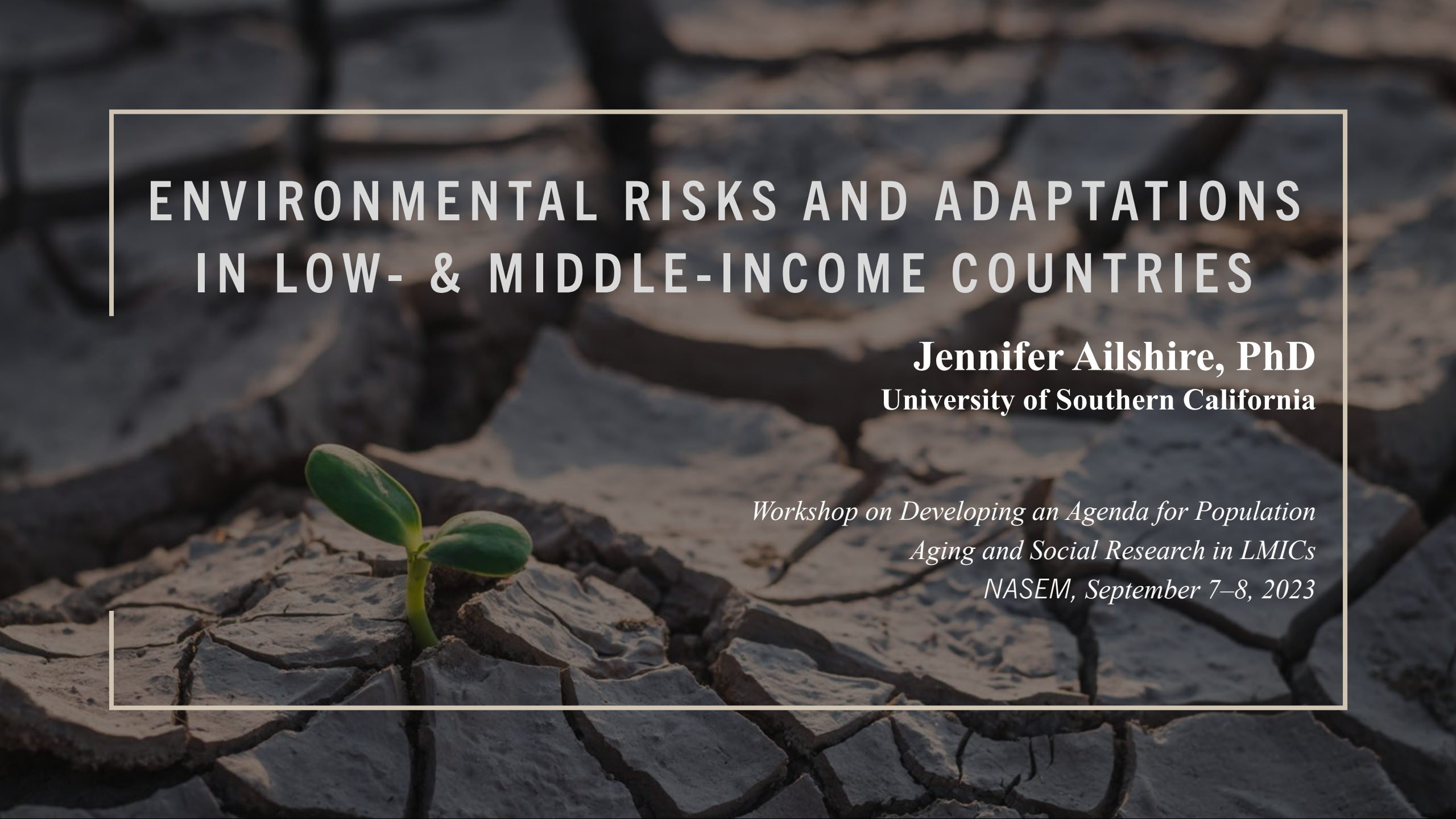


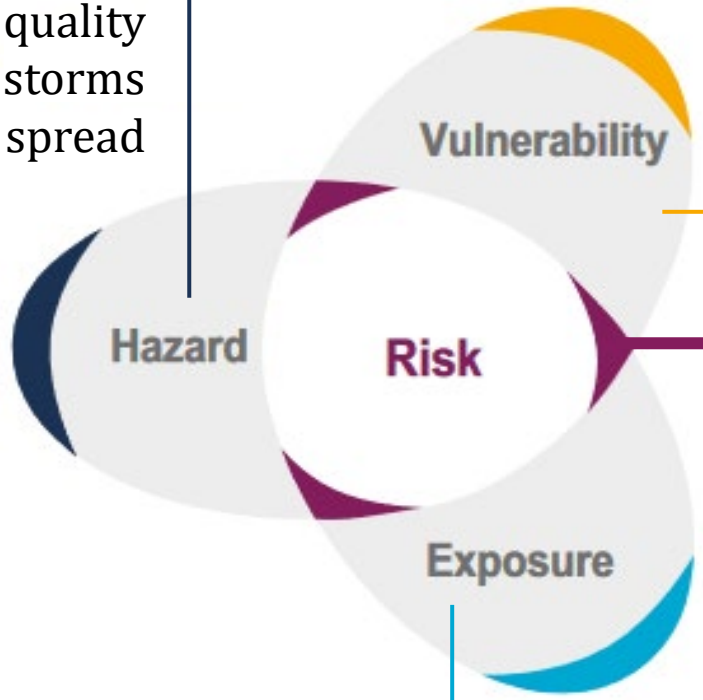
ENVIRONMENTAL RISKS AND ADAPTATIONS IN LOW- & MIDDLE-INCOME COUNTRIES

Jennifer Ailshire, PhD
University of Southern California

Workshop on Developing an Agenda for Population Aging and Social Research in LMICs
NASEM, September 7–8, 2023

