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Ranking the Next Pandemic: A Virus Catalogue and India's Preparedness

 **DOWN TO EARTH**8 July 2026 · **SCIENCE & TECH** · **GS3** · **GS2**

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THE LIFT LINE

The lesson of the last pandemic was that the world reacted late because it did not know where to look. A new catalogue that ranks every recognised human-infective RNA virus by its potential to spark the next pandemic is an attempt to fix exactly that: to move from reacting after an outbreak to watching the right pathogens before one begins. For a country of India's size and density, the question is whether its surveillance can act on such a map.

WHY THIS EDITORIAL MATTERS FOR YOUR EXAM

Pandemic preparedness, **biosecurity** (<https://ujyari.com/vocab/biosecurity/>) and health-systems capacity are recurring Mains themes, sharpened by the memory of COVID-19. The catalogue offers a concrete, current hook to discuss surveillance, One Health and the science-policy interface.

GS Paper 3: Science and technology developments and their applications; issues relating to health; biotechnology; disaster management (biological disasters).

GS Paper 2: Issues relating to health; global governance in health; institutions such as the WHO.

Prelims angle: RNA viruses; zoonotic spillover; sustained human-to-human transmission; the basic reproduction number (R_0); One Health; virome surveillance; the difference between a pathogen that infects humans and one that transmits between them; India's networks such as IDSP or IHIP and ICMR-NIV.

Mains angle: How risk-ranking and virome surveillance can shift India from reactive outbreak response to proactive pandemic prevention.

BACKGROUND AND CONTEXT

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Researchers from the Universities of Edinburgh, Glasgow and Peking compiled a catalogue of all 239 RNA virus species recognised as capable of infecting humans, published as a scientific dataset. For each, they recorded when and where it first emerged, how it spreads and its potential to cause an outbreak, then used these traits to rank pandemic risk.

The key distinction the catalogue draws is between infecting humans and transmitting between them. Only a minority of these species, roughly 60, are capable of sustained human-to-human transmission, the property that separates a contained spillover from an epidemic or pandemic. This is why coronaviruses and relatives of Ebola rank among the most worrying, while a lethal virus such as rabies, which almost never passes from person to person, poses little pandemic threat despite being deadly to the individual.

The value of such prioritisation is that surveillance resources are finite. Instead of watching everything equally, public-health systems can concentrate on the viral families and traits most likely to produce the next pandemic pathogen, and on the interfaces, wildlife, livestock and humans, where spillover happens. This is the logic of the One Health approach, which treats human, animal and environmental health as one connected system.

THE CORE ARGUMENT / ISSUE

The central argument is that pandemic risk is predictable enough to be prioritised, and that risk-ranking, coupled with virome surveillance and a One Health architecture, can move the world, and India, from late reaction to early detection, provided the surveillance and laboratory capacity exist to act on the science.

Deadliness Is Not the Same as Pandemic Risk

A virus that kills nearly everyone it infects but does not transmit between people, such as rabies, is a personal tragedy but not a pandemic threat. Pandemic risk is driven by transmissibility, so surveillance must weight transmission traits, not just lethality.

Prioritisation Makes Finite Surveillance Effective

With hundreds of viruses and limited resources, watching everything equally means watching nothing well. Ranking lets systems focus on the families and traits, such as respiratory transmission and rapid mutation, most likely to seed a pandemic.

The One Health Interface Is Where Prevention Happens

Most emerging pathogens are zoonotic. Genomic and virome surveillance at the wildlife, livestock and human interface is where the next pathogen can be caught before it adapts to sustained human spread.

VIRUS TYPE	LETHALITY TO INDIVIDUAL	HUMAN-TO-HUMAN TRANSMISSION	PANDEMIC RISK
Coronaviruses	Variable	Sustained, respiratory	High
Ebola relatives	Very high	Possible, contact-based	High to moderate
Rabies virus	Almost always fatal	Virtually none	Low
Most of the 239	Varies	Not sustained	Low to moderate

HOW TO THINK ABOUT THIS (ANALYTICAL FRAME)

Reframe pandemics as a two-variable problem: harm per infection and ability to spread. The catalogue's insight is that spread, not harm, is the pandemic driver, which reorders where attention should go. Apply the precaution-versus-resources tension: you cannot watch every threat, so prioritisation is not complacency, it is **triage** (<https://ujiyari.com/vocab/triage/>) that makes limited surveillance meaningful. Then use the systems lens of One Health: because most novel viruses jump from animals, prevention is upstream, at the interface, not downstream in hospitals. For India, layer on a capacity lens: a risk map is only as good as the labs, genomic sequencing, trained epidemiologists and data systems that can act on it, so the policy takeaway is investment in surveillance infrastructure, not just a better list.

THE DIAGRAM IN WORDS

239 human-infective RNA viruses catalogued and ranked -> only about 60 transmit sustainably between humans -> transmissibility, not lethality, drives pandemic risk -> coronaviruses and Ebola relatives rank high, rabies ranks low -> prioritisation lets finite surveillance focus on the riskiest families -> One Health watches the wildlife-livestock-human interface -> early detection of a spillover -> India's payoff depends on genomic and virome surveillance capacity -> reaction gives way to prevention.

WAY FORWARD

- 1 **Invest in genomic and virome surveillance.** Expand sequencing capacity and wastewater and wildlife surveillance so India can detect novel and high-risk viruses early.
- 2 **Operationalise One Health.** Integrate human, animal and environmental health surveillance under a single coordinated framework, with data-sharing across ministries.
- 3 **Prioritise by transmission traits.** Use risk-ranking to focus resources on virus families with the traits most likely to cause pandemics, at the interfaces where spillover occurs.
- 4 **Strengthen laboratory and epidemiological capacity.** Build a trained public-health workforce and a network of biosafety-capable labs so a risk map can be acted upon.

5 **Support global data-sharing.** Back open, timely sharing of pathogen data and sequences, since pandemic prevention is a global public good.

PYQ LINKAGE AND PRACTICE

UPSC has tested pandemic and health-security themes (2020: “COVID-19 pandemic has caused unprecedented devastation worldwide. However, technological advancements are being availed of for speedy eradication of the same. Explain”; 2021 on the challenges of the health sector). This editorial updates the theme with pathogen risk-ranking and the One Health surveillance agenda.

Practice question: “Pandemic risk is driven by transmissibility, not lethality alone.” In this light, discuss how risk-ranking and One Health surveillance can strengthen India’s pandemic preparedness. (15 marks, 250 words)

Sources: Down To Earth (<https://www.downtoearth.org.in/>)

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