



# Adapting Health Systems to Protect Children from the Impact of Climate Change

*Re-imagining the Package of Care for Children Subgroup*  
*May 3, 2023*



**Co-Chairs:**

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# Series Overview

## **Session 5: Climate Effects on Malaria Programming for Children**

- Summary of the evidence of changing temperature and climate conditions and effects on malaria-specific vectors and strategies for malaria surveillance that can be used to inform program decision-making.
- Examples of adjustments taken in malaria programs in response to changing temperatures and climate conditions in Senegal

### **Previous sessions:**

Session 1: Framed the series (November 10, 2022)

- Shared an overview of the Healthy Environments for Healthy Children (HEHC) Framework and highlights from UNICEF's heat waves report

Session 2: Children's Climate Risk Index (CCRI) (December 13, 2022)

- Reviewed the CCRI methodology and its potential application

Session 3: The Impact of Climate Change on Newborn Health Outcomes: A Focus on Congenital Heart Defects (February 13, 2023)

- Reviewed extreme heat and its contributions to congenital heart disease (CHD)

Session 4: Protecting Children and Pregnant People from Heat Stress (March 29, 2023)

- Possible interventions and recommendations



# Healthy Environments for Healthy Children

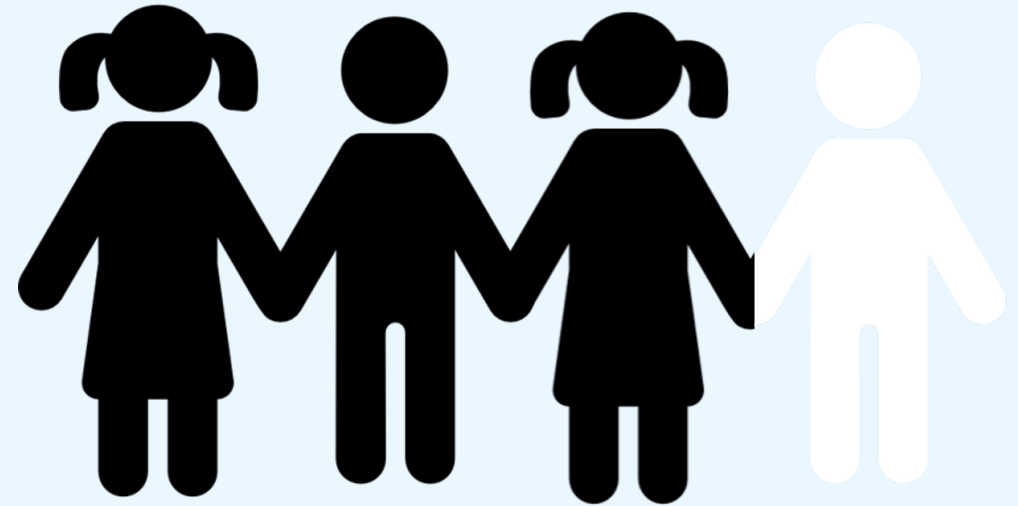
Swathi Manchikanti | Climate Adaptation for Health Lead, Healthy  
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## Child survival, health and well-being is **under threat**

Over **1 in 4** children under the age of 5 are dying from environmental risks



# Healthy Environments for Healthy Children Framework

1

Pollution and health

2

**Climate adaptation for health**

3

Climate-resilient and environmentally sustainable healthcare facilities



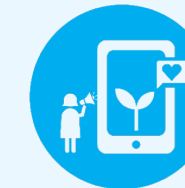
Strengthen climate-resilience and environmental sustainability in healthcare facilities



Develop responsive primary health care



Embed environmental health in school programmes



Promote climate and environmental action with children, adolescents and young people



Mobilize collective action

# Focusing on **adapting primary healthcare response** to five categories of environmental hazards

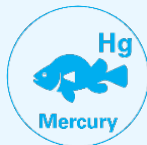
## Climate Change



## Toxic Metals



Lead



Mercury



Cadmium



Arsenic

## Toxic Chemicals



Highly hazardous pesticides



Benzene



Excess Fluoride



Additional chemicals in consumer products



Dioxins and dioxin-like substances (incl. PCBs)

## Hazardous Waste



Landfills and household waste



E-waste



Medical waste



Conflict related contamination

## Environmental Risks



Air Pollution



Mould and mycotoxins



Noise



Radiation



# Climate and Malaria: Strategies for surveillance and data that can be used to inform program decision-making

Radina Soebiyanto, PhD  
US President's Malaria Initiative (PMI)

PMI

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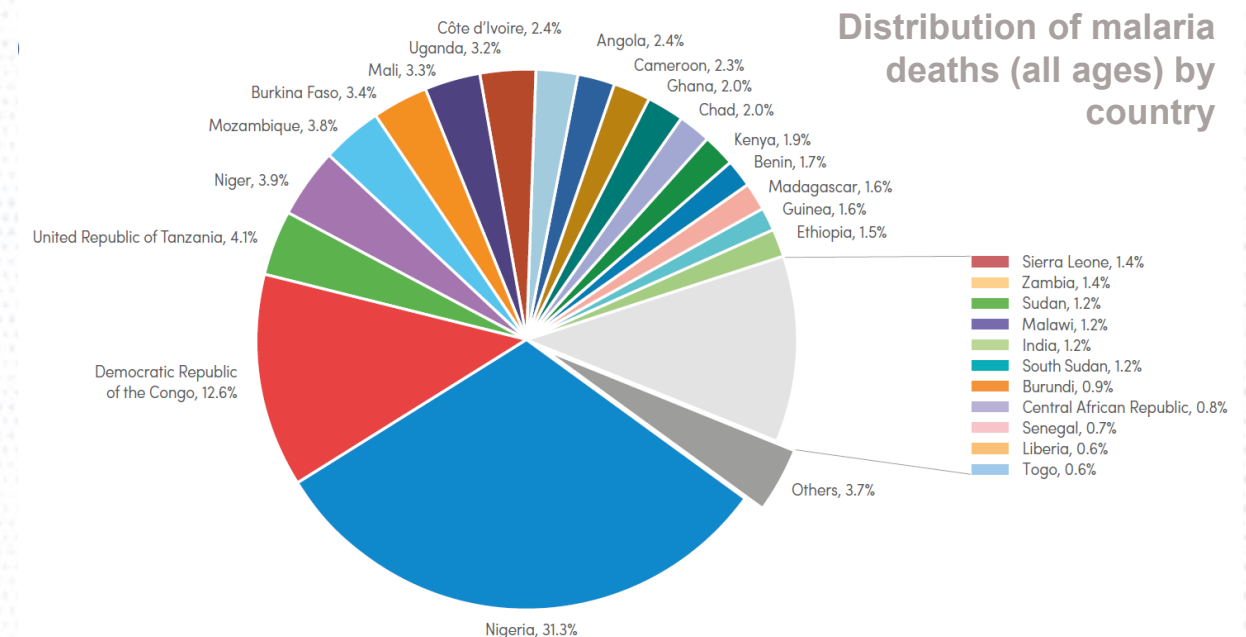


