

CLIMATE, MOVEMENT, AND MICROBES: HOW VACCINES PROTECT IN A WARMING, MOBILE WORLD



Shifting climates and human mobility change vaccine preventable diseases (VPD) risk – immunization must move and adapt with people.



1. What is changing? (Climate + mobility)

- Temperatures, rainfall patterns and extreme weather events are altering habitats for vectors and pathogens.
- Conflicts, disasters, economic migration and rapid urbanization move people into and between high risk, low coverage settings.
- These shifts create new overlaps between vulnerable populations and underused vaccines.

Changing climate



Changing mobility



New VPD risk patterns

2. Climate-Sensitive VPDs where vaccines matter

Vector-borne

- Japanese encephalitis, yellow fever, tick-borne encephalitis and other Vector-borne VPDs may expand or shift as vector ranges change.
- Warming, altered rainfall and land use changes can lengthen transmission seasons and introduce risk to new populations.

Water and food

- Floods, storms, and infrastructure breakdown increase the risk of cholera and typhoid, especially in informal settlements and displacement settings.
- Overwhelmed water and sanitation systems make outbreaks more likely and harder to control.

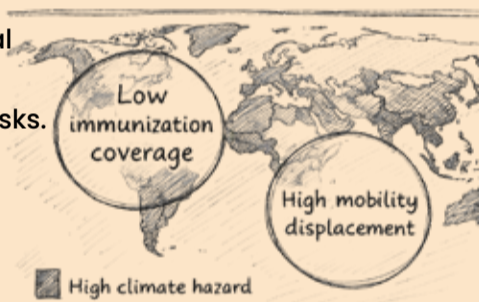
Crowding

- Conflicts, disasters, and economic crises drive crowding in camps and shelters, favouring measles, influenza, pneumococcal, and meningococcal outbreaks.
- Seasonal patterns can be disrupted by climate extremes, challenging traditional assumptions about “high season.”

3. Vulnerable populations and places

Key messages

- People in fragile and conflict-affected settings, coastal and riverine communities, and fast-growing informal urban settlements face concurrent climate and VPD risks.
- Children, pregnant women, older adults, and people with underlying conditions chronic conditions are disproportionately affected.
- Many of these groups are already underserved by routine immunization.



4. How immunization programmes can “climate proof” services

Risk based vaccination

- Use surveillance and climate information to anticipate where Vector-borne and Water-borne VPD risks are emerging or intensifying.
- Consider introducing or expanding relevant vaccines in areas where projected risk and population vulnerability are high.

Resilient delivery systems

- Strengthen cold chain and logistics for heatwaves and extreme events, including backup power and flexible stock placement.
- Design outreach strategies that can continue during floods, storms or heat emergencies.

Emergency response link

- Embed vaccination in disaster preparedness and humanitarian response plans, including pre-positioned supplies and rapid campaign playbooks.
- In displacement and refugee settings, treat immunization as a core lifesaving intervention alongside water, food and shelter.

5. Policy and communication messages

For policy makers

- Vaccines are part of climate adaptation for health, helping prevent outbreaks that overwhelm systems during climate shocks.
- Investing in vaccines for high risk regions and populations supports resilience, economic stability and health security.

For programme managers

- Use climate and mobility data to refine micro plans and campaign timing.
- Align immunization strategies with broader climate and disaster risk frameworks and primary health care strengthening.

For clinicians and the public

- Explain that some “old” diseases can appear in “new” places as climate and movement change.
- Emphasize vaccination before travel, displacement or seasonal climate extremes where relevant.

References

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