

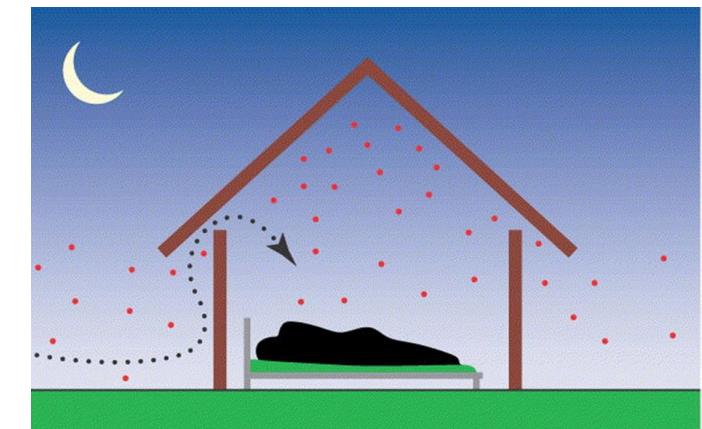
Urban mosquito control in Africa and the new mosquito on the block

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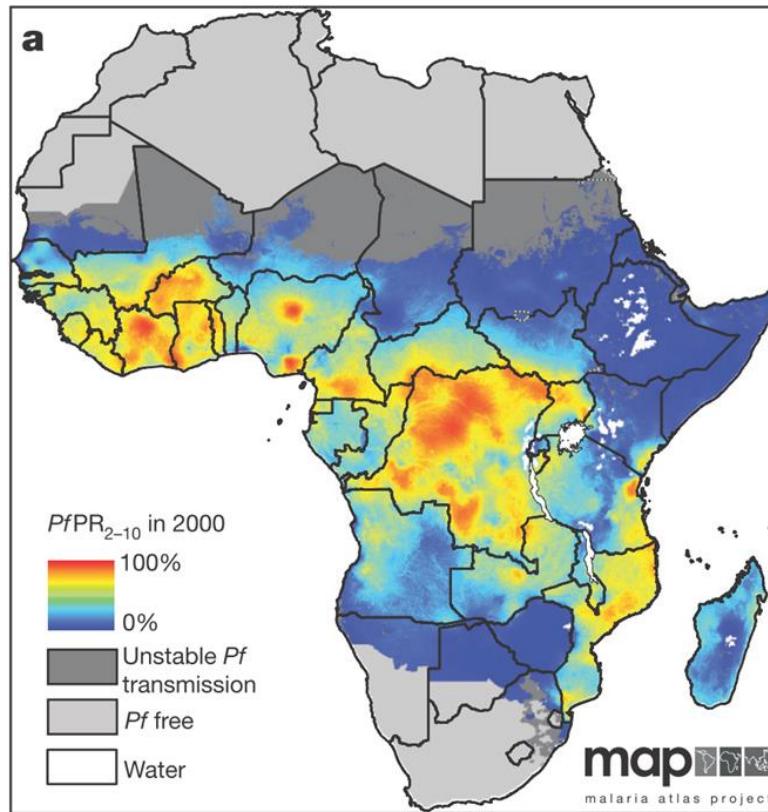
Malaria in Africa

- Malaria is a severe febrile illness caused by *Plasmodium* parasites and transmitted by female *Anopheles* mosquitoes
- Common in rural Africa
- Primary malaria mosquito is *Anopheles gambiae*
- Typically bites indoors at night

