

UNBREAKABLE

»» Building the Resilience of the Poor in the
Face of Natural Disasters



GFDRR

Global Facility for Disaster Reduction and Recovery

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LATINO

Puerto Rico lost \$43 billion after Hurricane Maria, according to govt. report

“Given the magnitude of the natural disaster, the economic sectors will keep feeling the impact for an undetermined amount of time,” the report says.





MARKET INSIDER

Hurricane Florence damage estimated at \$17 billion to \$22 billion and could go higher — Moody's Analytics

PUBLISHED MON, SEP 17 2018 • 4:40 PM EDT | UPDATED MON, SEP 17 2018 • 7:20 PM EDT



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KEY POINTS

- Property damage from Hurricane Florence is estimated at \$17 billion to \$22 billion, and that forecast could be conservative, depending on further flooding, says Moody's Analytics.
- Economists so far see a minimal impact to growth from the hurricane, which Moody's sees shaving 0.2 percentage points from third-quarter GDP.





WORLD • HURRICANE IRMA

Hurricane Irma's Damage Could Cost Us \$300 Million, Antigua and Barbuda PM Says



Increased flooding may cost the world \$1 trillion by 2050

John Roach

Published 4:42 AM ET Mon, 19 Aug 2013



Getty Images

Reyes Garcia wades through floodwater to inspect flood damage to a building April 19, 2013 in Des Plaines, Illinois.



