

ANTICIPATE · THINK SYSTEMS · TRANSFORM LIVES



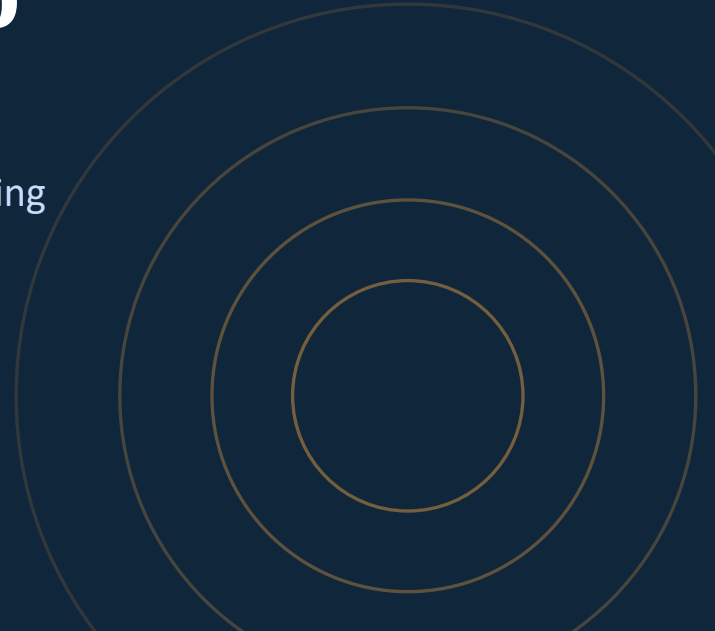
Anticipatory governance and future-ready leadership

Strategic foresight, long-term planning and scenarios: anticipating emerging challenges and informing policy responses

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We often plan by looking backwards



Last year's budget

The starting point



Historical trend

Adjusted for past patterns



Next year's allocation

Set largely by precedent

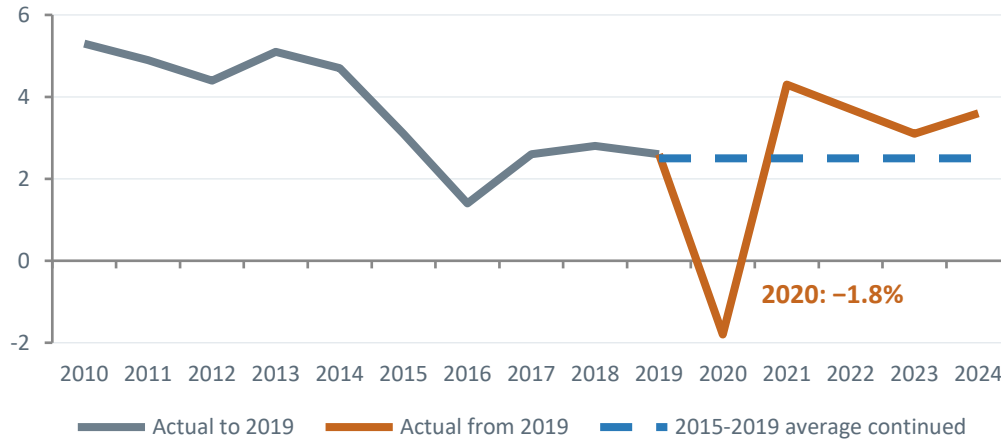
This works when the future looks like the past.

But doesn't help us prepare for our rapidly changing world and the inevitable shocks, structural shifts or slow-building risks.

Then COVID-19 broke the trend

Sub-Saharan Africa · Source: World Bank, World Development Indicators

Real GDP growth (%)



6.0% to 6.6%

Unemployment rate, 2019 to 2020

4.9% to 5.2%

Health expenditure, % of GDP, 2019 to 2020

36.5% to 37.1%

Out-of-pocket share of health spending, 2019 to 2021

Countries were able to demonstrate agile and adaptive governance in their response (Jansson et al. 2020).

Anticipatory governance is about preparedness.

Anticipatory governance: prepare for several futures



Explore

Build plausible **scenarios** of how the future could unfold, and what would drive each.



Stress-test

Test today's policies against current system vulnerabilities and against future scenarios.



Respond

Choose responses that hold up across futures, and consider policy adaptation pathways.

*A scenario is a plausible description of how the future might unfold under a particular set of assumptions. It isn't a prediction. A pragmatic approach for dealing with **uncertainty**.*

Scenarios: structured stories about alternative futures



Five pathways to 2100

The Shared Socioeconomic Pathways describe how society, the economy and demography could develop, with very different implications for our ability to mitigate and adapt to climate change.

