Global Health Cast 36

May 2nd, 2023

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Every Week

12.00 noon - CET

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What we talk about today

- COVID-19 update including variants
- Mpox cases rise in a few Asian countries
- Why infectious diseases will increase in the future
- Criteria for the development of new vaccines
- Evidence generation for the development of new vaccines
- “Most Infectious Diseases” - Rift Valley Fever

Figure 1. COVID-19 cases reported by WHO Region, and global deaths by 28-day intervals, as of 23 April 2023**

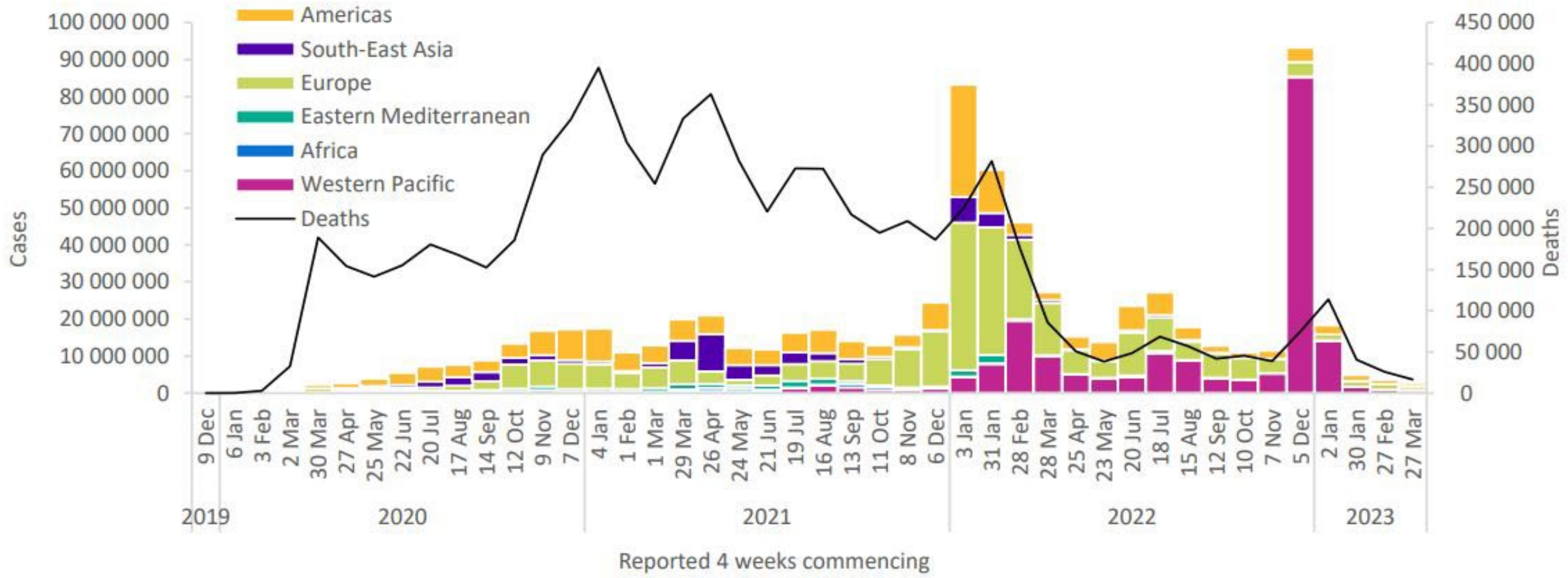

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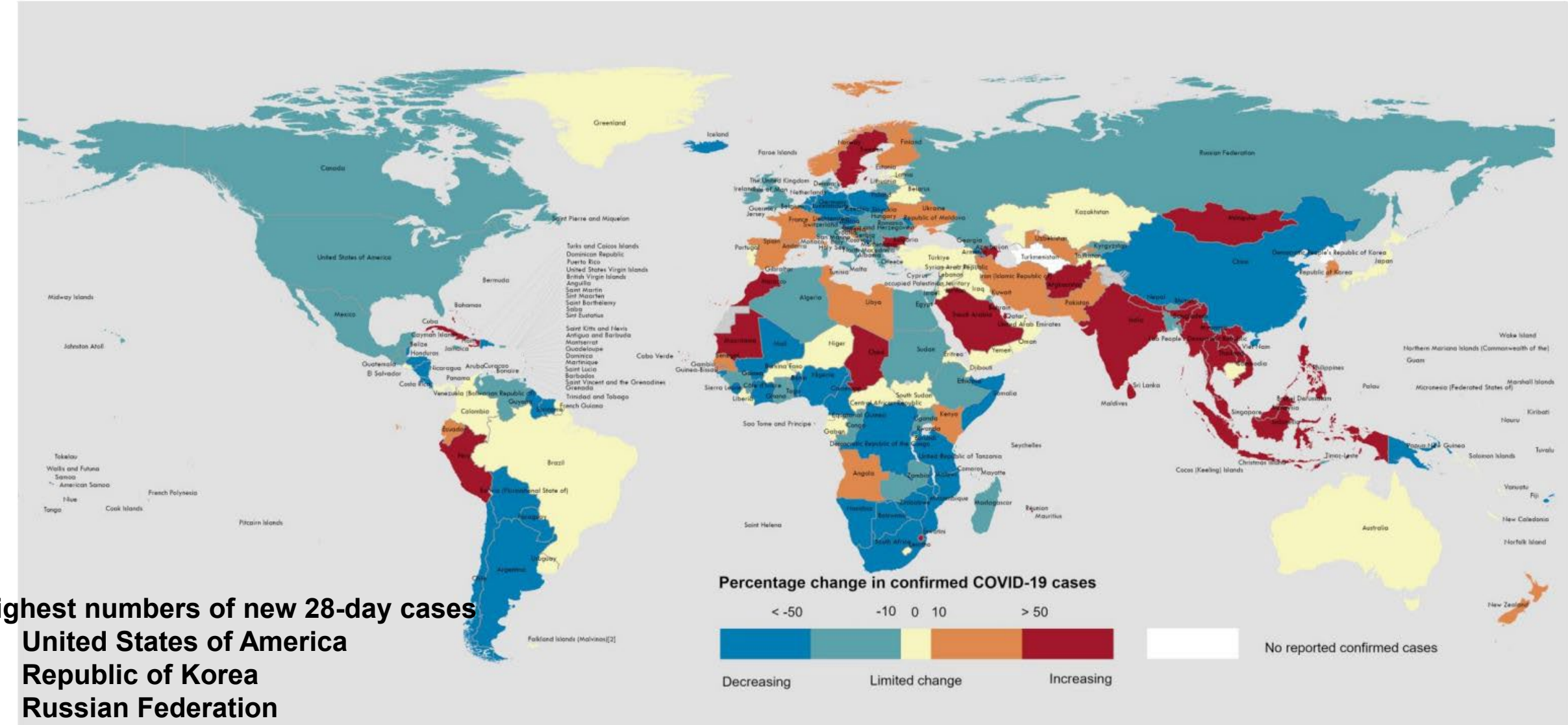
Figure 2. Percentage change in confirmed COVID-19 cases over the last 28 days relative to the previous 28 days, as of 23 April 2023**



Highest numbers of new 28-day cases

1. **United States of America**
2. **Republic of Korea**
3. **Russian Federation**
4. **Japan** (this was France last week)
5. **France** (this was Brazil last week)