ASSET LOSSES

1. Hazard

2. Exposure

3. Vulnerability



Avoiding disasters/impacts

ASSET LOSSES

1. Hazard

2. Exposure

3. Vulnerability



WELL-BEING LOSSES

1. Hazard

2. Exposure

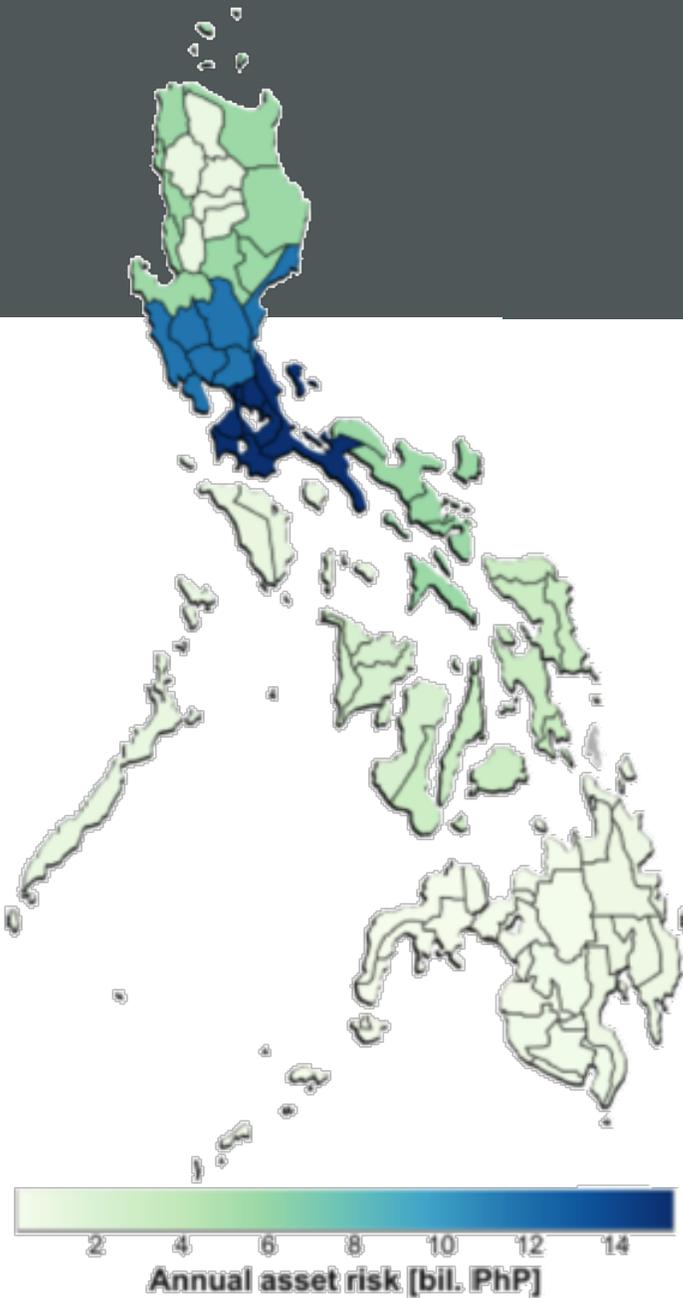
3. Vulnerability

4. Socioeconomic resilience

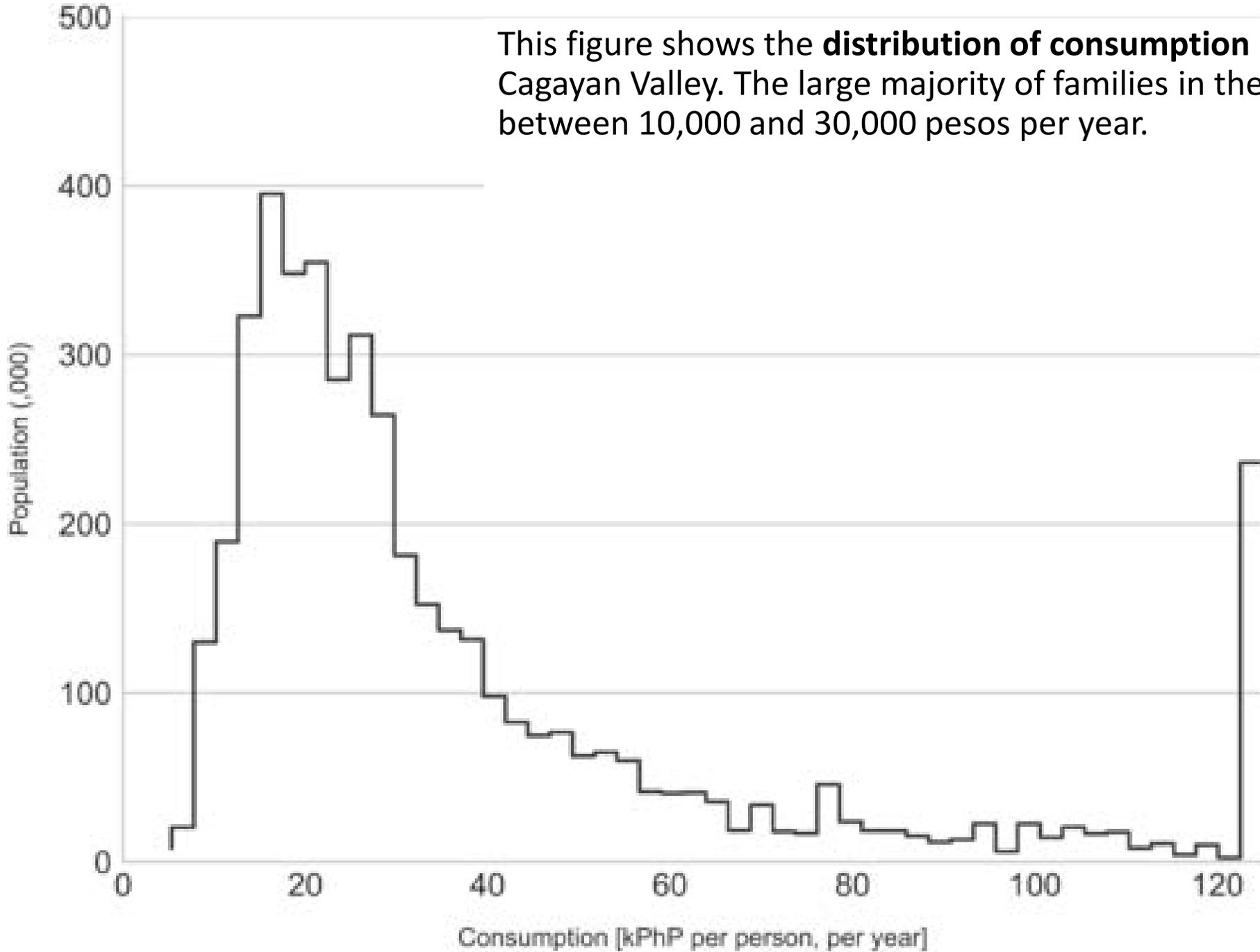
Managing residual risk/impacts

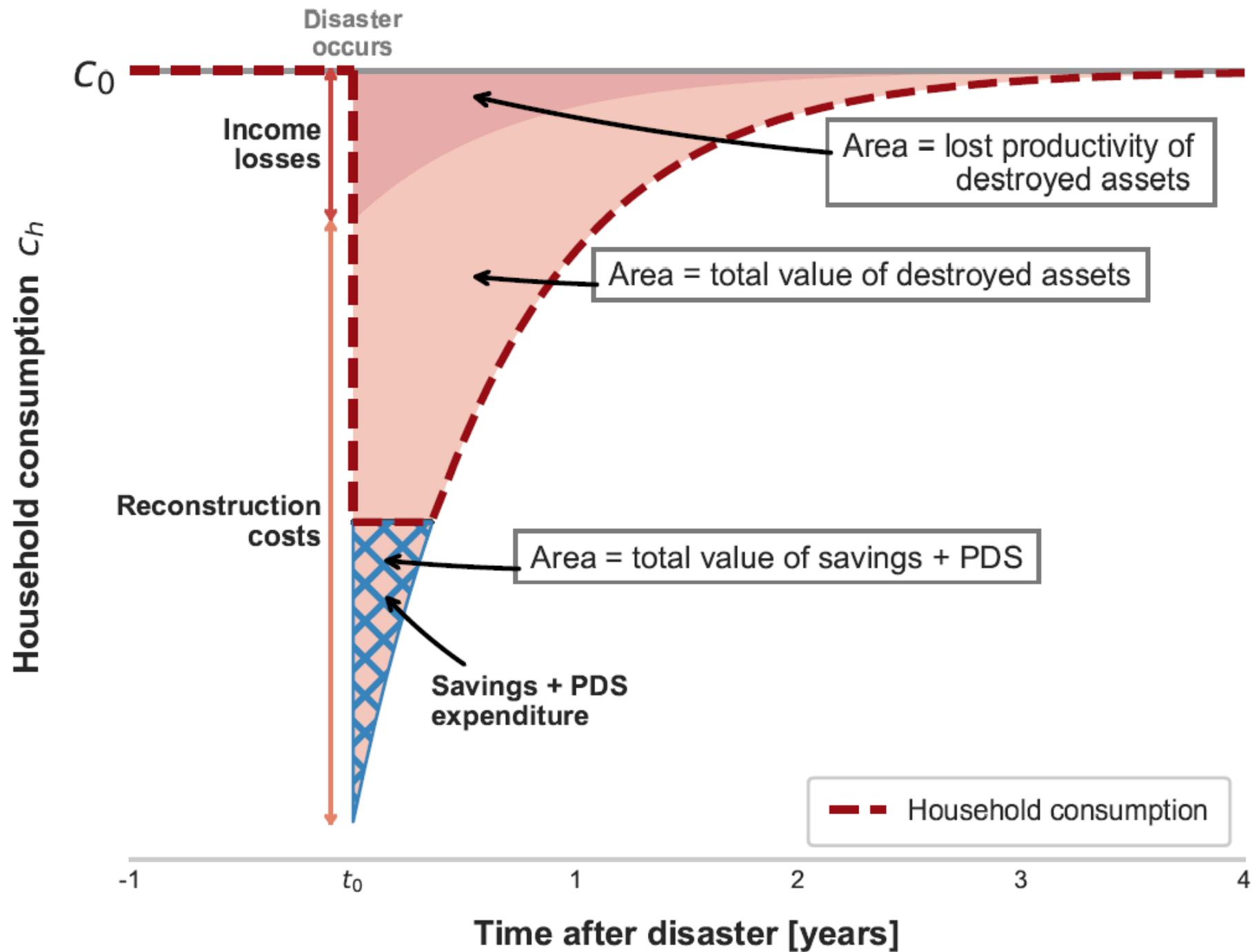
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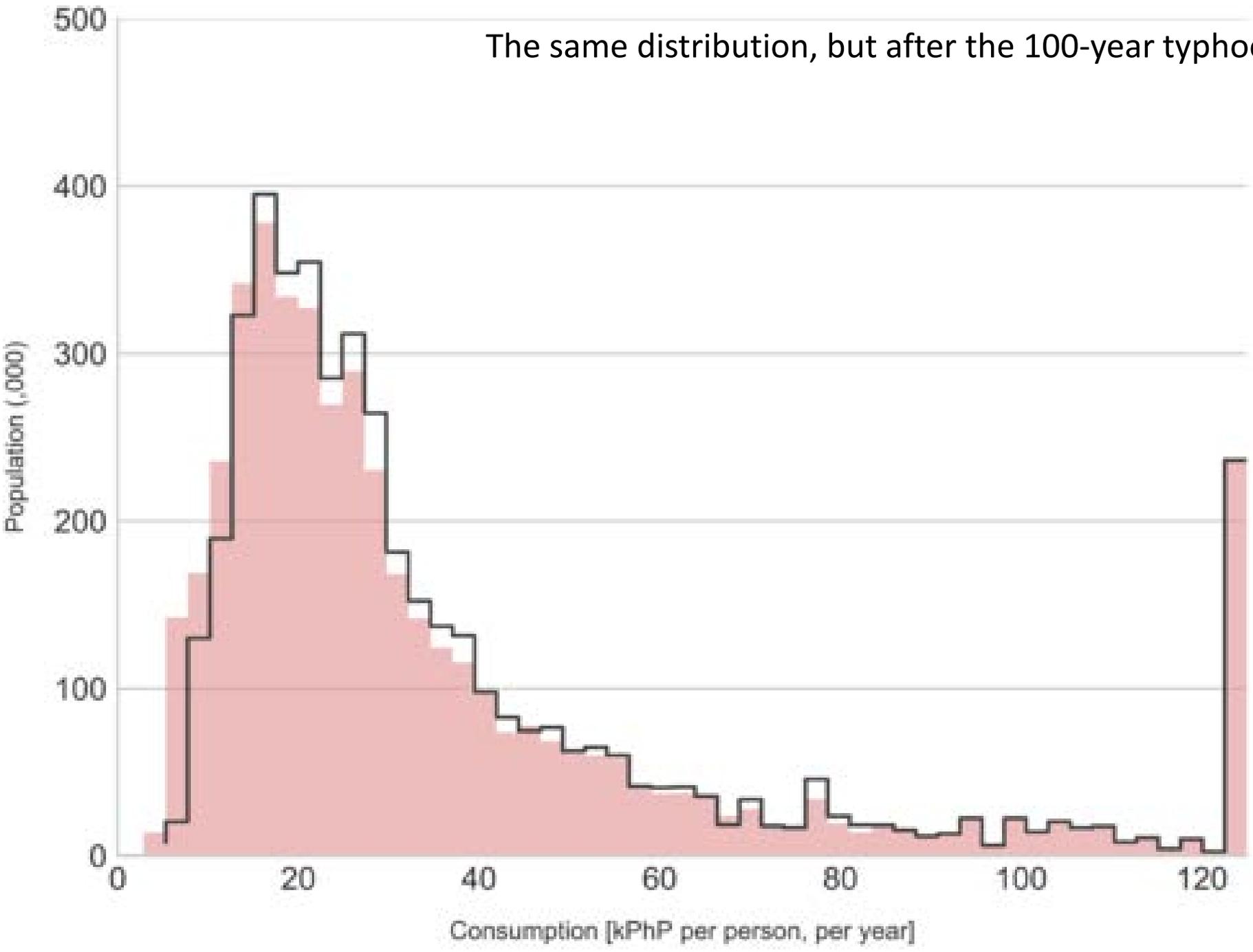


