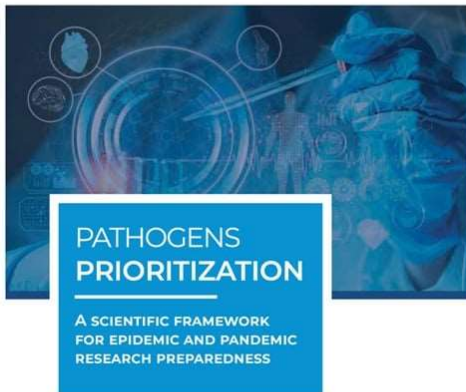


# Pathogens prioritization: a scientific framework for epidemic and pandemic research preparedness

## KRANKHEITSERREGER PRIORISIERUNG EIN WISSENSCHAFTLICHER RAHMEN ZUR VORBEREITUNG AUF EPIDEMIEN- UND PANDEMIENFORSCHUNG



JUNE 2024

30 July 2024 | Meeting report

**[Download \(6.1 MB\)](#)**

### Overview

This document outlines the findings of a global pathogen prioritization process involving over 200 scientists from more than 50 countries who evaluated the evidence related to 28 Viral Families and one core group of Bacteria, encompassing 1,652 pathogens. This process emphasized the imperative nature of collaborative efforts to attain global resilience against epidemics and pandemics.

### WHO TEAM

R&D Blue Print (RDB)

### EDITORS

World Health Organization

### NUMBER OF PAGES

38

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### Prioritizing-diseases-for-research-and-development-in-emergency-contexts

<https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts>

Table 1. Families and Pathogens that were prioritized in the 2024 update, as compared with the 2017 and 2018 prioritization processes<sup>4</sup>.

Family	2017	2018	PHEIC risk	2024	Prototype Pathogens
	Priority Pathogens	Priority Pathogens		Priority Pathogens	
Adenoviridae			Low-Medium		Recombinant Mastadenovirus
Adenoviridae			Low-Medium		Mastadenovirus blackbeardi serotype 14
Anelloviridae			Low		
Arenaviridae	Arenaviral hemorrhagic fevers including Lassa Fever	Lassa Fever virus	High	Mammarenavirus lassaense	Mammarenavirus lassaense
Arenaviridae			High		Mammarenavirus iuninense
Arenaviridae			High		Mammarenavirus lujense
Astroviridae			Low		Mamastrovirus virginiae
Bacteria			High	<i>Vibrio cholerae</i> serogroup 0139	
Bacteria			High	<i>Yersinia Pestis</i>	
Bacteria			High	<i>Shigella dysenteriae</i> serotype 1	
Bacteria			High	<i>Salmonella enterica</i> non typhoidal serovars	
Bacteria			High	<i>Klebsiella pneumoniae</i>	
Bornaviridae			Low		Orthobornavirus bornaense
Coronaviridae	Middle East Respiratory Syndrome Coronavirus	Middle East Respiratory Syndrome Coronavirus	High	Subgenus Merbecovirus	Subgenus Merbecovirus
Coronaviridae	Other highly pathogenic coronaviral diseases such as Severe Acute Respiratory Syndrome	Severe Acute Respiratory Syndrome	High	Subgenus Sarbecovirus	Subgenus Sarbecovirus
Filoviridae	Filoviral diseases Ebola	Ebola virus disease	High	Orthoebolavirus zairense	Orthoebolavirus zairense
Filoviridae	Filoviral diseases Marburg	Marburg virus disease	High	Orthomarburgvirus marburgense	
Filoviridae			High	Orthoebolavirus sudanense	
Flaviviridae	Zika virus	Zika virus	High	Orthoflavivirus zikaense	Orthoflavivirus zikaense
Flaviviridae			High	Orthoflavivirus denguei	Orthoflavivirus denguei
Flaviviridae			High	Orthoflavivirus flavi	
Flaviviridae			High		Orthoflavivirus encephalitis
Flaviviridae			High		Orthoflavivirus nilense
Hantaviridae			High	Orthohantavirus sinnombreense	Orthohantavirus sinnombreense
Hantaviridae			High	Orthohantavirus hantanense	
Hepadnaviridae			Low		Orthohepadnavirus hominoidi genotype C