# Malaria Burden

In 2021, there were **247 million** malaria cases and **619,000** deaths across 84 endemic countries

**80%** of deaths were children under 5 years old

Nigeria accounted for 38.4% of global malaria deaths in children under 5 years old





# Climate and Malaria

Climatic and environmental variables (temperature, rainfall, humidity, vegetation index, soil moisture, etc.) influence

- Mosquito population dynamics & habitat
- Pathogen growths
- Logistics of commodity and intervention campaign

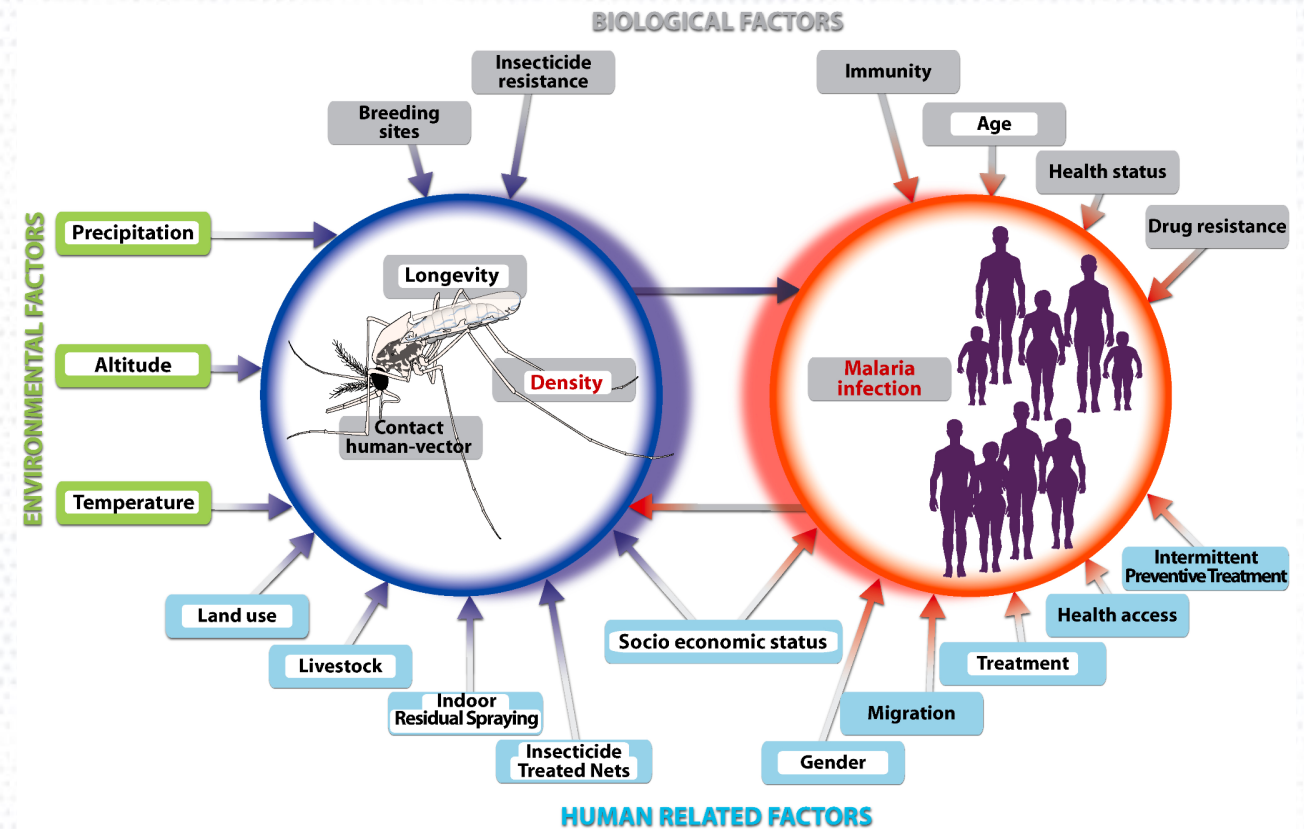
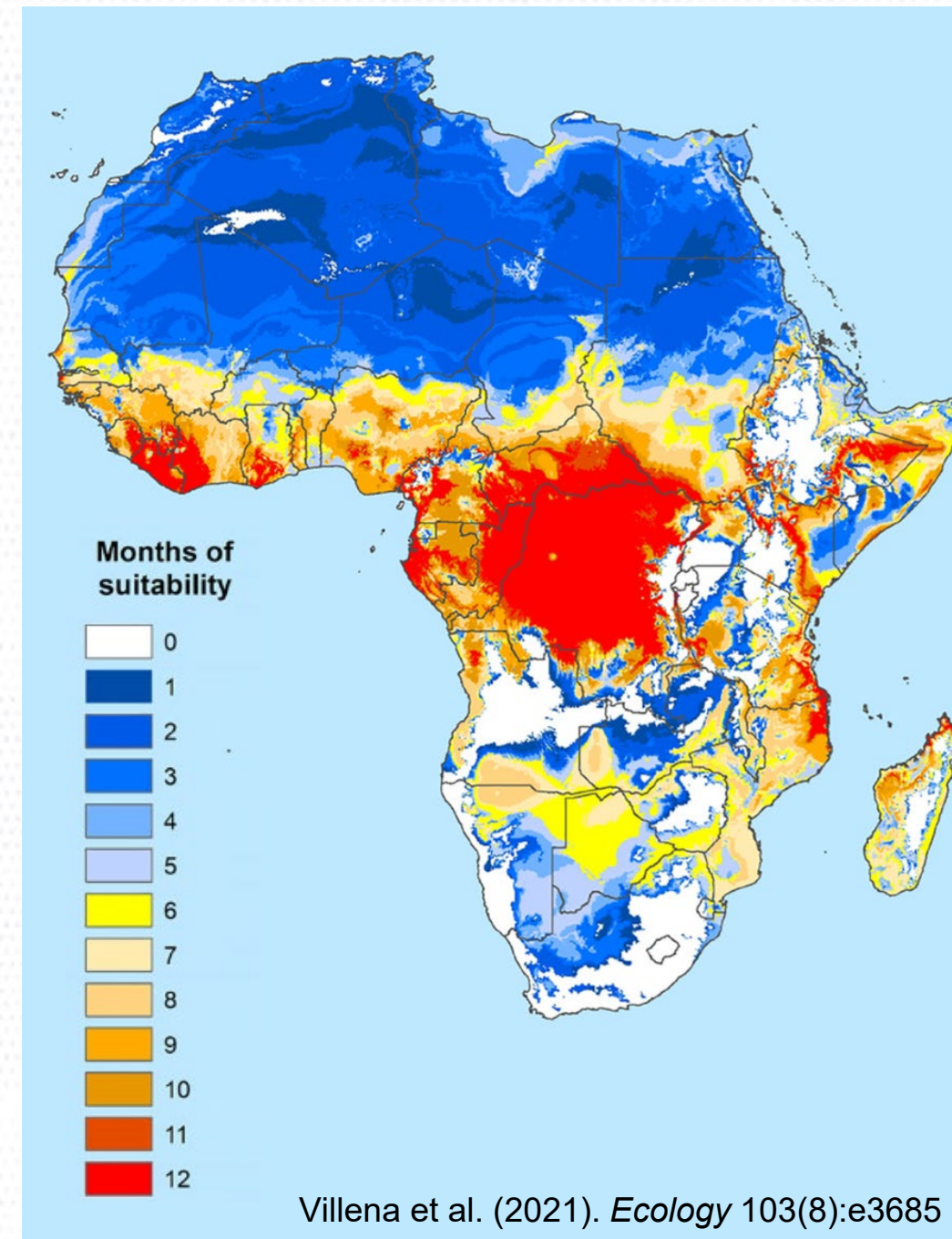