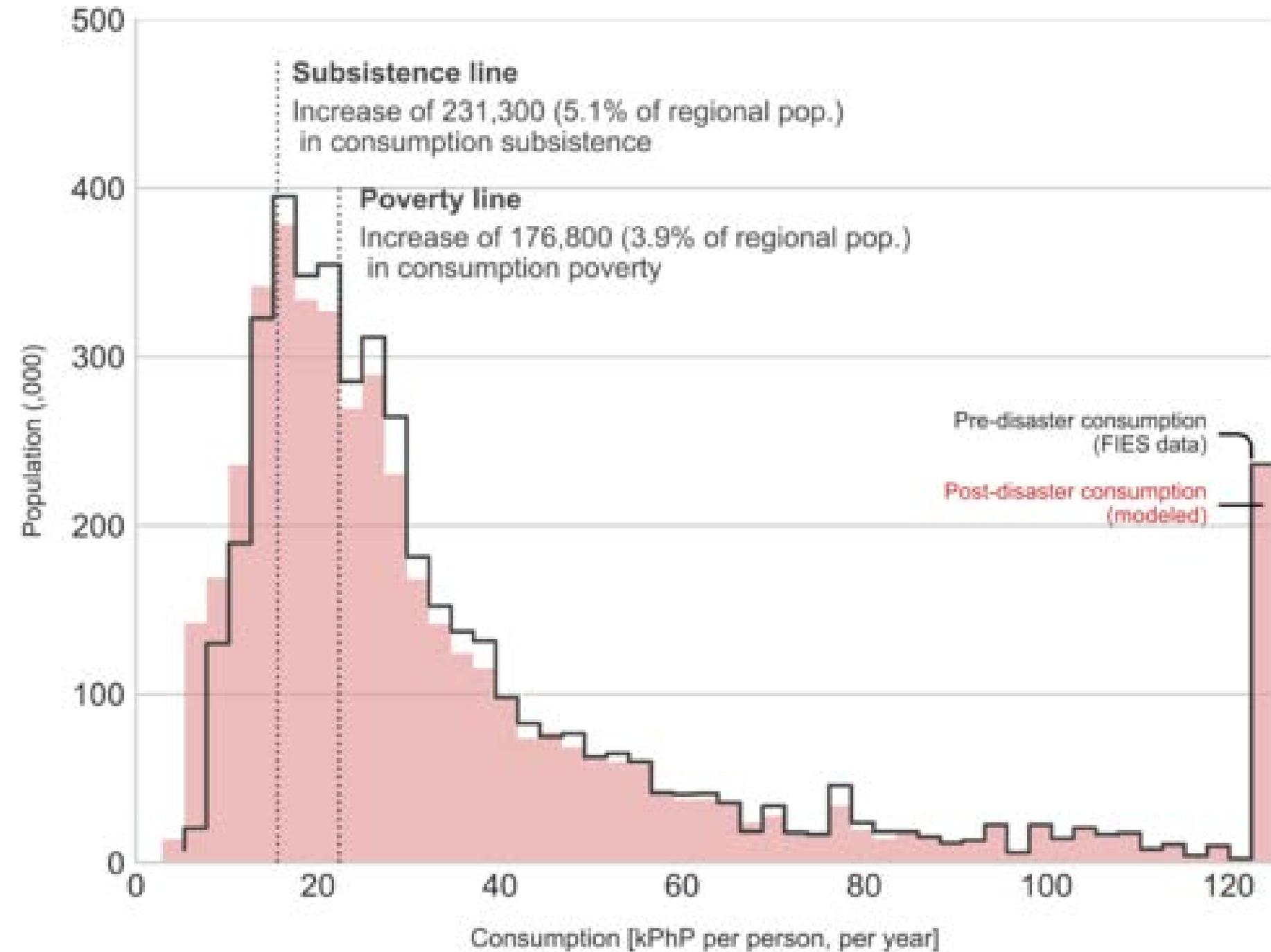
This figure shows the **distribution of consumption** in the region II – Cagayan Valley. The large majority of families in the region consume between 10,000 and 30,000 pesos per year.





The same distribution, but after the 100-year typhoon hit the region

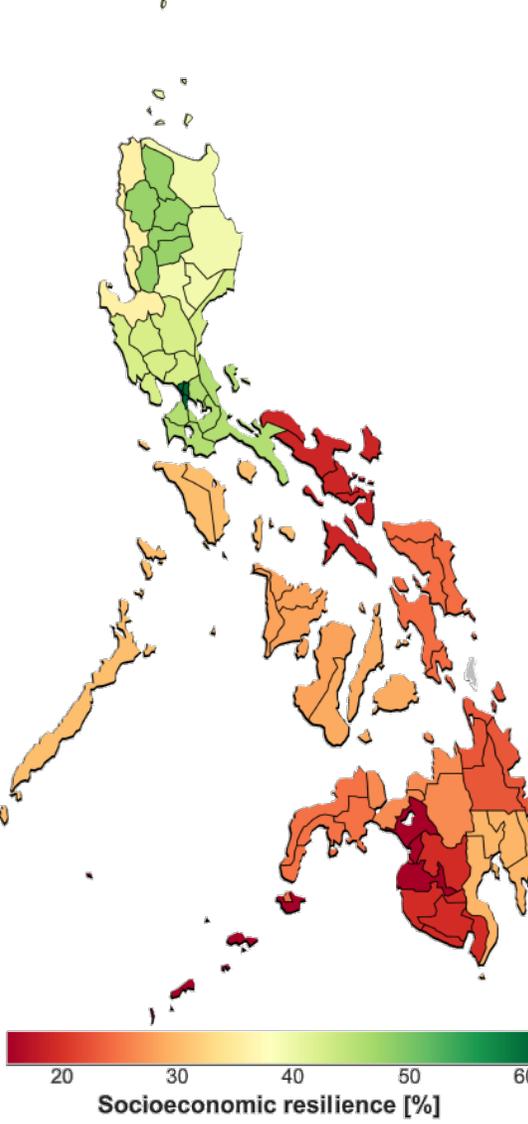
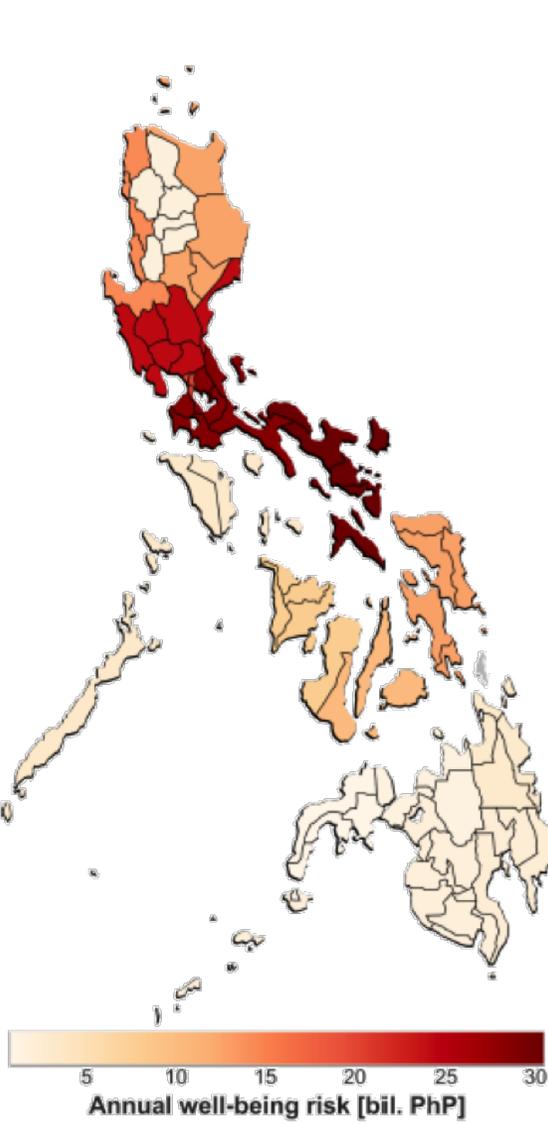
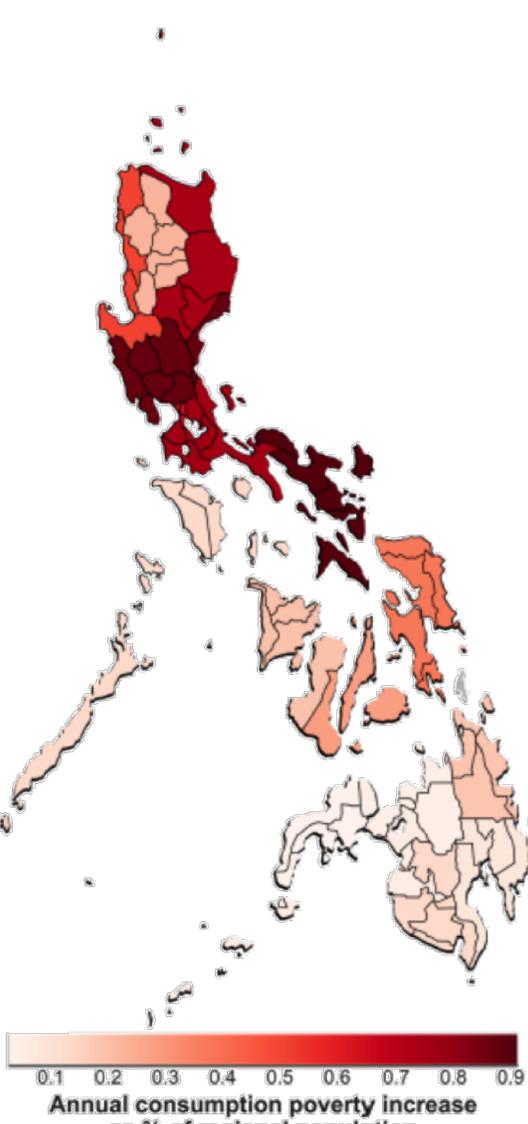
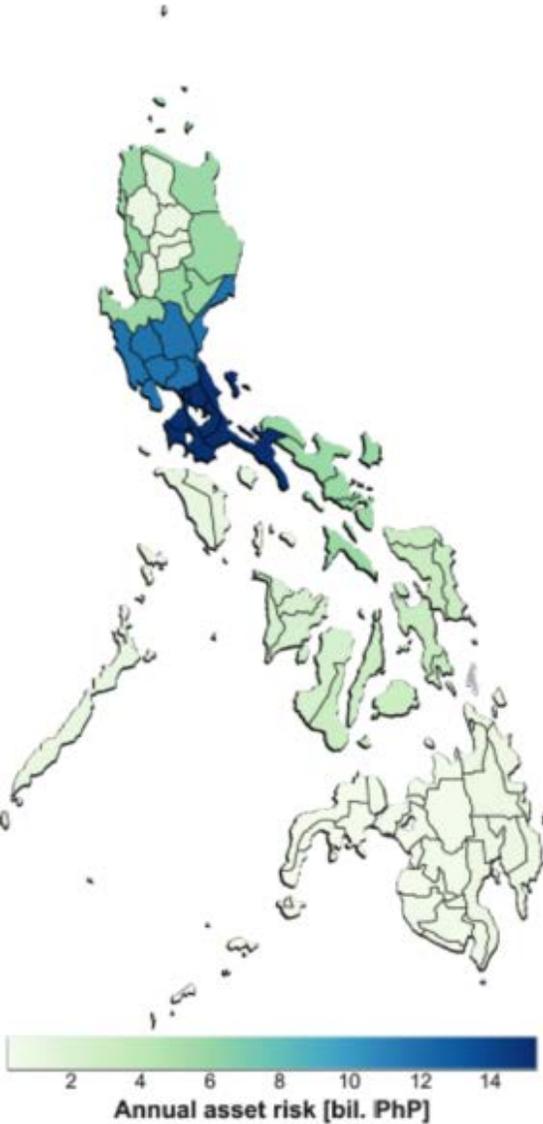




