Long-term Modelled Dengue Transmission Potential and National IHR Capacity Patterns Across 49 African Countries: A Regional Cooperation Perspective

Yuxiang Sun, Ye Yao, Yihan Lu

Department of Epidemiology, Ministry of Education Key Laboratory of Public Health Safety, School of Public Health, Fudan University

INTRODUCTION

Dengue transmission potential crosses borders, while response capacities are mainly national. We assessed long-term changes in modelled Aedes aegypti transmission potential, cross-country concordance with selected capacities, and recent capacity trajectories in Africa.

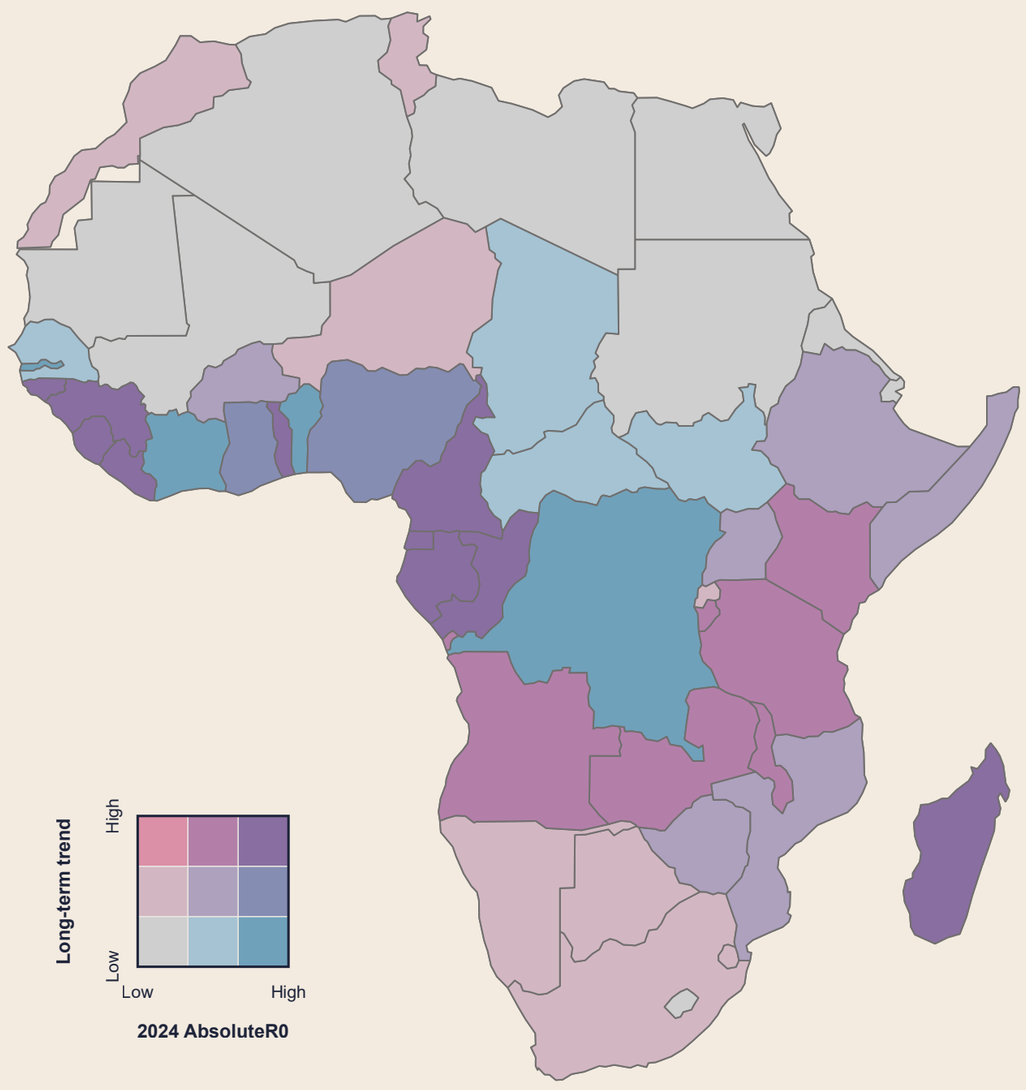
METHODOLOGY

We used one fixed 49-country cohort with estimable 1995–2024 trends and complete 2021–2025 WHO State Party Self-Assessment Annual Reporting (SPAR) scores. Annual country-level AbsoluteR0 came from Lancet Countdown 2025 indicator 1.3.1, which models transmission potential from temperature, rainfall, daylight duration, and human population density. We estimated country-specific Theil–Sen slopes for AbsoluteR0 over 1995–2024. Mean 2015–2024 AbsoluteR0 was related to 2024 SPAR scores for C4 laboratory, C5 surveillance, and C7 health emergency management using Spearman ρ. We summarised capacity change using 2025-minus-2021 score differences and five-year Theil–Sen trends.

RESULTS

1 Latest transmission potential and long-term change

In 2024, the median AbsoluteR0 across the 49 countries was 1.48 (IQR 0.47–2.42). Positive trends occurred in 35 countries (71.4%), with a median slope of +0.015 AbsoluteR0 per decade.