Image source: PLoS ONE 4(11): e8022.

# Climate and Malaria

- Temperature influence malaria mosquito (*Anopheles*) life cycles
- Malaria pathogen (*Plasmodium falciparum*) cannot complete its growth cycle in the *Anopheles* mosquito at temperatures below 20°C (68°F) [CDC]





# Climate and Malaria

Mosquito habitat depends on various climatic and environmental factors

- Rainfall
- Vegetation
- Soil moisture
- Land use



Hinne et al. (2021) *Parasite Vectors* 14:193



# Climate and Malaria

Extreme weather events can disrupt

- Access to care
- Supply chains of key commodities



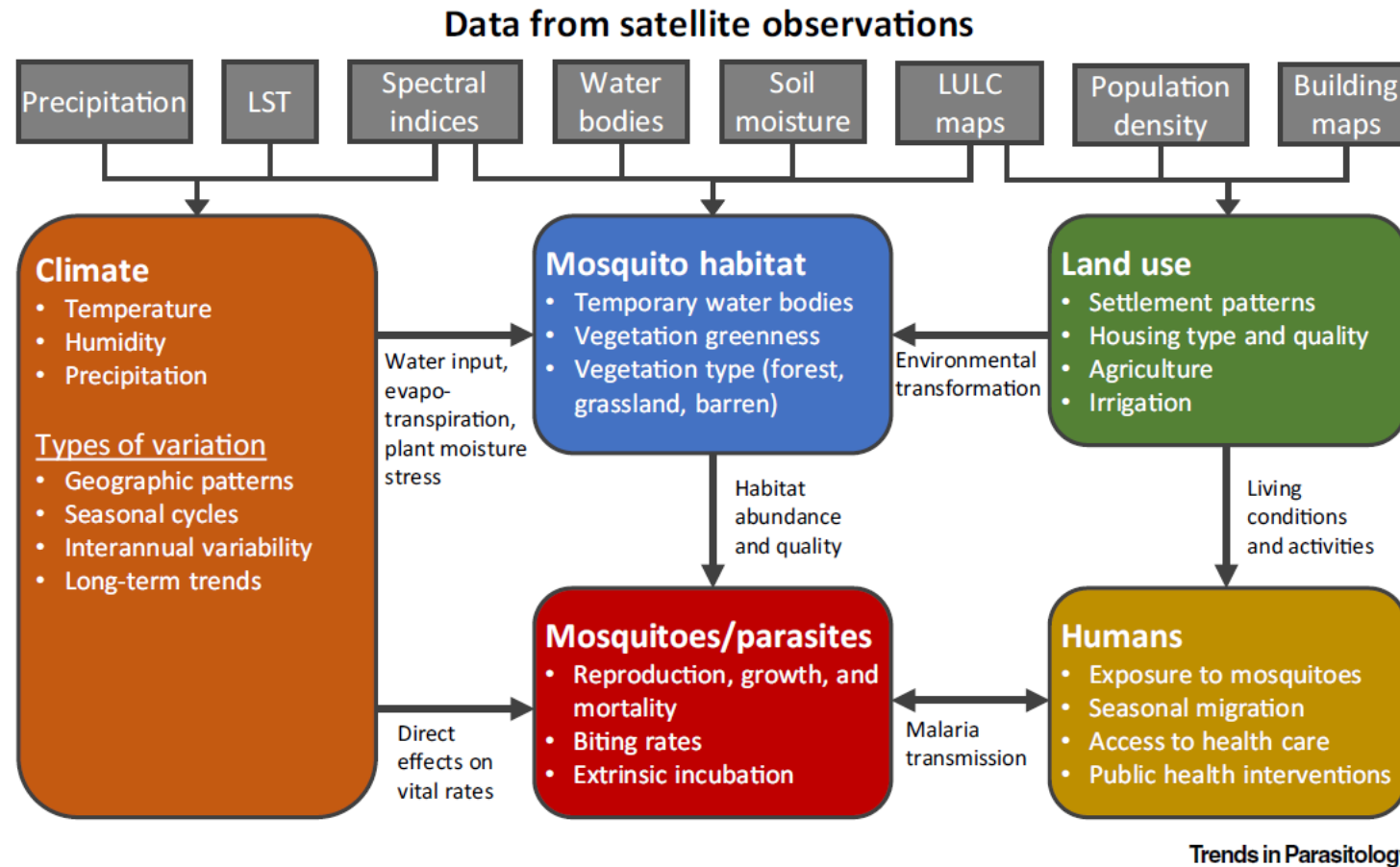


# Climate and Malaria

Shifts in weather pattern influence the timing of malaria campaigns that are often scheduled prior to or around rainy season

- Insecticide residual spraying (IRS)
- Seasonal malaria chemoprevention (SMC) – monthly administration of antimalarials to children under 6 years old during malaria season
- Surveys

Many climatic and environmental data are now publicly available that can be integrated into surveillance systems. Continuously monitoring climatic and epidemiological data can help inform program decision making