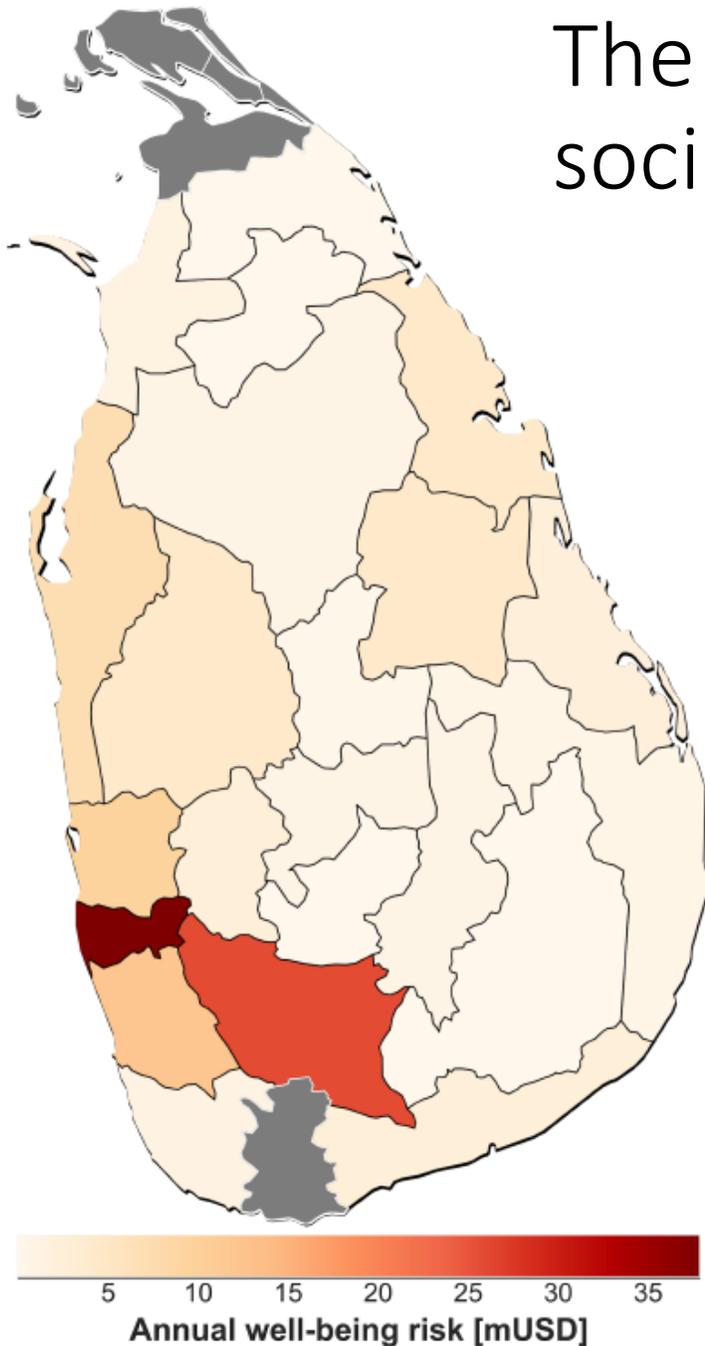
In the case of the 100-year typhoon, around 176,000 people fall in poverty, and 230,000 even fall below the subsistence line.

Stress testing all regions for all hazards, we find that about half a million Filipinos face transient consumption poverty every year due to their exposure to disasters.

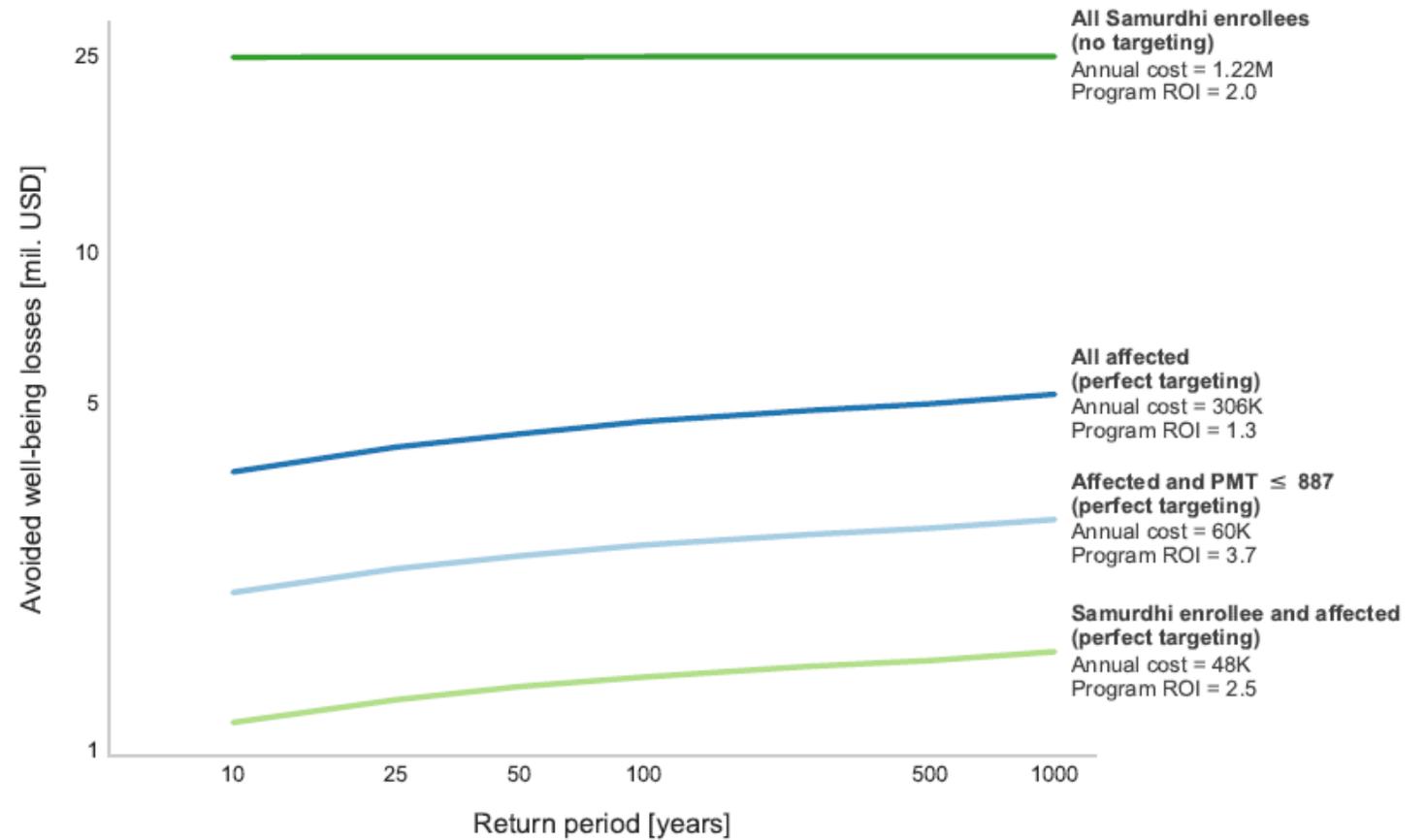
the regions identified as priorities for risk-management interventions differ depending on which risk metric is used. Each metric translates in quantitative form a different set of policy objectives.