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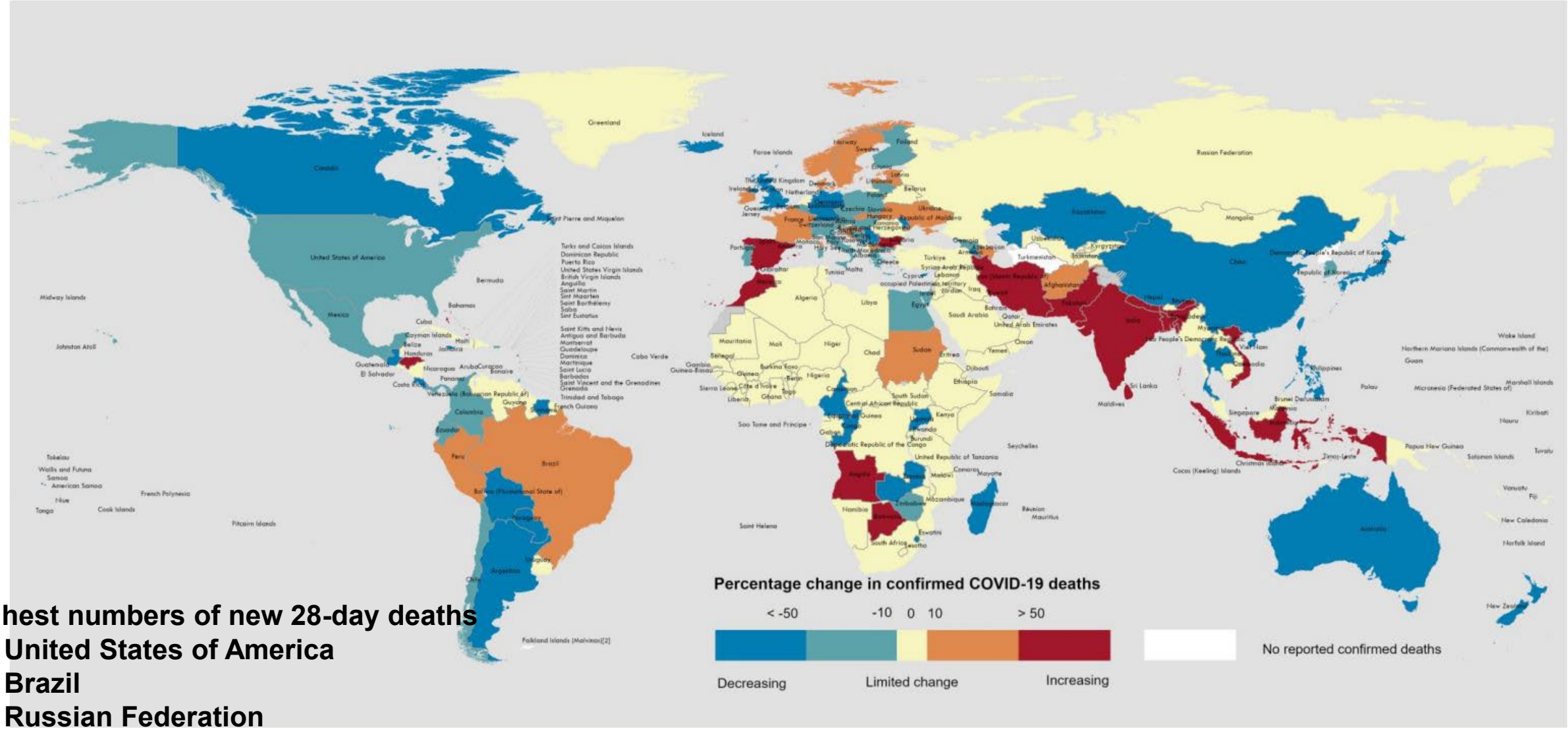
Figure 3. Percentage change in confirmed COVID-19 deaths over the last 28 days relative to the previous 28 days, as of 23 April 2023**



Highest numbers of new 28-day deaths

1. **United States of America**
2. **Brazil**
3. **Russian Federation**
4. **France** (this was Germany last week)
5. **Islamic Republic of Iran**

Table 2. Weekly prevalence of SARS-CoV-2 VOIs and VUMs, week 10 to week 14 of 2023

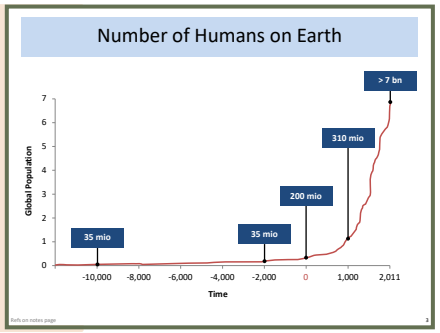
Lineage	Countries	Sequences	2023-10	2023-11	2023-12	2023-13	2023-14
XBB.1.5* (VOI)	103	174 238	49.14	48.93	49.41	48.55	45.39
XBB.1.16* (VOI)	37	3519	1.25	2.01	3.55	4.49	4.31
BA.2.75*	121	107 493	5.13	4.73	3.96	1.80	1.71
CH.1.1*	91	41 913	5.85	5.69	4.93	4.95	3.97
BQ.1*	145	401 594	9.47	7.70	5.85	3.91	3.64
XBB*	122	72 899	6.61	8.04	9.88	12.30	13.33
XBB.1.9.1*	69	13 835	5.83	6.72	7.27	8.38	9.36
XBB.1.9.2*	48	3370	1.32	1.77	1.87	2.48	2.69
XBF*	51	10 018	1.39	1.05	0.87	0.63	0.31
Unassigned	101	146 857	4.81	5.12	4.68	2.57	1.69
Other[+]	207	6 702 328	3.58	3.67	2.77	1.82	0.87

* Includes descendant lineages, except those individually specified elsewhere in the table. For example, XBB* does not include XBB.1.5, XBB.1.9.1, XBB.1.9.2 and XBB.1.16.