Our extension

We are adding health and health systems to the pathways, so planners can see what each future means for health and health systems.

From storylines to numbers to health impacts



Storylines

Qualitative narratives of alternative futures

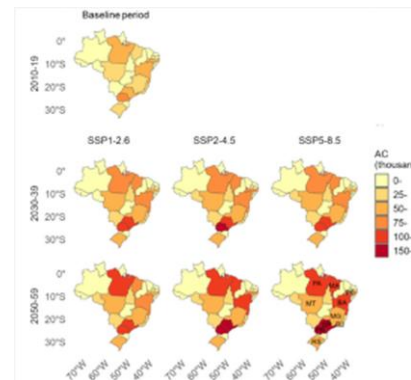


Quantifications

Population, GDP, and extensions such as governance and gender inequality



Spatial burden of heat-related hospital admissions in Brazil



54-78%

rise in heat-related admissions per 100,000 people by the 2050s, depending on the scenario (no adaptation)

Thousands of attributable admissions by state, decade and SSP scenario. Chen et al. (2025)

SSP Extensions Explorer

Visualise and download quantitative elaborations of the SSPs, including governance and rule of law. Hosted by IIASA.

iiasa.ac.at/models-tools-data/shared-socioeconomic-pathway-ssp-extensions-explorer

Climate scenarios: heat and rainfall in Senanga, Zambia

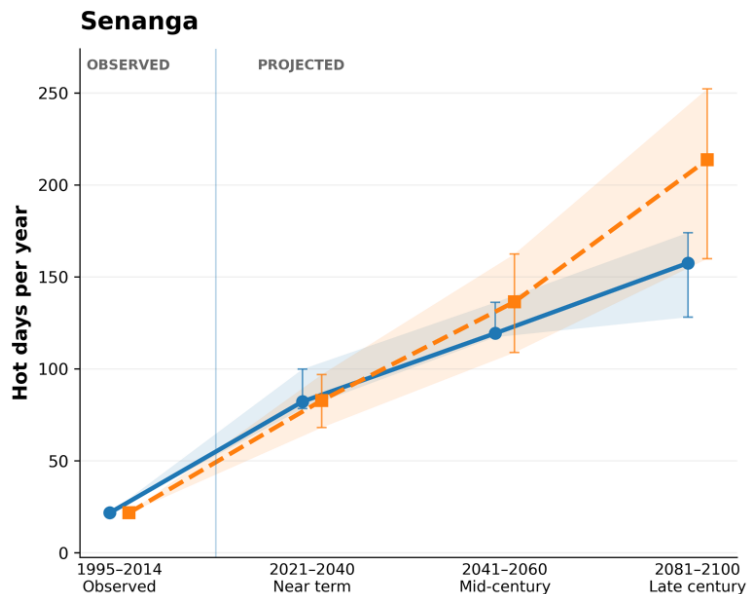


Median of four CMIP6 models; band = full model range · Rainfall shows intensity, not flood depth

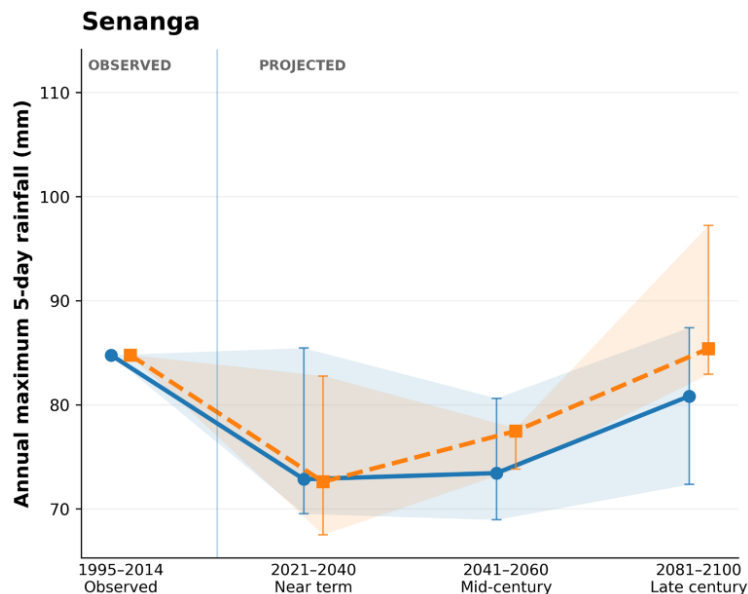
— SSP2-4.5

— SSP5-8.5

Hot days rise from about 22 to 160-210 a year



5-day rainfall intensity: no clear rise



Climate scenarios show how heat pressure may change over time, supporting preparedness before health-service disruption occurs.