The potential from (and cost of) adaptive social protection in Sri Lanka



Expected benefit of ASP (payout = 1 month of Samurdhi) in Sri Lanka, by RP and beneficiary group



LIFELINES

The Resilient Infrastructure Opportunity



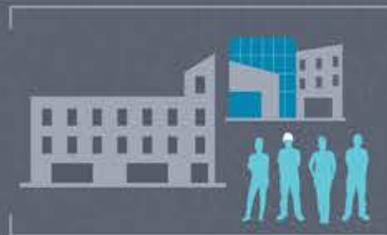
Natural Shocks



Infrastructure



Firms



People





Diagnosis



Solutions



Recommendations



Diagnosis



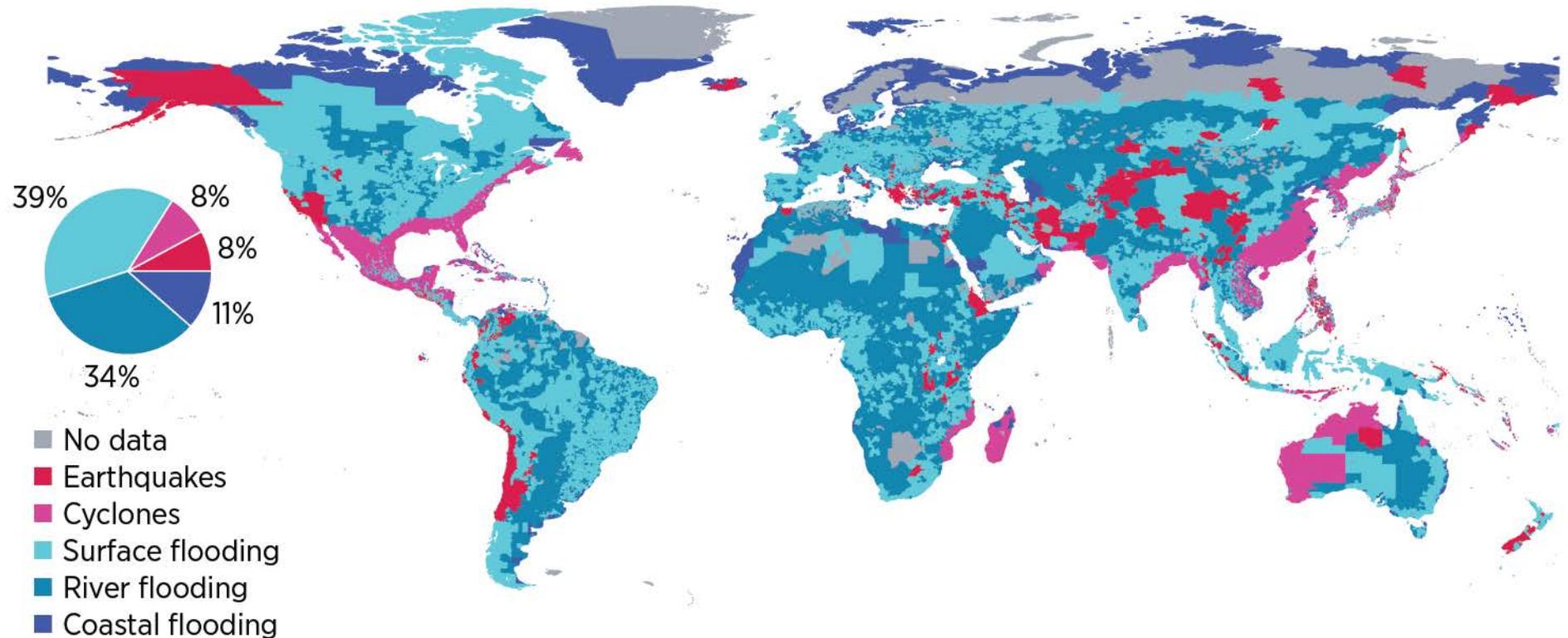
Solutions



Recommendations

The lack of resilient infrastructure is harming people and firms

Damages and repair costs are significant ...



\$30 billion

Annual global damages to transport and power generation

\$18 billion

Annual damages to low- and middle-income countries

... but repairs are only part of the problem.

\$391–\$647 billion

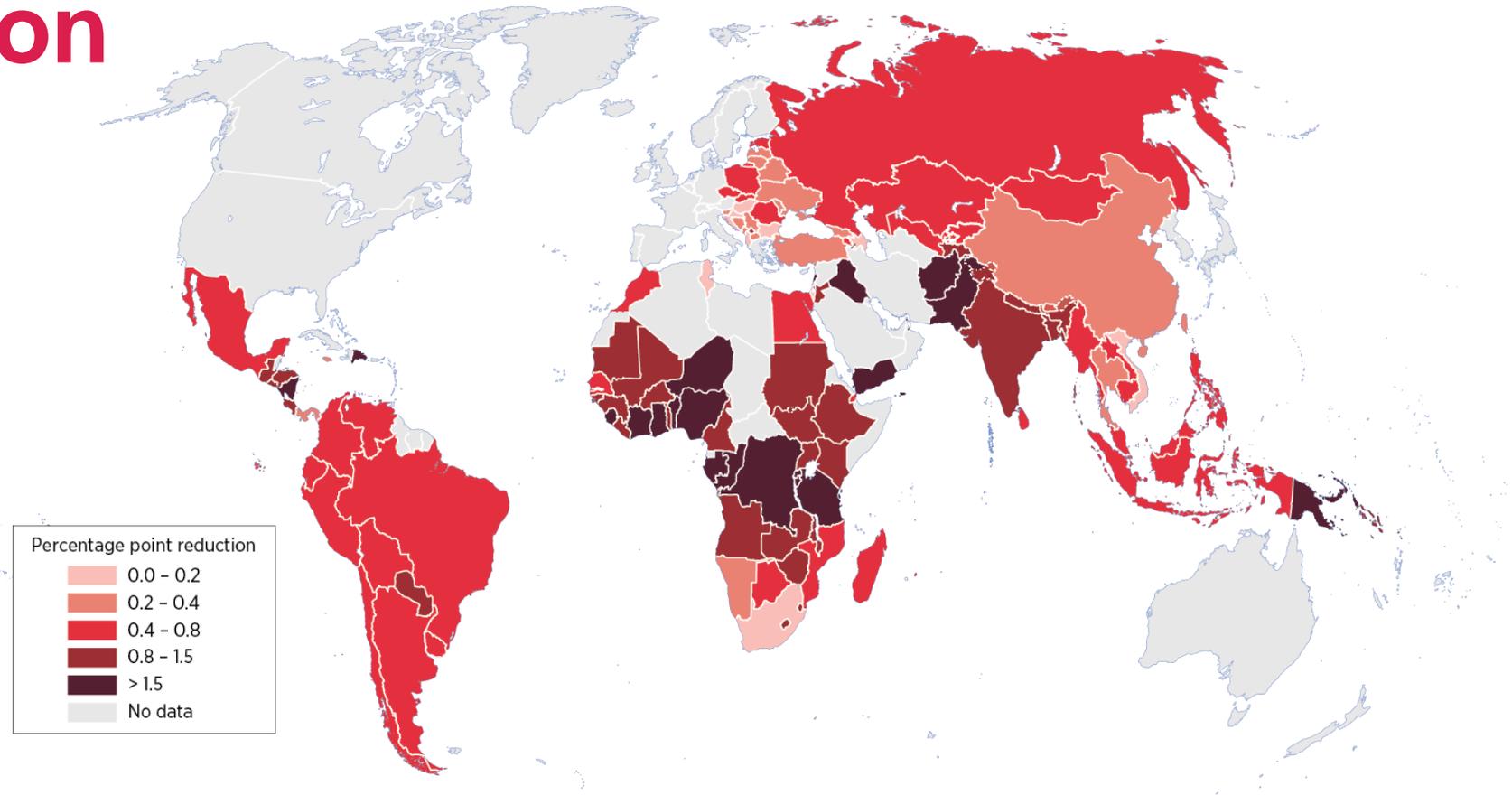
The annual cost of infrastructure disruptions on households and firms in developing countries.