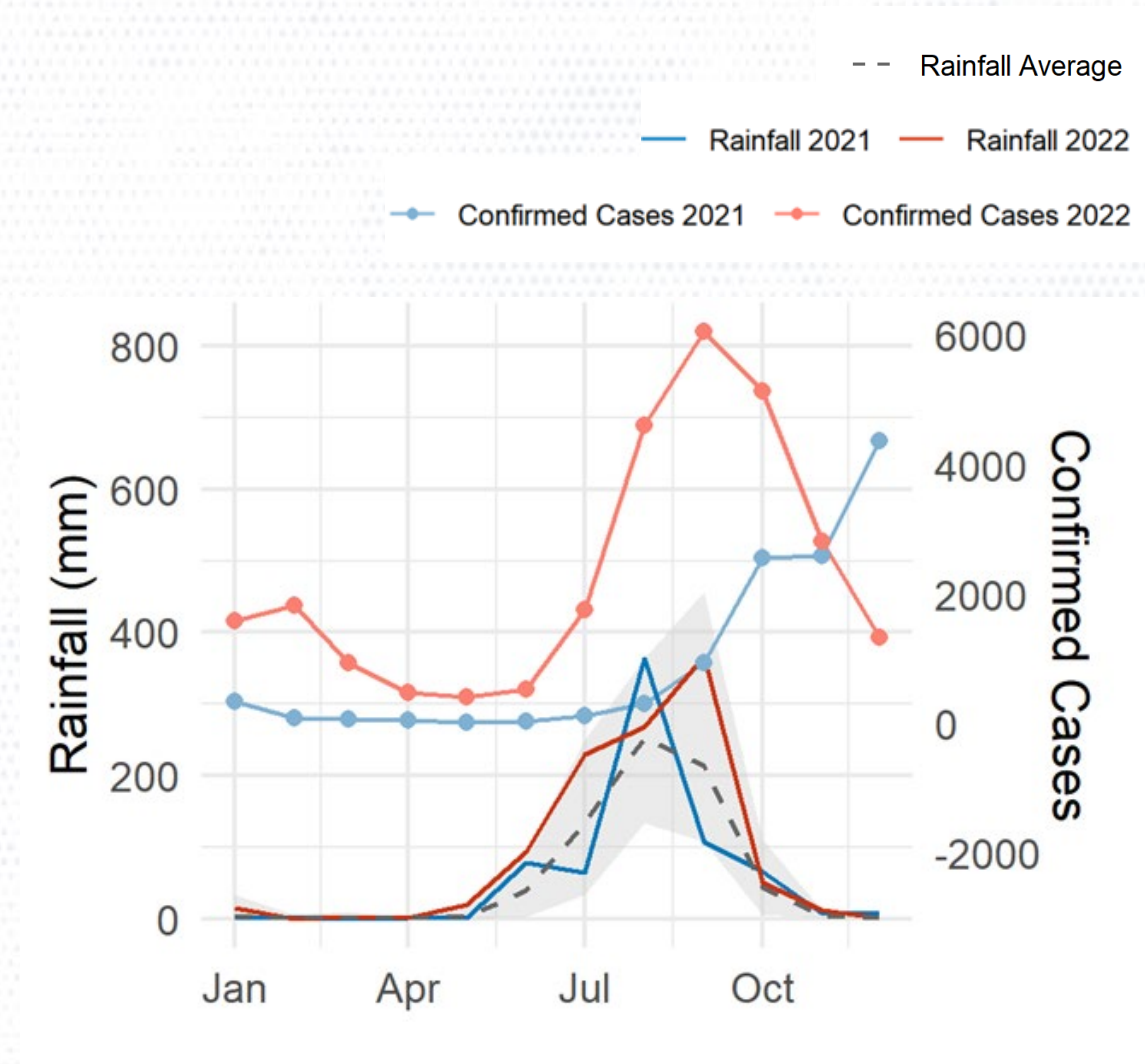




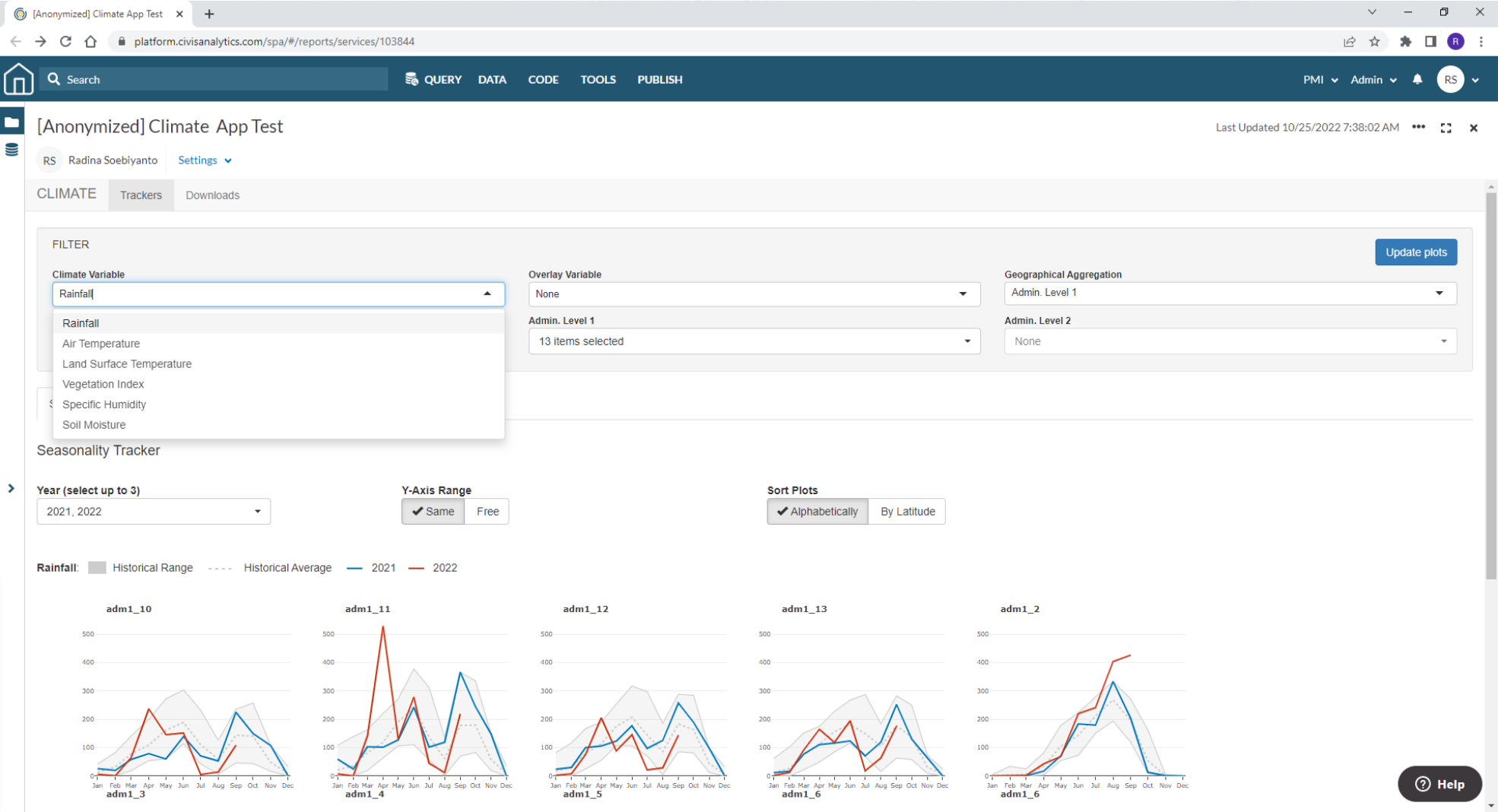
# Example: Rainfall