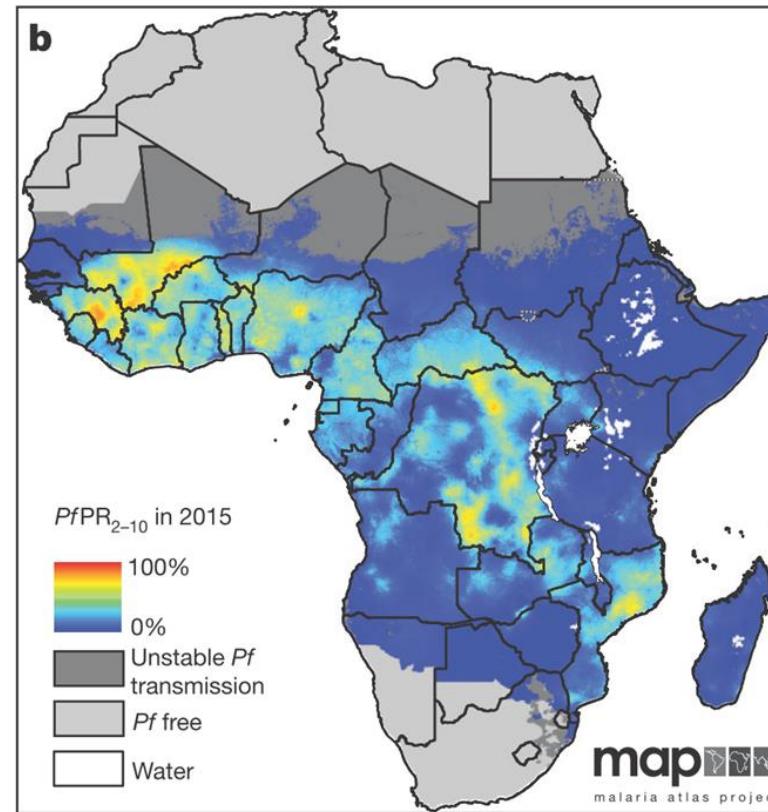


Mosquito control & effective treatment have led to massive reductions in malaria in Africa

2000

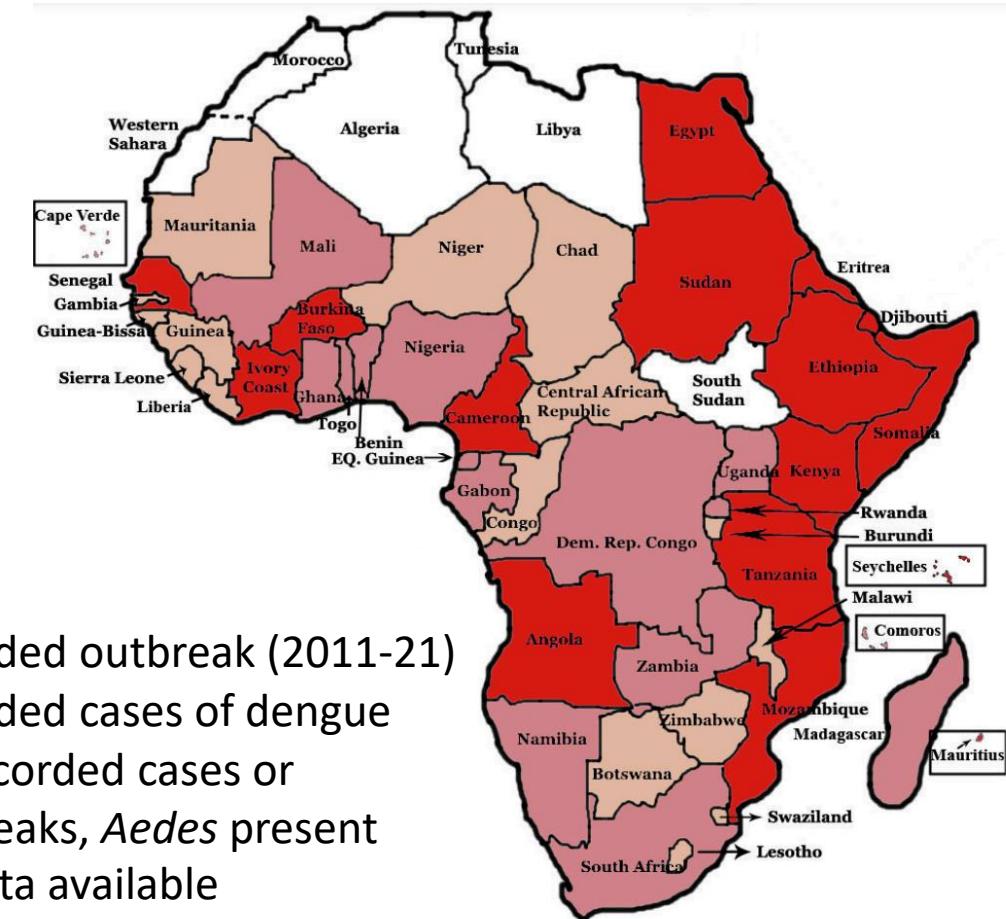


2015



Hidden burden of dengue in Africa

- Neglected tropical disease
- Often misdiagnosed as malaria
- Weak surveillance system for *Aedes* mosquito and disease