Firms

- Reduced utilization rate (\$151 billion)
- Lost sales (\$82 billion)
- Self-generation costs (\$65 billion)
- Increased inventories
- More expensive localization choices
- Higher barriers for entry of new firms
- Less competition and innovation
- Labor-biased technologies

Household

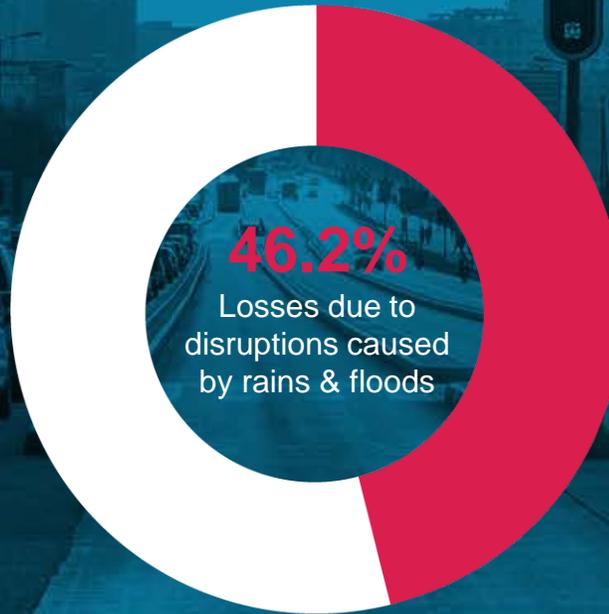
- Willingness-to-pay (\$90–\$343 billion)
- Health expenditures (\$3–\$6 billion)
- Income impact and gender implications



What fraction is caused by natural hazards? Zoom on Tanzania.



Transport



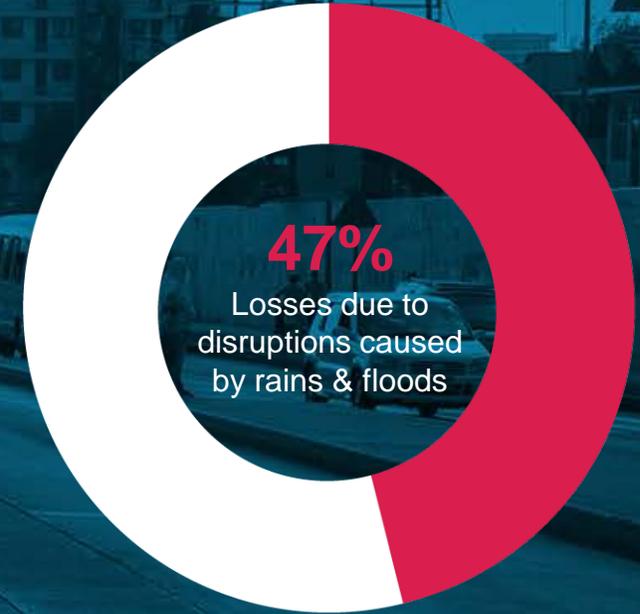
Total utilization losses per year:

\$640 million

Or 1.8 percent of GDP



Power



Weather-related losses per year:

\$250 million

Or 0.7 percent of GDP



Diagnosis



Solutions

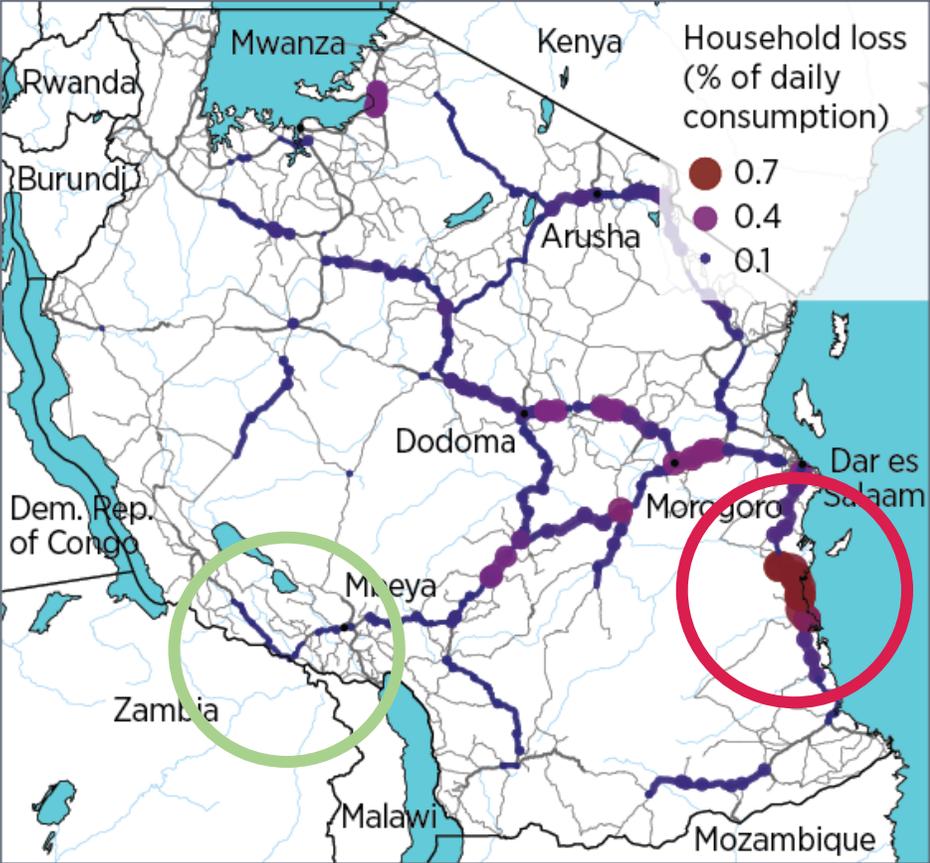


Recommendations

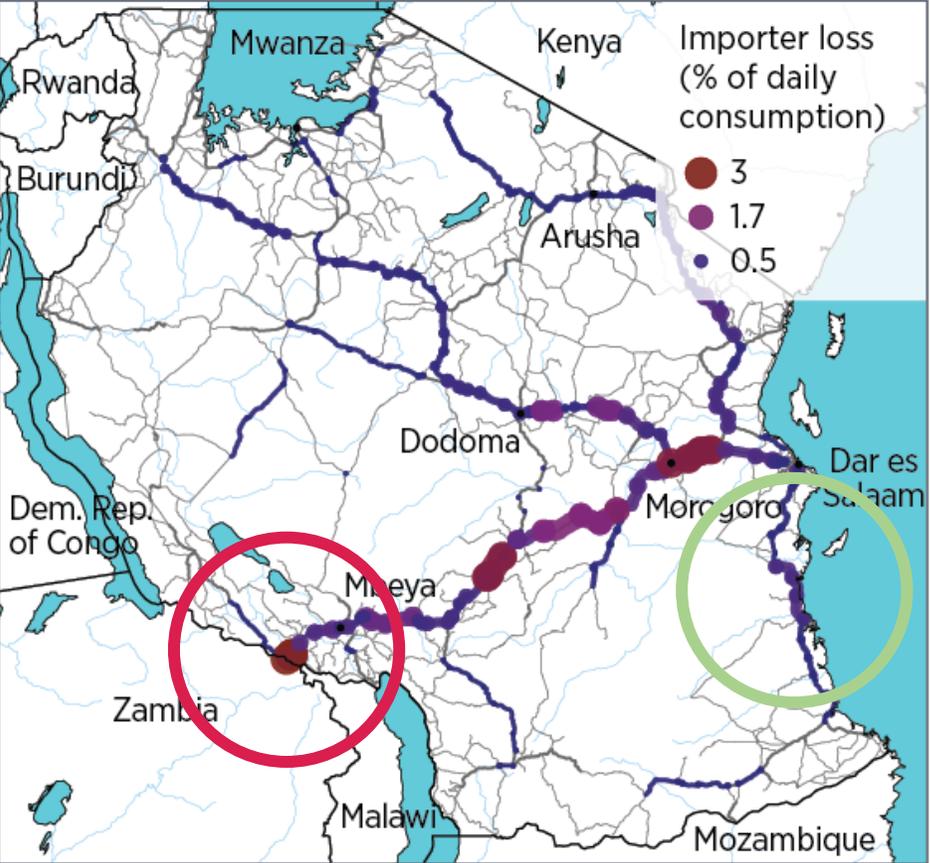
Investing in more resilient infrastructure is sound, profitable, and urgent