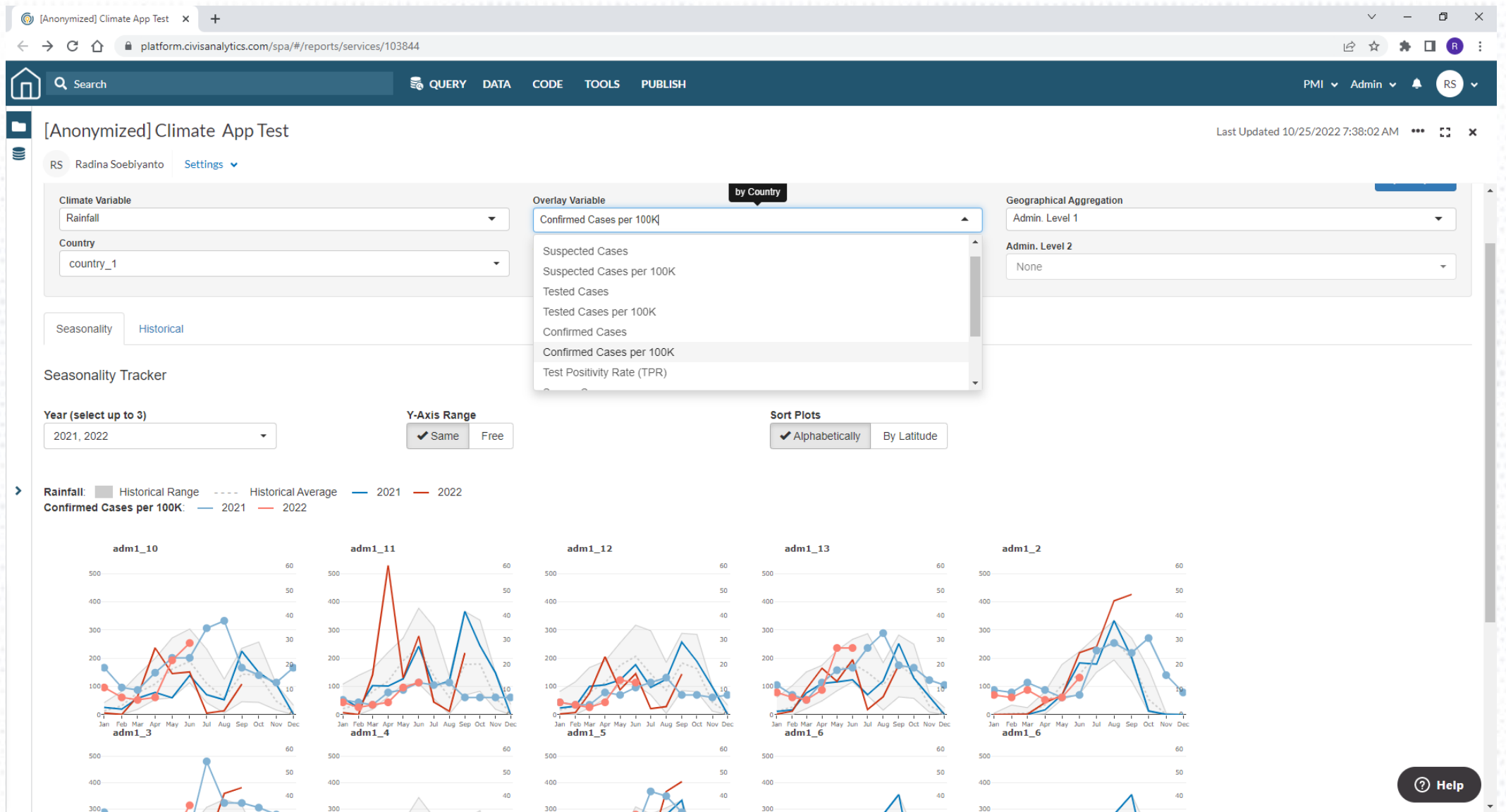
Use cases of monitoring current year rainfall pattern against previous year and historical average