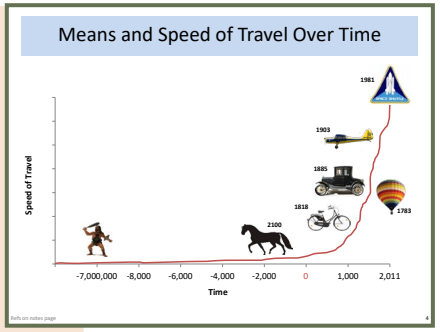
[+] Others are other circulating lineages excluding the VOI, VUMs, BA.1*, BA.2*, BA.3*, BA.4*, BA.5*.

3 Reasons Why Infectious Diseases Will Increase in the Future

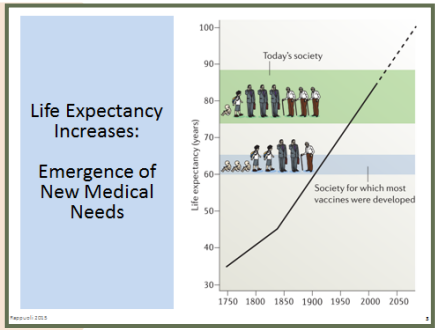
There will be more microbes,
- The number of humans increases
- The number of animals increases
- Climate change favors geographic expansion



There will be increased exposures,
- The number of humans increases
- The number of animals increases
- Travel increases
- New risk-behaviours



There will be increased risks.
- Ageing society – underlying diseases
- Medically induced reduced immunity



https://data.worldbank.org/indicator/SP.POP.TOTL; https://www.gapyear.com/history-of-travel/; https://www.pwc.com/gx/en/industries/healthcare/emerging-trends-pwc-healthcare/chronic-diseases.html

Criteria for Development of New Vaccines

Criterium	Comments
Medical Need	Lack of data; No national vaccination goals
Administrative Issues	
Pathway for **License**	Often main hurdle – „early killer“
Chance for **Recommendation**	Europe is mostly a „late adaptor“ – lack of exchange with industry
Health Economics: **Reimbursement**	Separate or follows recommendation
Acceptance: **Actual Use**	Adverse events is crucial, hesitancy?
Chances for Success / Risks	Idea for new product and production platform
Resources	Holistic + global skills + knowledge: license, production, marketing
Investment Size: ≥1 bn	Overall failure rate 90%; Factory needed for phase 3
Return on Investment	Global economic and political situation

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HJS, own assessment

Vaccine Development: Evidence Generation

Evidence	Process	Development	Manufacturing
Biological Plausibility	**Preclinical**	Find antigen, theoretical POC	Start thinking and factory planning
		Animal immunity, safety, Adjuvant? Read out tests and validation	Tech transfer to GMP: Manufacturing conditions; Antigen production; Delivery systems; Formulation; Pre-GMP batch for safety studies
	Clinical		
	Phase I	Reactogenicity, safety, Immunogenicity (100-200)	First GMP-batch produced; equipment & assay validation
	Phase II	Optimal dose; reactogenicity, safety Immunogenicity (some 1,000)	Established manufacturing process; Upscale; GMP-grade product; Assay validation
Proof of concept	**Phase III**	Reactogenicity, safety, efficacy in target population (10,000 – 100,000)	Study vaccine produced in „final factory“
	Registration – License	Phase 1-3, „Follow-up measures“ (FUM)	
	Recommendations	Usually pre-requisite for success	
	Reimbursement	Usually pre-requisite for success	
	Use		
Impact	**Phase IV**	Safety, effecticeness 100,00ds - milions	Process improvements