Stress test: comparing vulnerabilities and responses



REACH · Brazil and Zambia · What flood and heat do to maternal and child health care, and how existing policies hold up



Flood



Heat

**IMPACT: IN ROUTINE
DATA**

Some disruption for large scale floods; generally less clearly detectable effects

Lower ANC coverage and more c-sections in both countries; fewer non-hospital deliveries in Brazil

**IMPACT: IN
INTERVIEWS AND
STAKEHOLDER
WORKSHOPS**

A visible emergency. Movement disrupted; outreach, referral and commodity delivery delayed; missed or delayed ANC, delivery care, immunisation and PNC

A normalised hazard. Staff capacity to sustain routine services constrained; travel and clinic timing shift; waiting, storage, water and food conditions worsen

**EXISTING POLICY
RESPONSE**

Preparedness policies in place

Much less preparedness

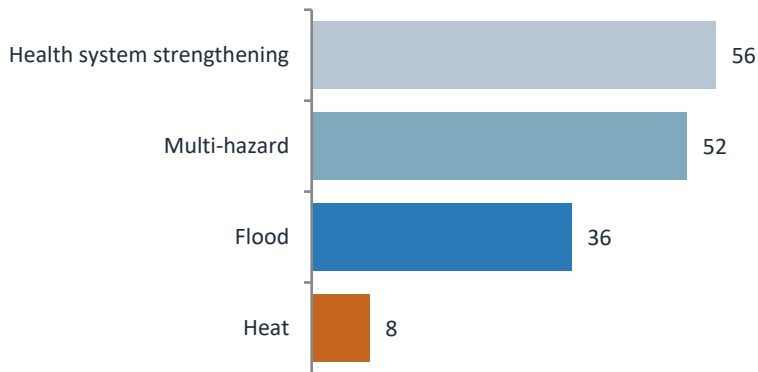
GAP

The gap: floods are visible, so we plan for them. Heat is a hidden risk, already shaping who receives care and how women deliver.

Stress test: mapping policies to vulnerabilities

Links between hazards, vulnerabilities and interventions (evidence synthesis) · 17 intervention categories

Evidence specific to heat is thinnest: 8 of 152 study links



Hazard targeted. Health system strengthening is not hazard-specific.

61% of interventions are focused on three vulnerabilities

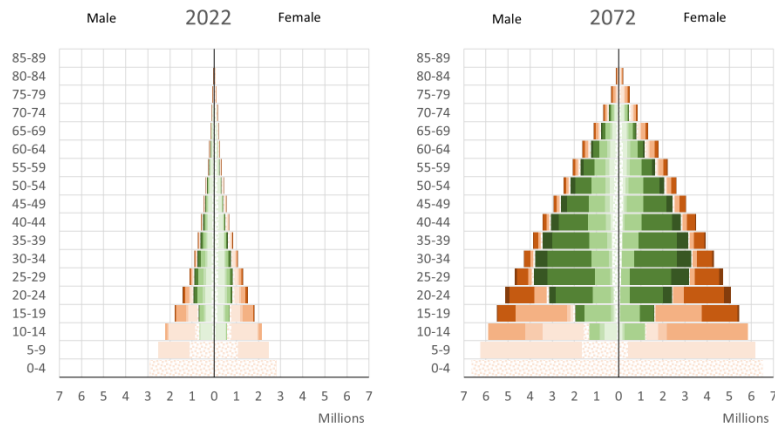


A key takeaway is that health system strengthening and climate adaptation can be mutually reinforcing.

Quantified scenario: population and workforce in Mozambique

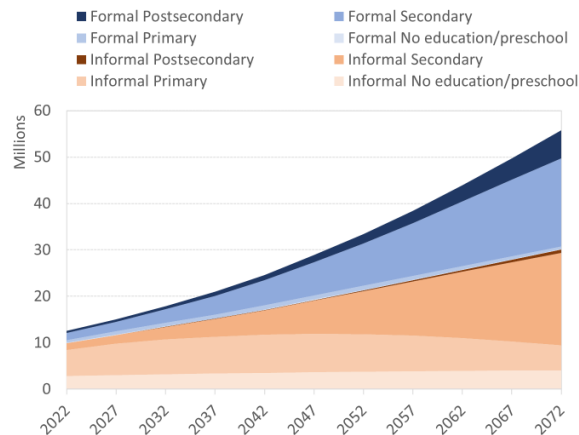
Source: Goujon and Marois, IIASA

The total population is projected to more than triple



33 million in 2022 to 115 million by 2072, if past trends continue. Green: economically active; orange: inactive; darker shades: higher education.