- Retrospective analysis of malaria trends – was increasing/decreasing malaria cases preceded by anomalously high/low rainfall?
- Changing the timing and/or duration of seasonal malaria chemoprevention (SMC) following a shift in rainfall pattern
- Check whether survey was timed appropriately during peak season



# Provide climatic variable data and visualization at subnational level







FILTER

Climate Variable

Rainfall

Country

country\_1

Overlay Variable

Confirmed Cases

Admin. Level 1

13 items selected

Geographical Aggregation

Admin. Level 1

Admin. Level 2

None

Update plots

Seasonality

Historical

Historical Tracker

Date Range

MMM 2016 to MMM 2022

Y-Axis Range

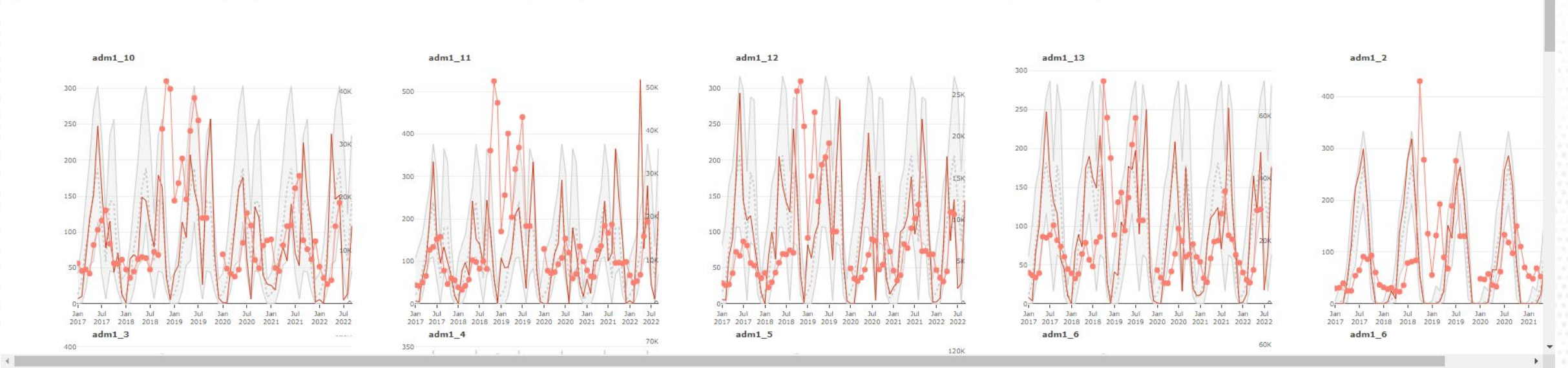
Same

Free

Sort Plots

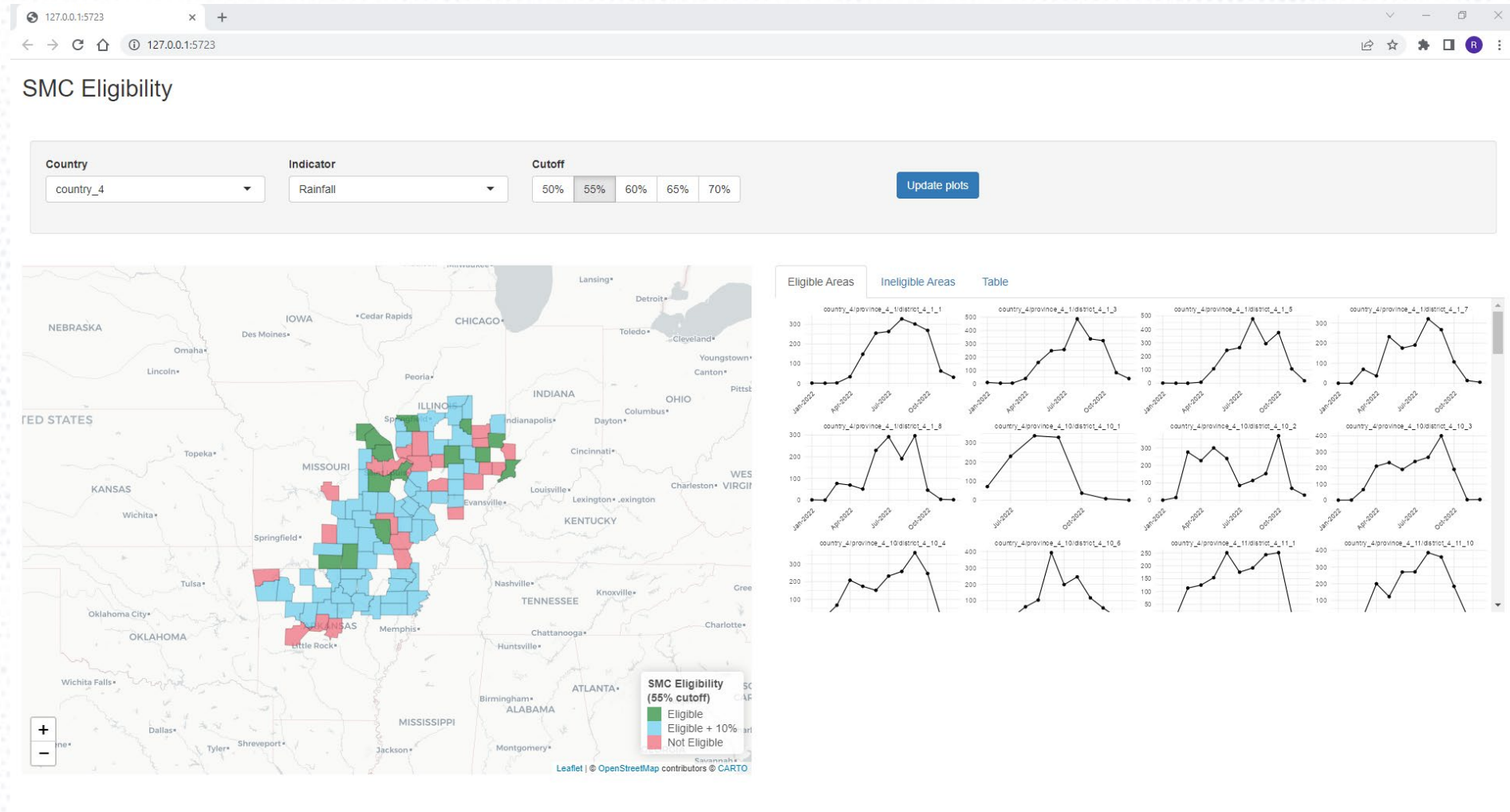
Alphabetically

By Latitude