Criticality analyses show where strengthening is more important and beneficial

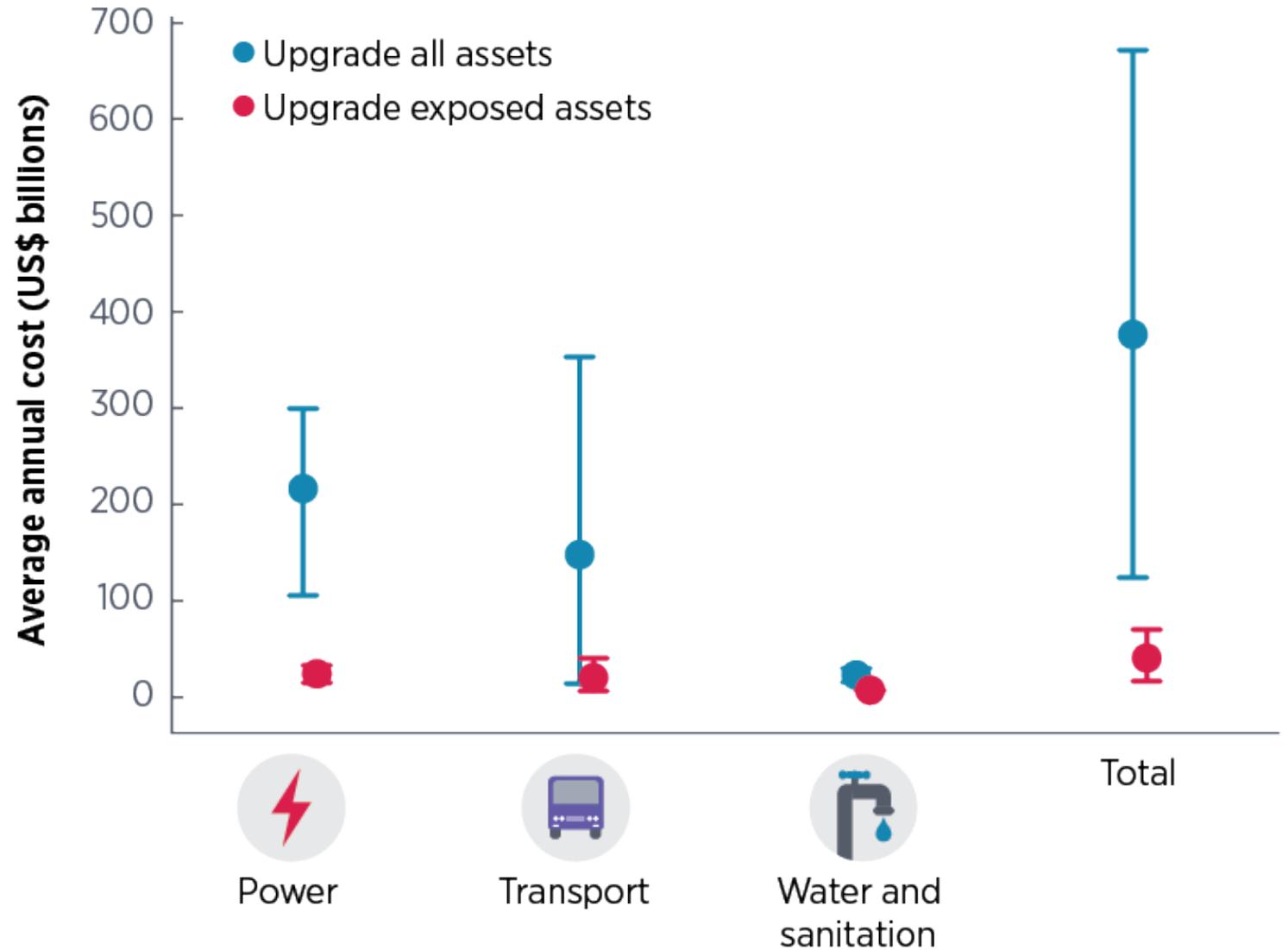
a. Impacts of disruption on households



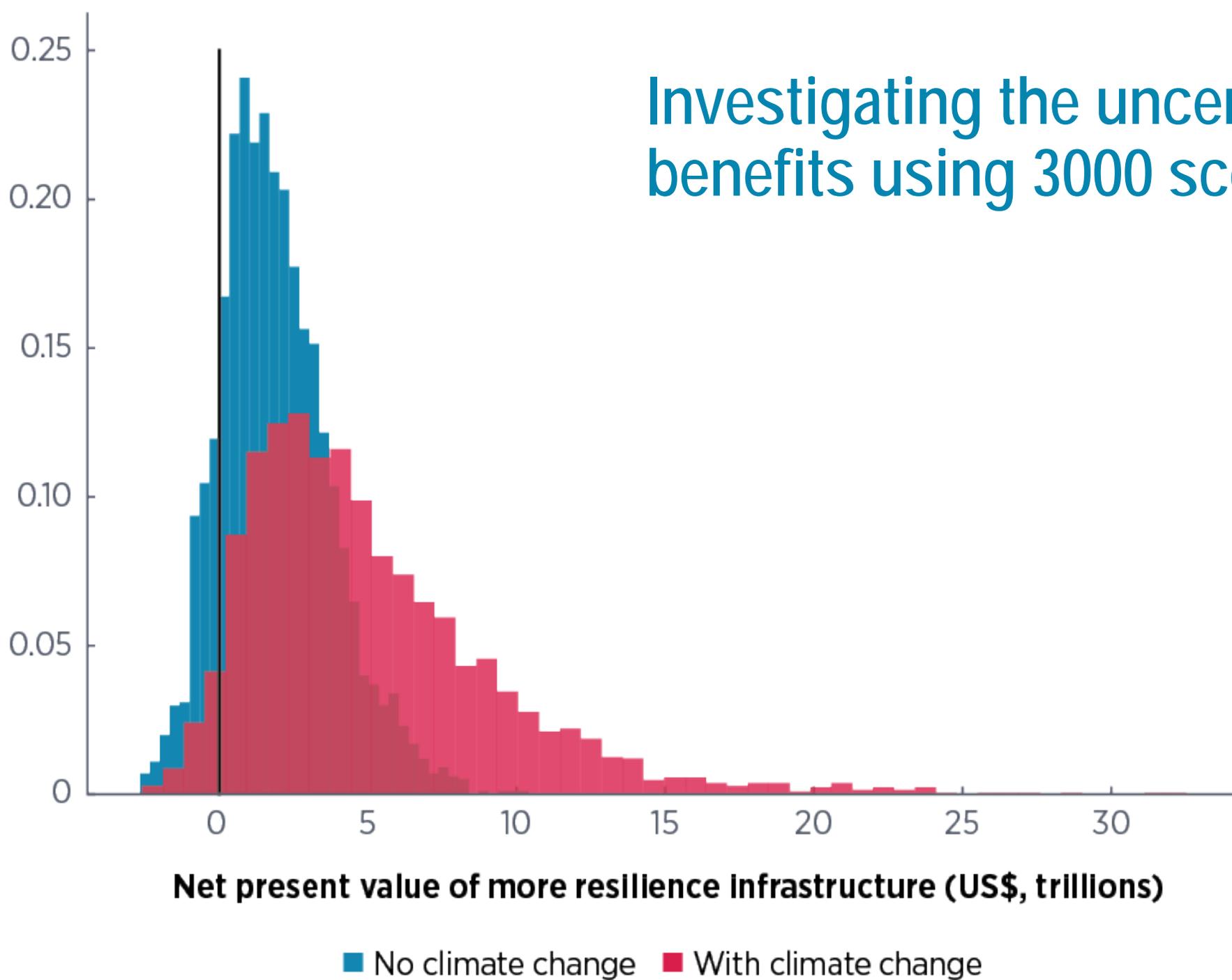
b. Impacts of disruption on international clients



With the right data, strengthening assets would cost \$11–\$65 billion per year—3 percent of total needs



