 6 [cited 2026 Jun 1]. Available from: https://www.who.int/news/item/06-10-2014-what-we-know-about-transmission-of-the-ebola-virus-among-humans
4. World Health Organization. Ebola disease [Internet]. Geneva: WHO; [cited 2026 Jun 1]. Available from: https://www.who.int/en/health-topics/ebola/ebola
5. WHO Ebola Response Team; Aylward B, Barboza P, et al. Ebola virus disease in West Africa—the first 9 months of the epidemic and forward projections. N Engl J Med 2014;371(16):1481–1495. DOI: 10.1056/NEJMoa1411100
6. Nyenswah T, Fallah M, Sieh S, et al. Controlling the last known cluster of Ebola virus disease - Liberia, January-February 2015. MMWR Morb Mortal Wkly Rep 2015;64(18):500–504. PMID: 25974635.
7. World Health Organization. Ebola virus disease vaccines [Internet]. Geneva: WHO; [cited 2026 Jun 1]. Available from: https://www.who.int/news-room/q-a-detail/ebola-vaccines
8. World Health Organization. WHO makes new recommendations for Ebola treatments, calls for improved access [Internet]. Geneva: WHO; 2022 Aug 19 [cited 2026 Jun 1]. Available from: https://www.who.int/news/item/19-08-2022-who-makes-new-recommendations-for-ebola-treatments---calls-for-improved-access
9. Letafati A, Salahi Ardekani O, Karami H, et al. Ebola virus disease: a narrative review. Microb Pathog 2023;181:106213. DOI: 10.1016/j.micpath.2023.106213
10. Centers for Disease Control and Prevention. Outbreak history: Ebola [Internet]. Atlanta: CDC; [cited 2026 Jun 1]. Available from: https://www.cdc.gov/ebola/outbreaks/index.html
11. Rugarabamu S, Mboera L, Rweyemamu M, et al. Forty-two years of responding to Ebola virus outbreaks in Sub-Saharan Africa: a review. BMJ Glob Health 2020;5(3):e001955. DOI: 10.1136/bmjgh-2019-001955
12. UK. Health Security Agency. Ebola: overview, history, origins and transmission [Internet]. London: GOV.UK; [cited 2026 Jun 1]. Available from: https://www.gov.uk/government/publications/ebola-origins-reservoirs-transmission-and-guidelines/ebola-overview-history-origins-and-transmission
13. Izudi J, Bajunirwe F. Case fatality rate for Ebola disease, 1976-2022: a meta-analysis of global data. J Infect Public Health 2024;17(1):25–34. DOI: 10.1016/j.jiph.2023.10.020
14. Lefebvre A, Fiet C, Belpois-Duchamp C, et al. Case fatality rates of Ebola virus diseases: a meta-analysis of World Health Organization data. Méd Mal Infect 2014;44(9):412–416. DOI: 10.1016/j.medmal.2014.08.005
15. Hartley MA, Young A, Tran AM, et al. Predicting Ebola severity: a clinical prioritization score for Ebola virus disease. PLoS Negl Trop Dis 2017;11(2):e0005265. DOI: 10.1371/journal.pntd.0005265
16. Centers for Disease Control and Prevention. How Ebola disease spreads [Internet]. Atlanta: CDC; [cited 2026 Jun 1]. Available from: https://www.cdc.gov/ebola/causes/index.html
17. European Centre for Disease Prevention and Control. Investigation and public health management of people with possible Ebola virus disease infection [Internet]. Stockholm: ECDC; 2019 Jul [cited 2026 Jun 1]. Available from: https://www.ecdc.europa.eu/sites/default/files/documents/Technical_Report_EVD-management-July-2019_0.pdf
18. Vetter P, Fischer WA 2nd,Schibler M, et al. Ebola virus shedding and transmission: review of current evidence. J Infect Dis 2016;214(Suppl. 3):S177–S184. DOI: 10.1093/infdis/jiw254
19. Nishiura H, Chowell G. Theoretical perspectives on the infectiousness of Ebola virus disease. Theor Biol Med Model 2015;12:1. DOI: 10.1186/1742-4682-12-1
20. Althaus CL. Estimating the reproduction number of Ebola virus (EBOV) during the 2014 outbreak in West Africa. PLoS Curr 2014;6. DOI: 10.1371/currents.outbreaks.91afb5e0f279e7f29e7056095255b288
21. House T. Epidemiological dynamics of Ebola outbreaks. Elife 2014;3:e03908. DOI: 10.7554/eLife.03908
22. Wolfe CM, Hamblion EL, Schulte J, et al. Ebola virus disease contact tracing activities, lessons learned and best practices during the Duport Road outbreak in Monrovia, Liberia, November 2015. PLoS Negl Trop Dis 2017;11(6):e0005597. DOI: 10.1371/journal.pntd.0005597