<sup>4</sup> <https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts>

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	2017	2018	2024		
Family	Priority Pathogens	Priority Pathogens	PHEIC risk	Priority Pathogens	Prototype Pathogens
Hepeviridae			Low		Paslahepevirus balayani genotype 3
Herpesviridae			Low		
Nairoviridae	Crimean Congo Haemorrhagic Fever	Crimean Congo Haemorrhagic Fever	High	Orthonairovirus haemorrhagiae	Orthonairovirus haemorrhagiae
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H1	Alphainfluenzavirus Influenzae H1
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H2	
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H3	
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H5	Alphainfluenzavirus Influenzae H5
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H6	
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H7	
Orthomyxoviridae			High	Alphainfluenzavirus Influenzae H10	
Papillomaviridae			Low		
Paramyxoviridae	Nipah and related henipaviral diseases	Nipah and henipaviral diseases	High	Henipavirus nipahense	Henipavirus nipahense
Parvoviridae			Low		Protoparvovirus carnivoxan
Peribunyaviridae			Low		Orthobunyavirus oropoucheense
Phenuiviridae	Severe Fever with Thrombocytopenia Syndrome		High	Bandavirus dabiense	Bandavirus dabiense
Phenuiviridae	Rift Valley Fever	Rift Valley Fever	High		Phlebovirus riftense
Picobimaviridae			Low		Orthopicobirnavirus hominis
Picornaviridae			Medium	Enterovirus coxsackiepol	
Picornaviridae			Medium		Enterovirus alphacoxsackie 71
Picornaviridae			Medium		Enterovirus deconjecti 68
Pneumoviridae			Low-Medium		Metapneumovirus hominis
Polyomaviridae			Low		
Poxviridae			High	Orthopoxvirus variola	
Poxviridae			High		Orthopoxvirus vaccinia
Poxviridae			High	Orthopoxvirus monkeypox	Orthopoxvirus monkeypox
Retroviridae			Medium	Lentivirus humimdef1	Lentivirus humimdef1
Rhabdoviridae			Low		Genus Vesiculovirus
Sedoreoviridae			Low		Genus Rotavirus
Spinareoviridae			Low		Orthoreovirus mammalis
Togaviridae			High	Alphavirus chikungunya	Alphavirus chikungunya
Togaviridae			High	Alphavirus venezuelan	Alphavirus venezuelan
Pathogen X	Pathogen X	Pathogen X		Pathogen X	

# Pathogens prioritization: a scientific framework for epidemic and pandemic research preparedness

## KRANKHEITSERREGER PRIORISIERUNG EIN WISSENSCHAFTLICHER RAHMEN ZUR VORBEREITUNG AUF EPIDEMIEN- UND PANDEMIENFORSCHUNG

### R&D Blueprint

<https://www.who.int/teams/blueprint/>

### Mpox (monkeypox)

<https://www.who.int/teams/blueprint/monkeypox>

### Landscape of vaccines licensed or under development for Mpox

DRAFT landscape of COVID-19 candidate vaccines –  
27 May 2020

10 candidate vaccines in clinical evaluation

Platform	Type of candidate vaccine	Developer	Coronavirus target	Current stage of clinical evaluation/regulatory status-Coronavirus candidate	Same platform for non-Coronavirus candidates
Non-Replicating Viral Vector	ChAdOx1-S	University of Oxford/Janssen/Serum Institute of India	SARS-CoV2	Phase 2b/3 <a href="#">2020-091138-33</a> Phase 1/2 <a href="#">2020-091073-15</a>	MERS, influenza, TB, Dengue, Zika, MERS, plague
Non-Replicating Viral Vector	Adenovirus Type 5 Vector	CanSino Biological Inc./Beijing Institute of Biotechnology	SARS-CoV2	Phase 2 <a href="#">CHCTE2000031781</a> Phase 1 <a href="#">CHCTE19000000206</a>	Ebola
RNA	LNP-encapsulated mRNA	Moderna/NEAD	SARS-CoV2	Phase 2 (IND submitted) Phase 1 <a href="#">NCT04283461</a>	multiple candidates
Inactivated	Inactivated	Wuhan Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 <a href="#">CHCTE2000031809</a>	
Inactivated	Inactivated	Beijing Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 <a href="#">CHCTE2000031819</a>	
Inactivated	Inactivated + alum	Sinovac	SARS-CoV2	Phase 1/2 <a href="#">NCT04313174</a> <a href="#">NCT04313106</a>	SARS
Protein Subunit	Full length recombinant SARS-CoV-2 glycoprotein nanoparticle vaccine adjuvanted with Matrix M	Novavax	SARS-CoV2	Phase 1/2 <a href="#">NCT04318908</a>	RSV; CDHF; HPV; VZV; EBV
RNA	3 LNP-mRNAs	BioNTech/Pfizer	SARS-CoV2	Phase 1/2 <a href="#">2020-091038-30</a> <a href="#">NCT04318908</a>	
Inactivated	Inactivated	Institute of Medical Biology, Chinese Academy of Medical Sciences	SARS-CoV2	Phase 1	
DNA	DNA plasmid vaccine with electroporation	Inovio Pharmaceuticals	SARS-CoV2	Phase 1 <a href="#">NCT04318410</a>	multiple candidates

115 candidate vaccines in preclinical evaluation

Platform	Type of candidate vaccine	Developer	Coronavirus target	Current stage of clinical evaluation/regulatory status-Coronavirus candidate	Same platform for non-Coronavirus candidates
DNA	DNA Vaccine (DQ-18)	Genesine Consortium	SARS-CoV2	Pre-Clinical	
DNA	DNA with electroporation	Karolinska Institute / Cobera Biologics (DPENCODRNA Project)	SARS-CoV2	Pre-Clinical	