35/49
countries with positive trend estimates

+0.015
median trend per decade in AbsoluteR0

2 Geographic concordance with national capacities

Spearman ρ was −0.336 for laboratory, −0.023 for surveillance, and −0.116 for health emergency management. Laboratory capacity showed moderate inverse geographic concordance with transmission potential, while concordance was weak for surveillance and health emergency management.

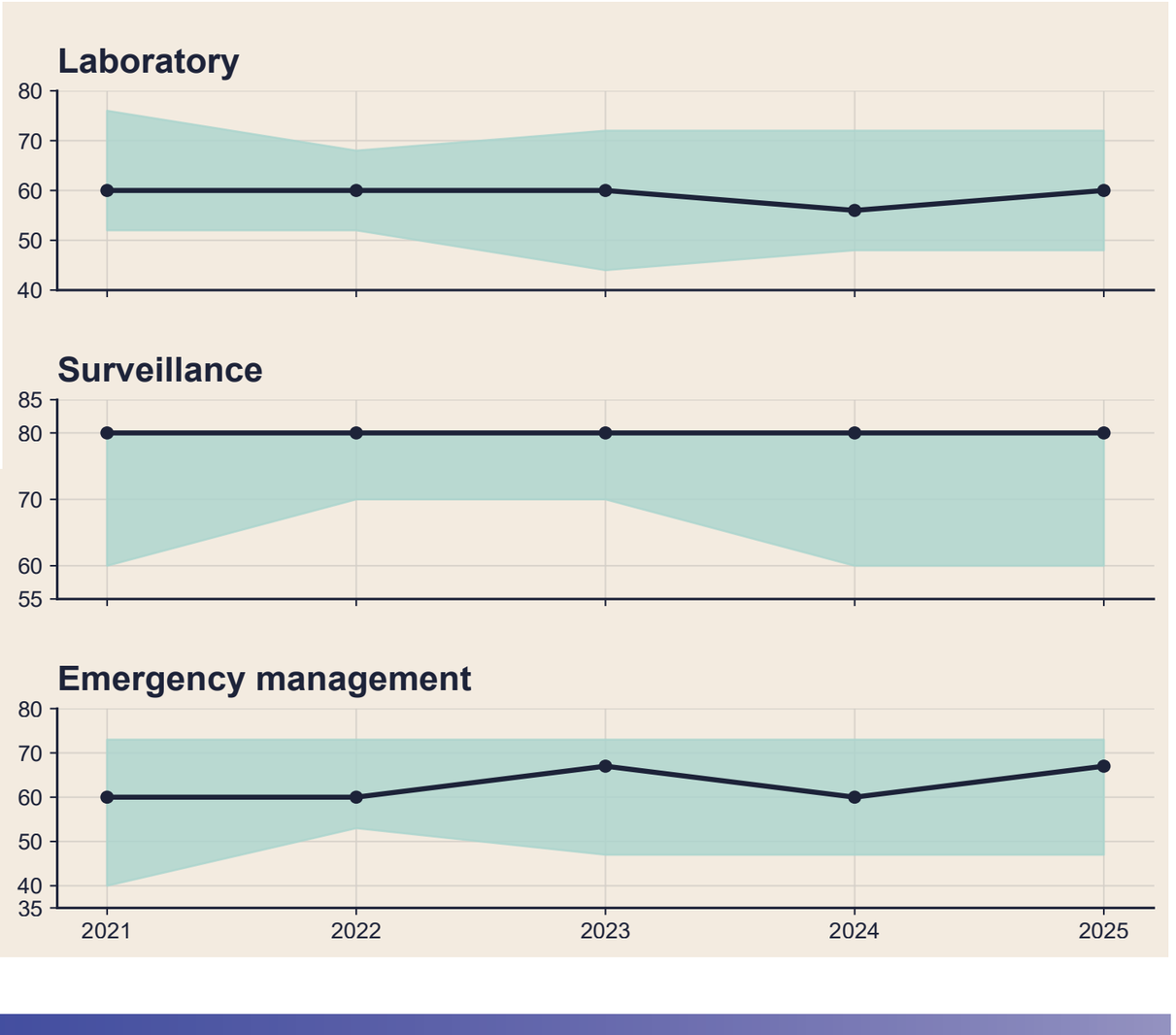
−0.336
Spearman ρ between mean AbsoluteR0 and **laboratory capacity**

−0.023
Spearman ρ between mean AbsoluteR0 and **surveillance capacity**

−0.116
Spearman ρ between mean AbsoluteR0 and **emergency management capacity**

3 Recent capacity trajectories

Median 2025-minus-2021 score changes were 0 for both laboratory and surveillance, compared with +7 points for health emergency management. However, median five-year slopes were zero in all three domains, indicating no consistent improvement over the study period.



CONCLUSIONS

- Modelled Aedes aegypti transmission potential increased in most included African countries over 1995–2024.
- Laboratory capacity was inversely associated with transmission potential, while surveillance and emergency-management capacities showed weak geographic concordance. These uneven patterns highlight the value of regional cooperation.
- Recent capacity trajectories showed no consistent improvement against the longer-term rise in transmission potential, underscoring the importance of sustained international partnerships.

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