Mpox cases rise in a few Asian countries

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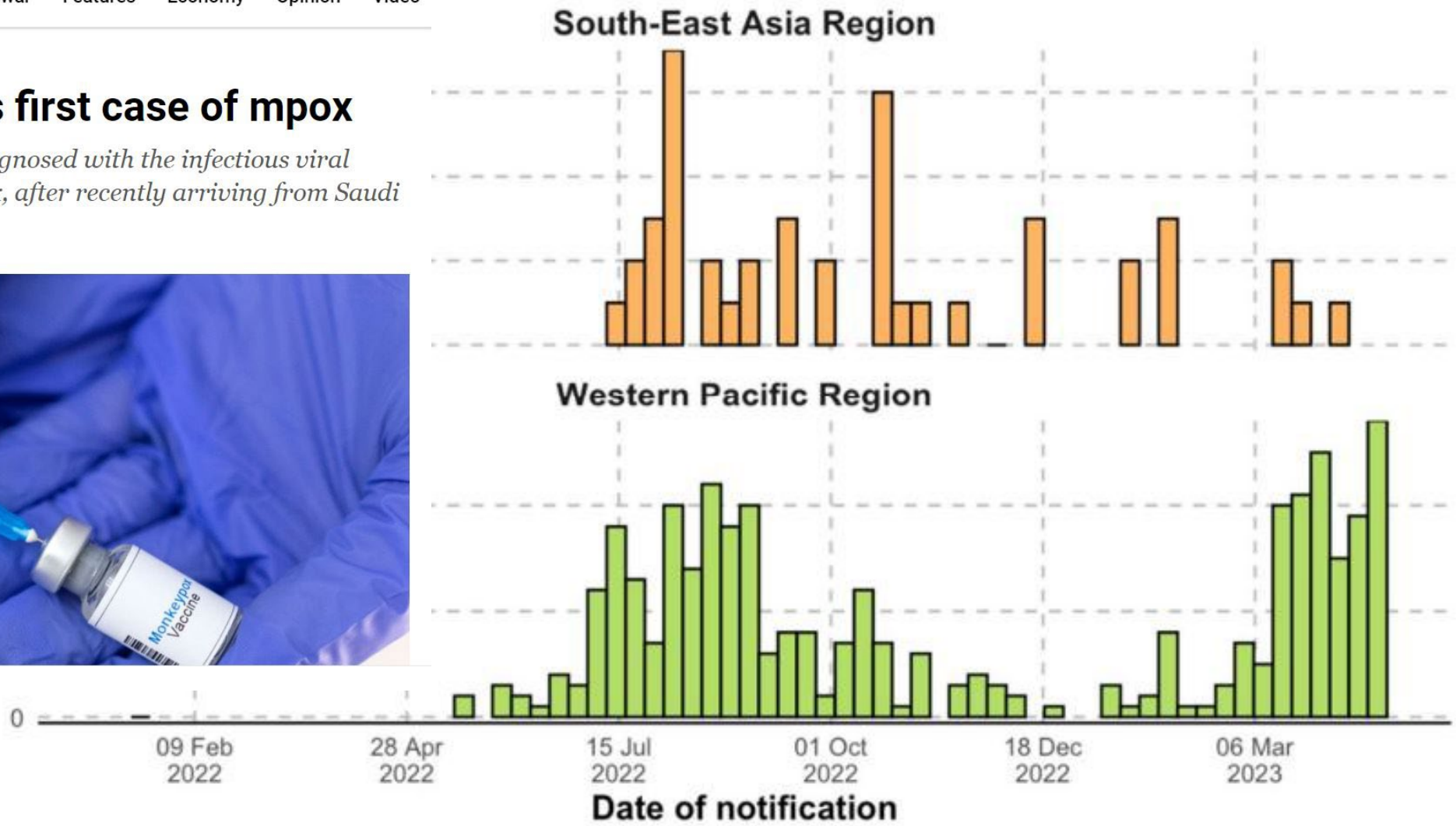
Pakistan confirms its first case of mpox

A 25-year-old Pakistani man is diagnosed with the infectious viral disease, once known as monkeypox, after recently arriving from Saudi Arabia.



Source: WHO

The most infectious diseases the WHO has identified to date:

- ✓ **Nipah virus Check out GHC 33**
- ✓ **Crimean-Congo hemorrhagic fever Check out GHC 34**
- ✓ **Lassa fever Check out GHC 35**
- Rift Valley fever
- Zika
- Ebola and Marburg
- Middle East respiratory syndrome (MERS)
- Severe acute respiratory syndrome (SARS)

Disease X (any unknown pathogen that could cause a future outbreak)

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Rift Valley Fever Distribution Map

- Countries reporting endemic disease and substantial outbreaks of RVF
- Countries reporting few cases, periodic isolation of virus, or serologic evidence of RVF infection
- RVF status unknown