These landscape documents have been prepared by the World Health Organization (WHO) for informational purposes only concerning the 2019-2020 global effort of the novel coronavirus. Inclusion of any particular product or entity in any of these landscape documents does not constitute, and shall not be deemed or construed as, any

16 August 2024 | Technical document

**[Download \(67.1 kB\)](#)**

### Overview

The tab is the result of a preliminary landscape of vaccines licensed or under development for Mpox

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## KRANKHEITSERREGER PRIORISIERUNG EIN WISSENSCHAFTLICHER RAHMEN ZUR VORBEREITUNG AUF EPIDEMIEN- UND PANDEMIENFORSCHUNG

Targeting research on diseases of greatest epidemic and pandemic threat

<https://www.who.int/teams/blueprint/who-r-and-d-blueprint-for-epidemics>

### Prioritizing the world's greatest pathogen threats

There are over **1,400** species of human pathogens in the world. These include viruses, bacteria and fungi.

To guide future research efforts, the World Health Organization (WHO) R&D Blueprint for Epidemics launched on 21 November 2022, a global initiative to scientifically review all pathogens that could cause a future global pandemic (like COVID-19) or an epidemic of international concern.

#### How are the most dangerous pathogens shortlisted?

**200**  
plus

Global experts are independently reviewing and shortlisting pathogens of pandemic threat

**30**

**Viral families** are being studied to ensure all viruses that can infect humans are reviewed for any pathogen X

**1**

**Bacteria group** is being studied to scientifically screen for any bacteria pathogen X

**Pathogen X**

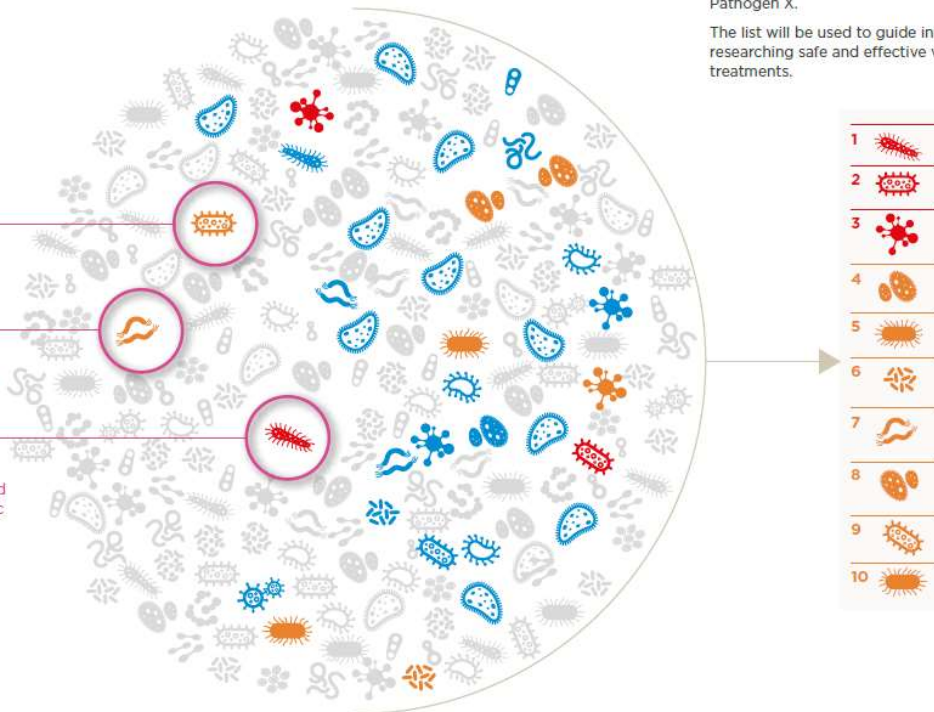
**Pathogen X**  
A yet unknown pathogen not currently infecting humans but could be pathogenic due to: their zoonotic risk, mode of transmission, global warming, tropical deforestation, or other factors.

#### Key scientific criteria to shortlist

How **transmissible** are they?

How **virulent** are they?

Are there sufficient **vaccines** or **treatments** in the event of an epidemic or pandemic?



#### The final shortlist of priority pathogens

The list is expected in early 2024 and will shortlist priority viral families, the highest threat pathogens, the prototype pathogens for research and any Pathogen X.

The list will be used to guide investments into researching safe and effective vaccines and treatments.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Pathogen reviewed and not shortlisted. These are viruses or bacteria unlikely to cause an epidemic or pandemic or there is equitable access to safe and effective vaccines / treatments.

Pathogens reviewed and not shortlisted. These are viruses or bacteria that have epidemic or pandemic potential but where there is equitable access to safe and effective vaccines / treatments.

Pathogens reviewed and shortlisted. These are viruses or bacteria that have epidemic or pandemic potential and where there are no or insufficient vaccines / treatments.

Pathogens reviewed and shortlisted. These are viruses or bacteria where the epidemic or pandemic potential is currently unknown but shortlisted as potential Pathogen X.