# Rainfall data can be used to help determine SMC eligibility

Criteria: children in age groups at high risk of severe malaria in areas where malaria is highly seasonal, and transmission is intense – which often corresponds with the period of highest rainfall [\[WHO\]](#)





# THANK YOU

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# Adapting climate change for malaria

*SENEGAL EXPERIENCE AND ADAPTATION*

*DR ABOUBACAR SADOU*

*PMI RESIDENT ADVISOR*

**PMI**

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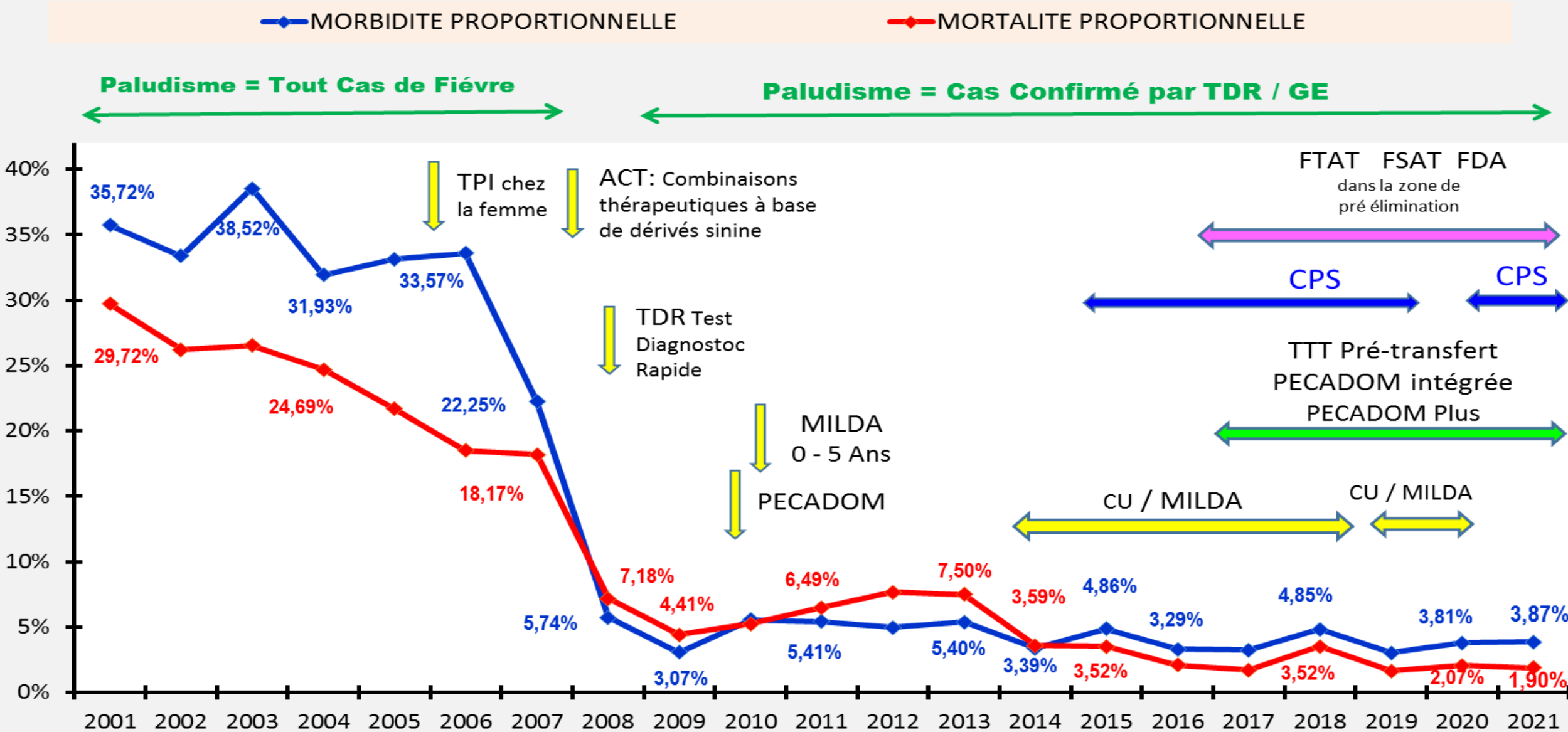
Map of Senegal showing the distribution of the number of health facilities per region. The map is color-coded according to the number of facilities, with a legend on the left. The legend categories are:

- 0
- >0 - ≤1
- >1 - ≤5
- >5 - ≤15
- >15 - ≤25
- >25 - ≤100
- >100 - ≤250
- >250 - ≤450
- >450 - 745