0 250 500 1,000 Miles

0 375 750 1,500 Km

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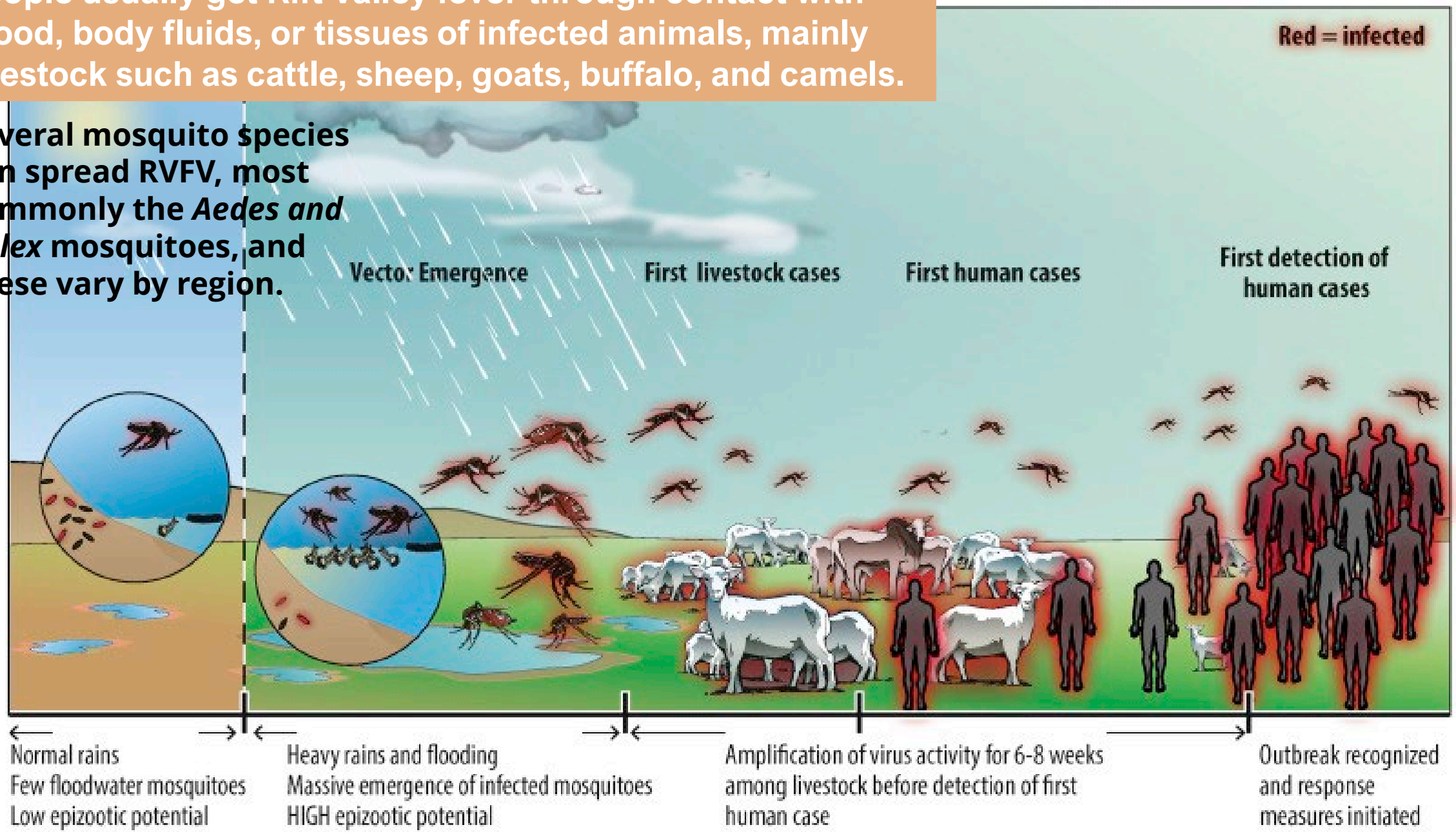
People usually get Rift Valley fever through contact with blood, body fluids, or tissues of infected animals, mainly livestock such as cattle, sheep, goats, buffalo, and camels.

Several mosquito species can spread RVFV, most commonly the *Aedes and Culex* mosquitoes, and these vary by region.



Vaccinating cattle

Avoiding direct contact with blood, bodily fluids or tissues of animals

Cooking raw meat and milk thoroughly

Washing hands with soap immediately after direct contact with animals

Protecting yourself from mosquito and insect bites

How to prevent RVF transmission / infection

Symptoms

No symptoms

Mild illness with fever, weakness, back pain and dizziness

8–10% of people develop severe symptoms, including eye disease, excessive bleeding, and swelling of the brain

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Anyone can catch COVID-19 but it does not affect everyone the same way. The outcome depends on your age, health, and vaccination status.

Serious complications are more likely if you are older or if you have medical conditions like cancer, diabetes, heart, lung, liver, and kidney diseases, obesity or if you are immunosuppressed or use immunosuppressive drugs or if you have not been vaccinated.