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🕒 August 30, 2023

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**Burkina Faso: more than 350 deaths from dengue fever in a month**

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Africa

Sudan medics warn that cholera and dengue fever are spreading

Reuters

September 27, 2023 1:01 PM GMT+1 · Updated 2 months ago



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Africa: Dengue outbreak declared in Chad

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Africa

1 Comment



NewsDesk @bactiman63

The Minister of Health in Chad officially declared the end of Dengue fever in the country.

New mosquito on the block



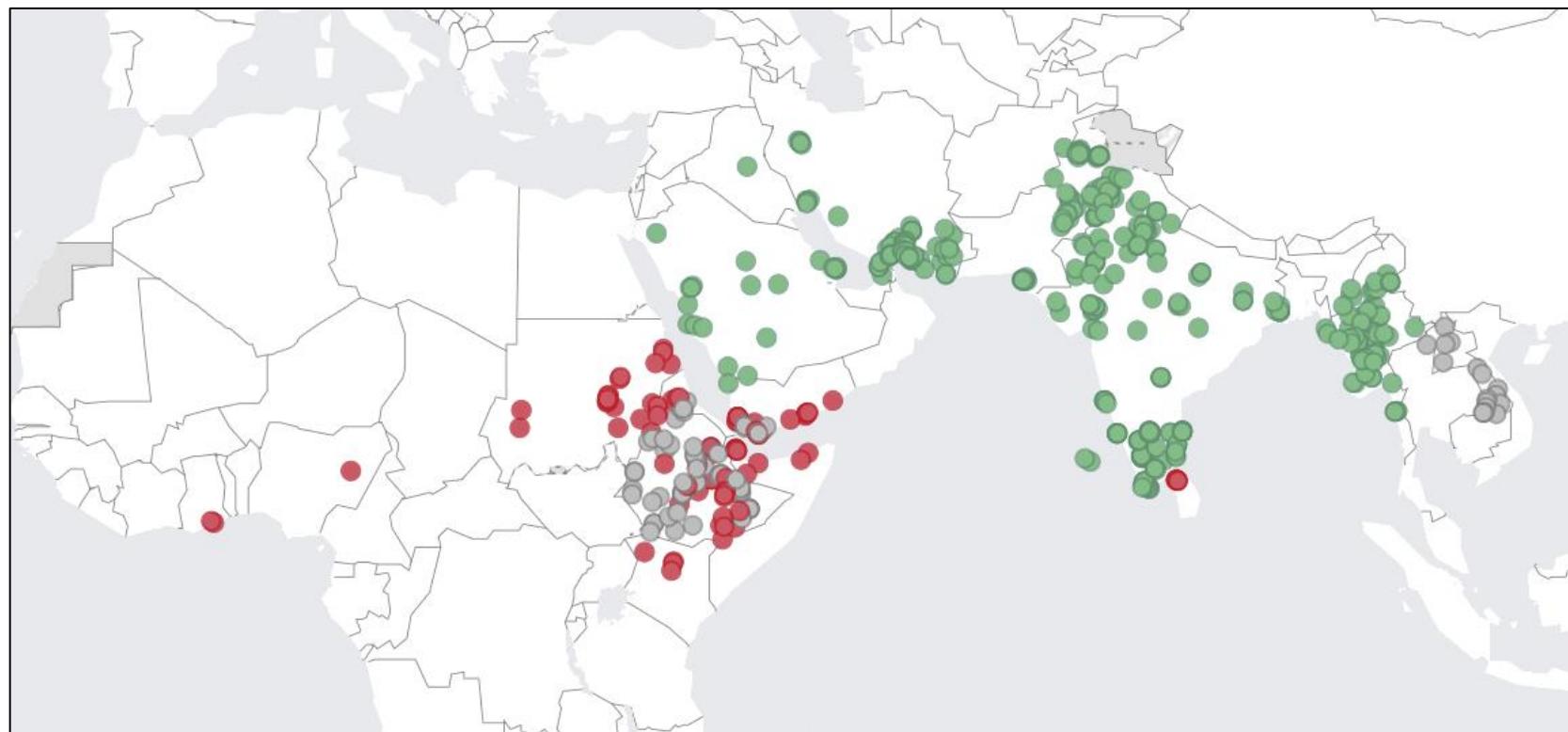
Anopheles stephensi mosquito

Anopheles stephensi – a unique mosquito

- Urban adapted mosquito
- Thrives in artificial container habitats (often shared with *Aedes aegypti*)
- Transmits human malaria parasites (*Plasmodium falciparum* & *P. vivax*)
- Persists through dry periods



Anopheles stephensi is spreading in Africa



● Invasive ● Not present ● Endemic range

Djibouti (2012)
Ethiopia (2016)
Sri Lanka (2017)
Sudan (2019)
Puntland (2019)
Nigeria (2020)
Somaliland (2020)
Yemen (2021)
Ghana (2022)
Eritrea (2022)
Kenya (2022)

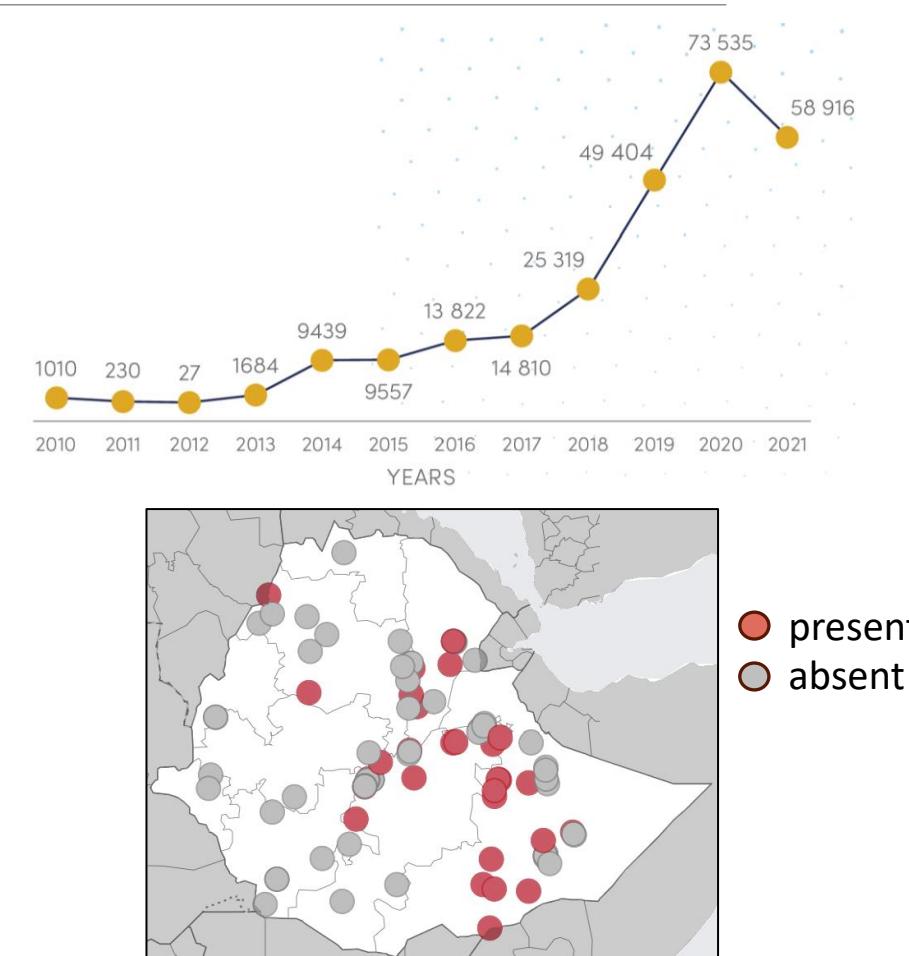
Arrival of *Anopheles stephensi* in the Horn of Africa associated with malaria increases