The workforce of 2072 will look markedly different



Reference scenario, 2022-2072. Blue: formal sector; orange: informal sector; darker shades: higher education.

Without comprehensive policies to accelerate fertility decline, boost female employment, improve job formalization, and accelerate education gains, the demographic transition will not translate into substantial economic growth.

What this means for public sector leaders



Use scenarios in the planning cycle

Make foresight a routine part of planning.



Stress-test before you commit

Ask where current policy is exposed today, and how that changes across futures.



Invest in local data and modelling capacity

So that the analysis is done, owned and trusted close to the decisions.



Work across sectors, and borders

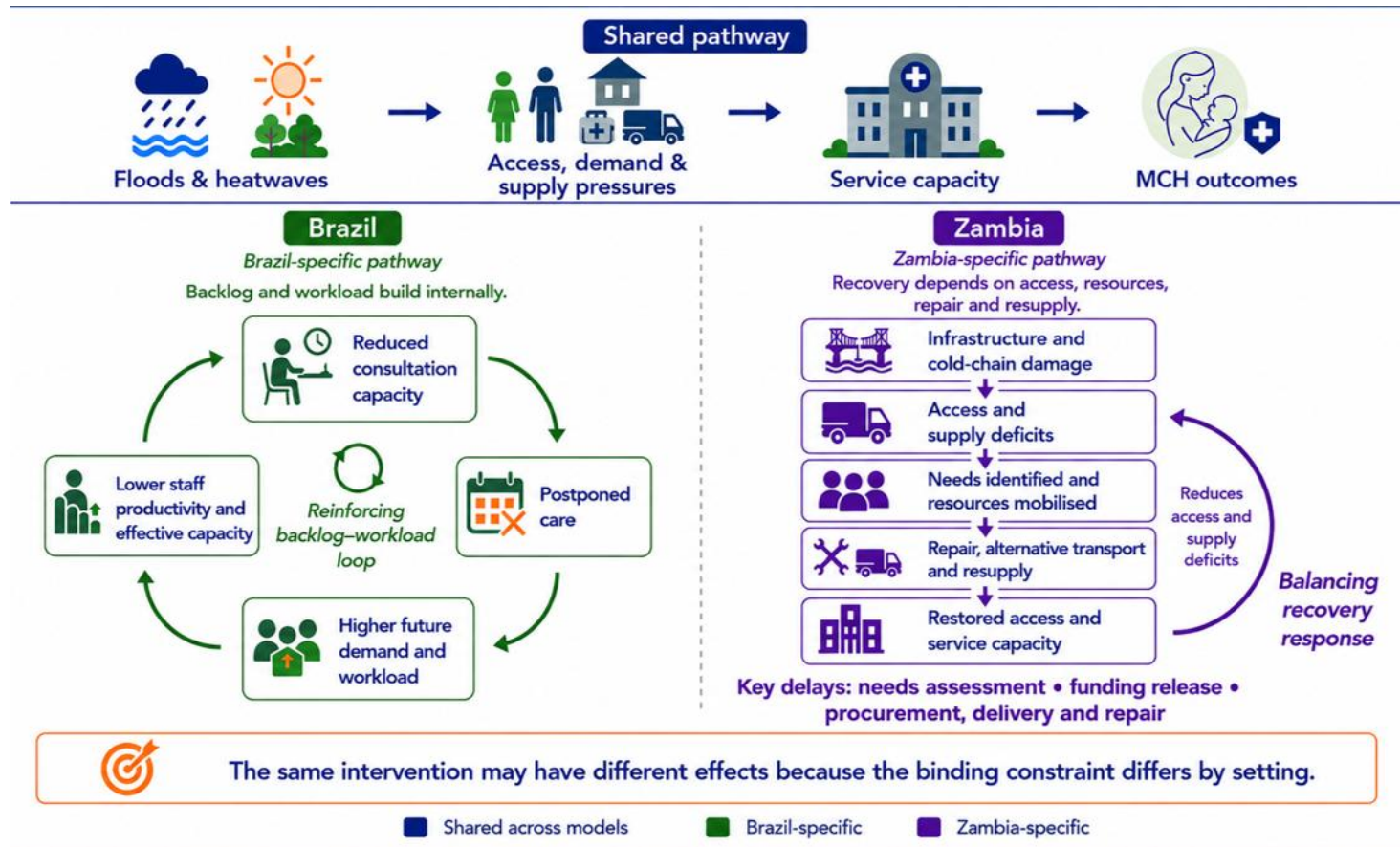
Risks rarely respect ministry or territorial boundaries, yet evidence on cross-sectoral governance is still limited.