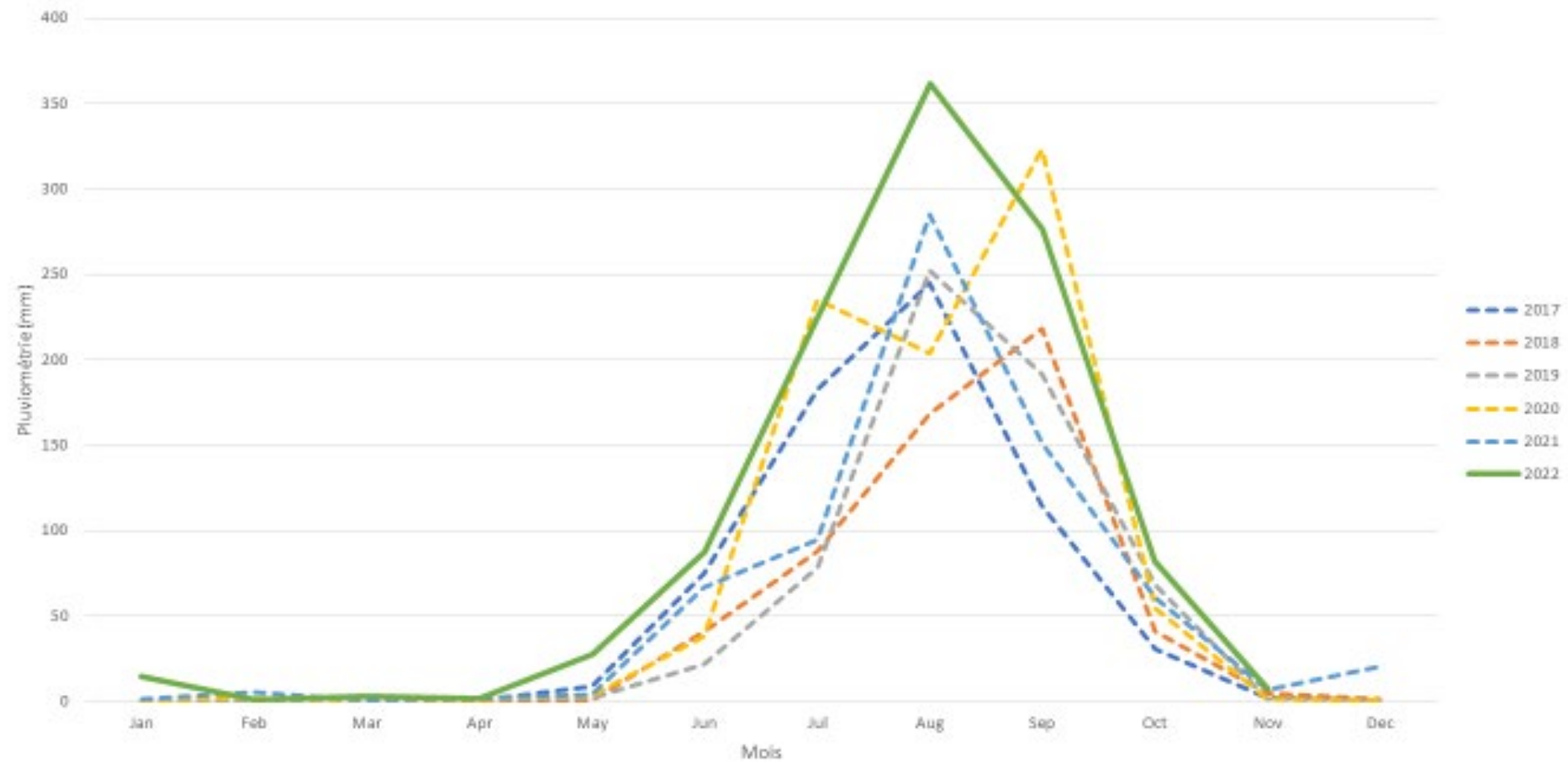
The map shows that the highest number of facilities is concentrated in the eastern part of the country, particularly in the regions of Diourbel, Kaolack, and Kolda.



# Evolution Morbidité, Mortalité proportionnelles de 2001 à 2021 implémentation des interventions majeures



Evolution de la pluviométrie de 2017 à 2022 au Sénégal





# Adaptation Programming- PMI activities

- **Malaria Control and Elimination:**

PMI and the Senegal National Malaria Control Program are adapting to climate change by innovating and adapting actual malaria control strategies through:

1. Expanding the home-based malaria case management (PECADOM) and its proactive component (PECADOM Plus)
  - **In time** to ensure a year-round implementation instead of just focusing on the malaria high transmission period, and
  - **In space** to include more and more geographic areas that are seeing recrudescence of malaria cases
2. Adapting the implementation of seasonal malaria chemoprevention (SMC) by:
  - Increasing the number of monthly rounds to cover the whole rainy season
  - Reviewing recent climate data to adapt the implementation start date and best target the beginning of the rainy season.

These adaptations conducted to an increase of the budget for these interventions by about 20% as compared to the standard implementation.

# Thank you!

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# We have compiled a collection of resources for you

## Resource Pack for Protecting Children from Heat Stress

The panelists of the heat stress webinars and the facilitators together developed a short but helpful list of key selected resources as part of a [Heat Stress Resource Pack](#) that can help you quickly read up on the impact of heat stress on maternal, infant, and child populations and also see examples of plans and guidelines currently being implemented in healthcare settings across countries.

 [Resource Pack for Protecting Children from Heat Stress](#)

CHTF Events page:

<https://www.childhealthtaskforce.org/events/2022/11/adapting-health-systems-protect-children-impact-climate-change-series>



# Climate Change and Child Health Discussion Series



Engage with the co-chairs:

- Cara Endyke Doran: [cendykedoran@globalcommunities.org](mailto:cendykedoran@globalcommunities.org)
- Raoul Bermejo: [rbermejo@unicef.org](mailto:rbermejo@unicef.org)

Reach out to the Child Health Task Force Secretariat: [childhealthtaskforce@jsi.com](mailto:childhealthtaskforce@jsi.com)

## **Healthy Environment Healthy Children Framework:**

<https://www.unicef.org/media/91631/file/Healthy-Environments-for-Healthy-Children-Global-Programme-Framework-Summary.pdf>

## **CCRI:**

<https://www.unicef.org/reports/climate-crisis-child-rights-crisis>

Subgroup information, recordings and presentations from previous webinars are available on the subgroup page of the Child Health Task Force website:

[www.childhealthtaskforce.org/subgroups/expansion](http://www.childhealthtaskforce.org/subgroups/expansion)





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