Djibouti:

- Malaria achieved pre-elimination status in 2011
- 36-fold increase in malaria cases since detection in 2012

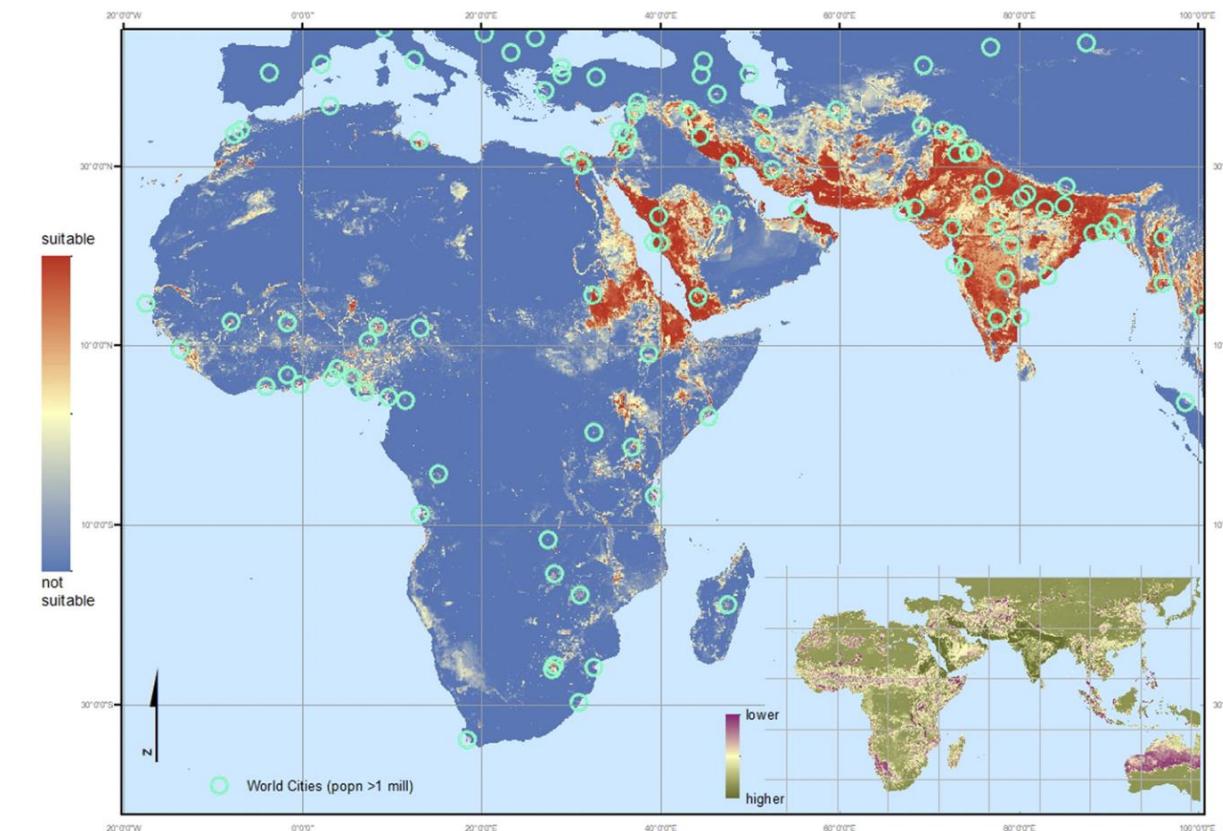
Ethiopia:

- Widespread *Anopheles stephensi* distribution
- Dry season malaria outbreak in 2022 linked to *Anopheles stephensi*
- Models suggest *Anopheles stephensi* could cause 50% increase in malaria cases and require additional \$72 million/year for control



Anopheles stephensi puts urban populations at risk of malaria & threatens malaria elimination