OVER TO YOU

What is the slow, hidden risk in your sector that current planning isn't seeing?

- Choose a plan or policy from your work and:
 - Name two uncertainties that could change the context (e.g. climate, funding, technology, demographics).
- Outline two or three quick scenarios from each of them.
- Think about what impact this would have for the plan, what signals to look out for, and if there is anything you would change.

SDM: Comparing Feedback Pathways in Maternal and Child Health Services in Brazil and Zambia





REACH

For climate-resilient maternal and child healthcare
Para resiliência climática na saúde materno-infantil

REACH Hybrid SD-ABM Demonstrator

Explore how climate hazards affect access, demand, capacity and outcomes in maternal and newborn health systems

Building evidence
for healthier and more
resilient communities

Simulation setup

Select settings to configure and run a simulation.

1. Country

- ☒ Zambia
- ☐ Brazil

2. Municipality / district

- ☒ Zambia (2 study sites)
 - ☒ Senanga
 - ☐ Sinazongwe
- ☐ Brazil (2 study sites)
 - ☐ Recife
 - ☐ Palmares

3. Model mode

- ☐ SDM only
- ☐ ABM only
- ☒ Hybrid SD - ABM
- ☐ Compare all three

4. Climate extreme

- ☒ Flood
- ☐ Heatwave
- ☐ Compound hazard

5. Time horizon

- ☐ Historical
- ☐ Baseline
- ☒ Near-term
- ☐ Mid-century
- ☐ Far future

▶ Run simulation

Simulate. Compare. Build more resilient health systems.

Select country, district, model mode, climate extreme and time horizon to explore how hazards affect access, demand, capacity and outcomes.



Facility SD (System Dynamics)

- Staff time and staffing capacity
- Productivity and absenteeism
- Readiness and service availability
- Access constraints (e.g. roads, supplies)

Interface variables (System handshake)

C01 Available staff minutes by staff group → service slots

C02 Realised facility load ratio → stress / productivity



Facility ABM (Agent-based model)

- Service slots and scheduling
- Women served / denied
- Realised facility load and congestion
- Referrals and care-seeking behaviour
- Overflow and queueing



Days simulated
365



Women served
8,425



Referrals
281



Mean load ratio
0.05

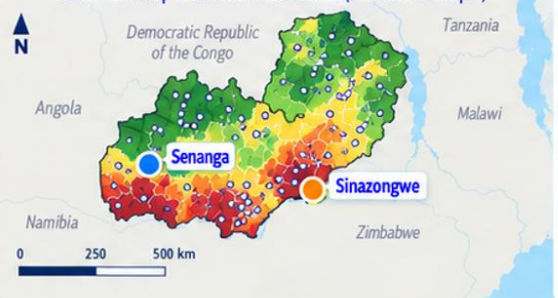


Facility closures / repairs
3



Live spatial simulation

Flood risk map for Zambia and Brazil (selected example)



Flood risk (return period)

- 2-year
 - 5-year
 - 10-year
 - 25-year
 - 50+ year
- Agent (woman)
● Study site



Key outcomes over time



Service availability Proportion of facilities operational



Realised demand Women seeking care (per day)



Congestion / workload Facility load ratio



Unmet need Women not receiving needed care (per day)



About this demonstrator

This platform links system dynamics (SDM) with agent-based modelling (ABM) to explore how climate hazards affect maternal and newborn health service availability, use and outcomes.



Key interface variables



C01 Available staff minutes by staff group → service slots (SD → ABM)



C02 Realised facility load ratio → stress / productivity (ABM → SD)



Explore different scenarios

Switch between SDM, ABM or Hybrid mode, compare climate hazards (flood, heatwave, compound), and explore historical, baseline and future time periods (IPCC-style).



Key question

How do climate hazards affect access, demand, capacity and outcomes – and what can build more resilient maternal and newborn health systems?