Investigating the uncertainty on benefits using 3000 scenarios



Altogether: Investing in resilience is sound, profitable, and urgent

\$4

In net benefit for each \$1 invested in infrastructure resilience

\$4.2 trillion

Net benefit from building new infrastructure to higher resilience standards

\$100 billion

Cost of delaying action by one year





Diagnosis



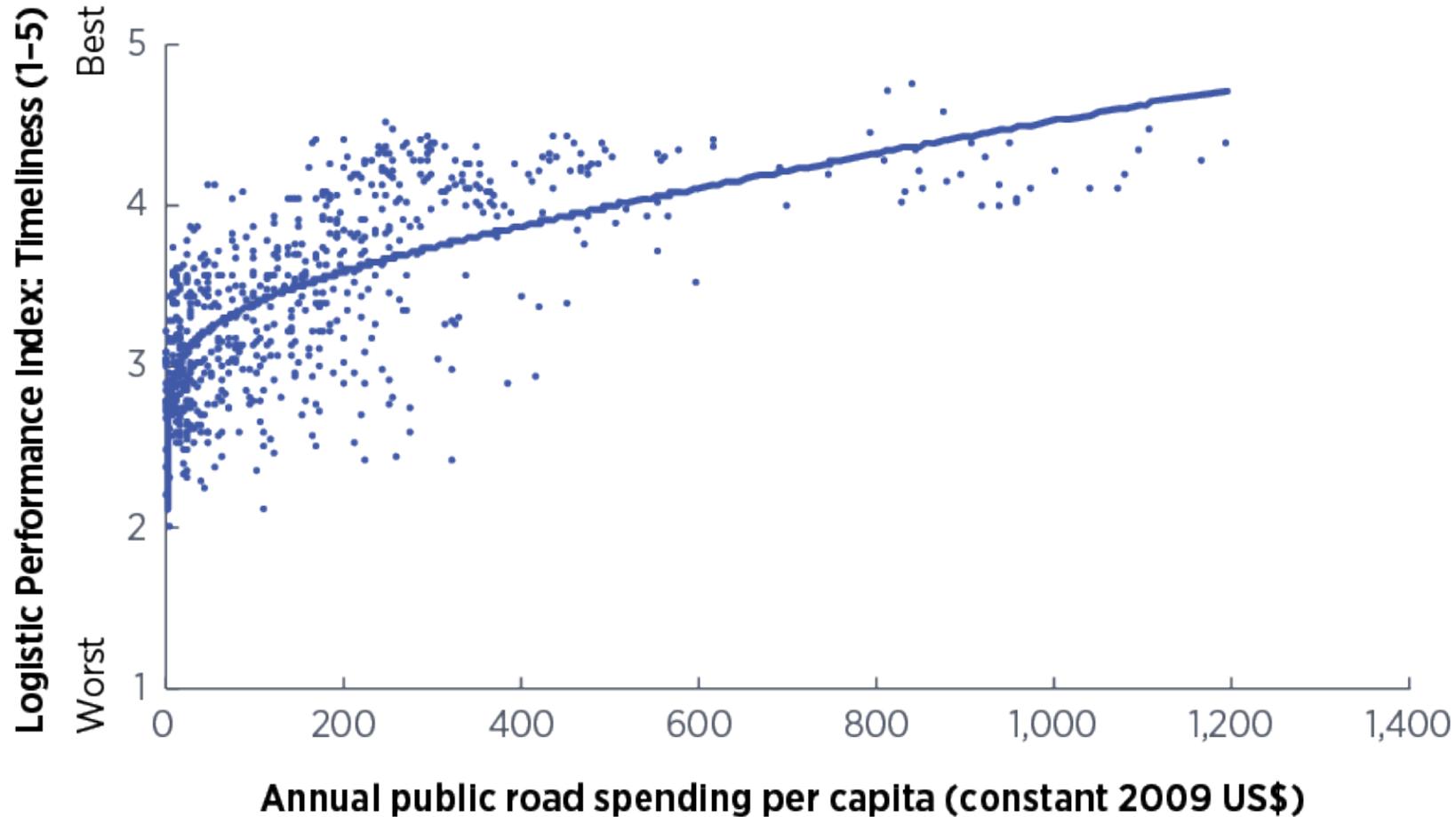
Solutions



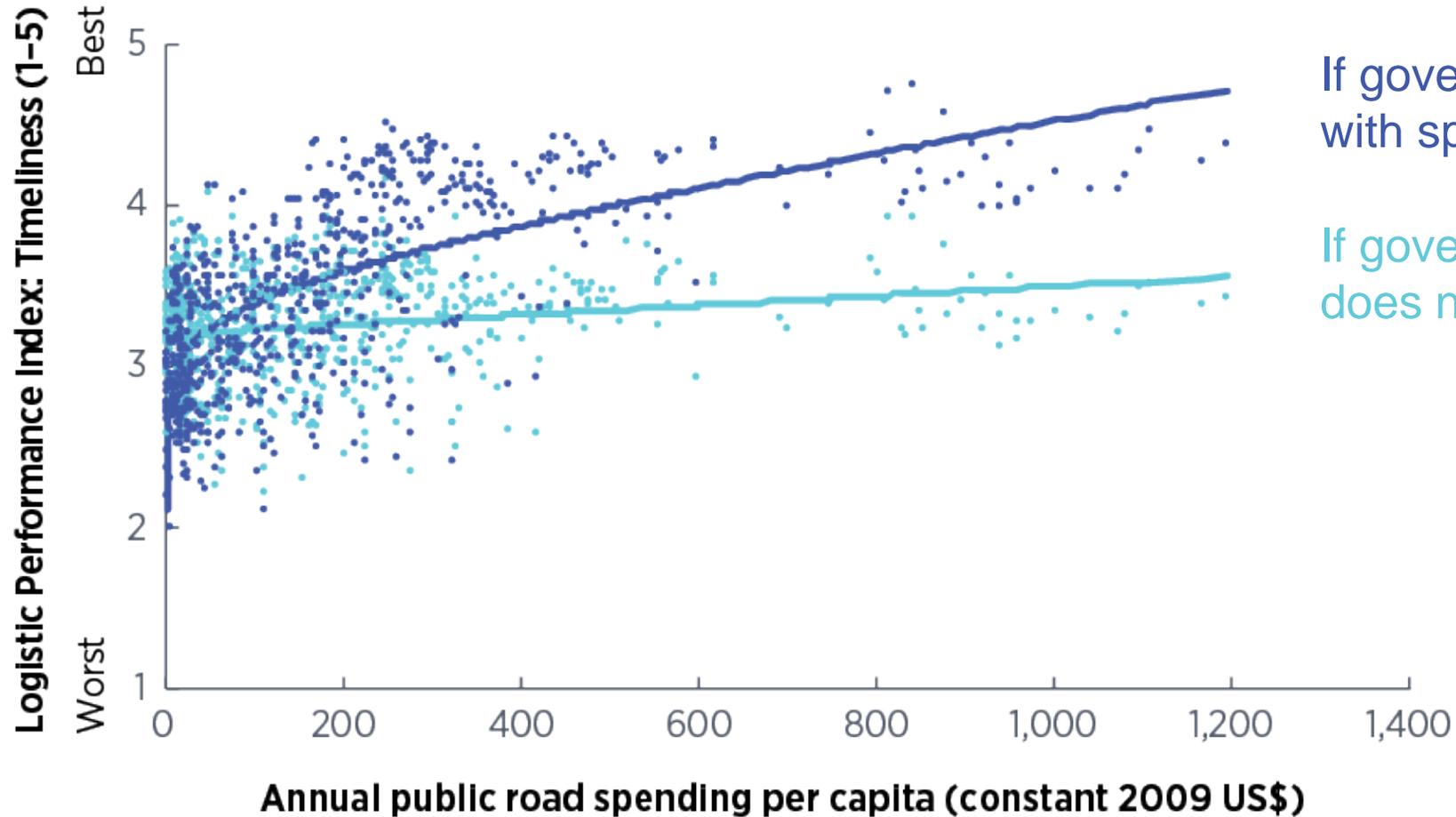
Recommendations

Good infrastructure management is the necessary basis for resilient infrastructure—but targeted actions are also needed.

Spending more improves the reliability of transportation systems ...



... but only if governance improves as well



If governance improves with spending

If governance does not improve

Priority areas for financial support—how can we spend better?

FULL INFRASTRUCTURE COSTS

COST TO REGULATORS AND GOVERNMENT

Master planning,
regulation design,
and enforcement

Data and model
development, research,
training, education

LIFECYCLE COST TO (PUBLIC OR PRIVATE) INFRASTRUCTURE SERVICE PROVIDERS

Project design
and preparation

Upfront
investment cost

Operational costs

Maintenance and
repair costs (and
decommissioning)

Priority areas for financial support—how can we spend better?

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For instance, \$1 invested in maintenance is worth \$1.5 in new investment

Team members

- The report has been prepared by a team led by Stephane Hallegatte, with Jun Rentschler and Julie Rozenberg.
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- **Engineering solutions and cost estimates:** Miyamoto International
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- **Sponsored by the Japan—World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries and the Global Facility for Disaster Reduction and Recovery (GFDRR).**