- 68% of global population will live in urban areas by 2050 (up from 55% in 2018)
- Additional 126 million people at risk of *Anopheles stephensi* transmitted malaria in urban areas
- Limited resources for malaria and other vector-borne disease control
- Threatens progress towards malaria elimination



WHO Initiative to stop the spread of *Anopheles stephensi* launched Sept 2022



Increase collaboration



Strengthen surveillance



Improve information exchange



Develop guidance



Prioritise research



Anopheles stephensi at a glance

Anopheles stephensi is a mosquito species that is capable of transmitting both *Plasmodium falciparum* and *P. vivax* malaria parasites. It was originally native to South Asia and parts of the Arabian Peninsula but has been expanding its range over the last decade, with detections reported in Djibouti (2012), Ethiopia and Sudan (2016), Somalia (2019), Nigeria (2020) and Ghana and Kenya (2022). To date, it remains unclear when and via which route these countries were invaded. Although *An. stephensi* has likely spread to other African countries, it has yet to be detected as systematic, large-scale surveillance of the vector is still in its infancy.

Anopheles stephensi has the capacity to thrive in urban and man-made environments, setting it apart from the other main mosquito vectors of malaria that primarily breed in naturally occurring waterbodies in rural areas. Where *An. stephensi* has been reported in Africa, it has been found to be resistant to many of the insecticides used in public health, posing an added challenge to its control.

The invasion of *An. stephensi* in sub-Saharan Africa – where the burden of malaria is highest and over 40% of the population lives in urban environments – is particularly worrying. Since 2012, *An. stephensi* is thought to have contributed to a resurgence of malaria in Djibouti City and at least one outbreak of the disease in Ethiopia. While the overall contribution of *An. stephensi* to malaria transmission in the region is unclear, the rapid growth of many African cities, coupled with the invasion and spread of this highly efficient and adaptable malaria vector, could undermine the gains made in reducing the burden of the disease.



Anopheles stephensi presents challenges for surveillance & control

- Need to ramp up surveillance & the adult mosquito is hard to catch!
- *Anopheles stephensi* resistance to major insecticides used for control
- No indication of indoor biting or resting – utility of standard malaria control tools?
- Balancing resources versus control of malaria rural vectors
- Epidemiological impacts of *Anopheles stephensi* as yet unclear
- Larval control not widely practised in Africa

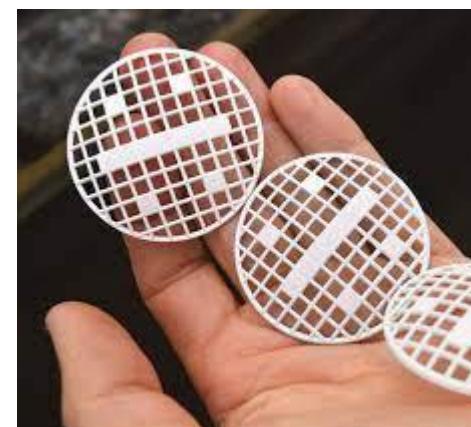
Opportunity to exploit synergies with *Aedes aegypti* surveillance & control

Opportunity for integrated mosquito surveillance



Integrated larval control of *Aedes aegypti* and *Anopheles stephensi*

- Household and community larvicing
- Finding and removing standing water
- Covering water storage containers



Photos: Hmooda Toto Kafy, Dereje Galata

Opportunity to exploit synergies with *Aedes aegypti* surveillance & control

Harness efforts of town/city leaders



Promote inter-sectoral collaborations such as water, education, transport, and private sector



Opportunity to exploit synergies with *Aedes aegypti* surveillance & control

Engage communities with locally adapted messaging based on context and risk level



Summary

- Malaria in Africa typically occurs in rural areas where control efforts are focused
- A new malaria mosquito, *Anopheles stephensi* is spreading in urban areas
- *Anopheles stephensi* often shares its larval habitats with *Aedes aegypti*
- Opportunity for integrated surveillance and control of both mosquitoes with co-benefits on malaria and arboviral diseases
- Need to engage with city leaders/local councils, diverse sectors and communities

wellcome trust

 **CEASE**
Controlling emergent *Anopheles stephensi* in Ethiopia and Sudan