論文の内容の要旨

論文題目　Effects of sulfadoxine-pyrimethamine resistance on the effectiveness of policies for preventive treatment of malaria in Africa: a systematic analysis of national trends
(スルファドキシン-ピリメタミン耐性がマラリアの予防的治療に関する政策の有効性に及ぼす影響：アフリカ諸国における系統的傾向分析)

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Introduction
The rising burden of drug resistance is a major challenge to the global fight against malaria. I estimated national *Plasmodium falciparum* resistance to sulfadoxine/pyrimethamine (SP) across Africa, from 2000 to 2020.

Methods
I assembled molecular, clinical, and endemicity data covering malaria-endemic African countries up to December 2018. Subsequently, I reconstructed georeferenced patient data, using pfdhps540E and pfdhps581G to measure mid-level and high-level SP resistance. Gaussian Process Regression was applied to model spatiotemporal standardized prevalence.

Results
In Eastern Africa, mid-level SP resistance increased by 64.0% (95% uncertainty interval, 30.7–69.8%) in Tanzania, 55.4% (31.3–65.2%) in Sudan, 45.7% (16.8–54.3%) in Mozambique, 29.7% (10.0–45.2%) in Kenya, and 8.7% (1.4–36.8%) in Malawi from 2000 to 2010. This was followed by a steady decline of 76.0% (39.6–92.6%) in Sudan, 65.7% (25.5–85.6%) in Kenya, and 17.4% (2.6–37.5%) in Tanzania from 2010 to 2020. In Central Africa, the levels increased by 28.9% (7.2–62.5%) in Equatorial Guinea and 85.3% (54.0–95.9%) in the Congo from 2000 to 2020, while in the other countries remained largely unchanged. In Western Africa, the levels have remained low from 2000 to 2020, except for Nigeria, with a reduction of 14.4% (0.7–67.5%), and Mali, with an increase of 7.0% (0.8–25.6%). High-level SP resistance increased by 5.5% (1.0–20.0%) in Malawi, 4.7% (0.5–25.4%) in Kenya, and 2.0% (0.1–39.2%) in Tanzania, from 2000 to 2020.

Conclusion
Under the World Health Organization protocols, SP is no longer effective for intermittent

preventive treatment in pregnancy and infancy in most of Eastern Africa and parts of Central Africa. Strengthening health systems capacity to monitor drug-resistance at subnational levels across the endemicity spectrum is critical to achieve the global target to end the epidemic.