Framework for Environmental Impacts on Health in LMIC's

Heat (drought)
Air, water, soil quality
Floods, storms
Vector spread



Age
Gender
Mobility
Preexisting conditions
Poverty
Migrant status

Outdoor labor
Housing quality
Location/local geography
Livelihood type

Outcomes

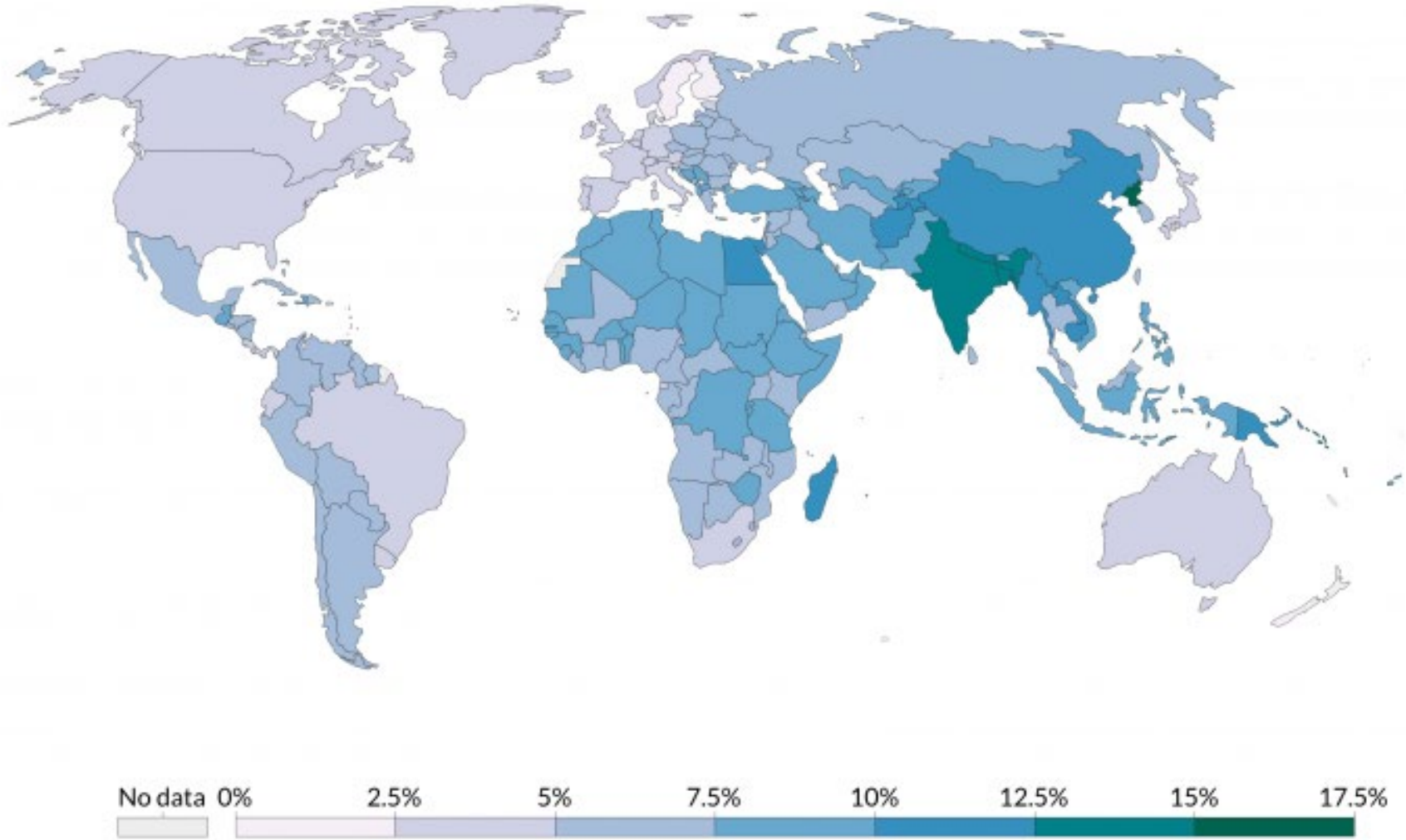
- Adverse health
  - chronic health problems
  - heat related illness
  - infectious disease
  - mental health
  - mortality
- Loss of economic livelihood
- Migration /displacement
- Community loss/disruption

Adapted from: IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability

Share of deaths from air pollution, 2017

Share of deaths which are attributed to total air pollution – outdoor and indoor – as a risk factor.

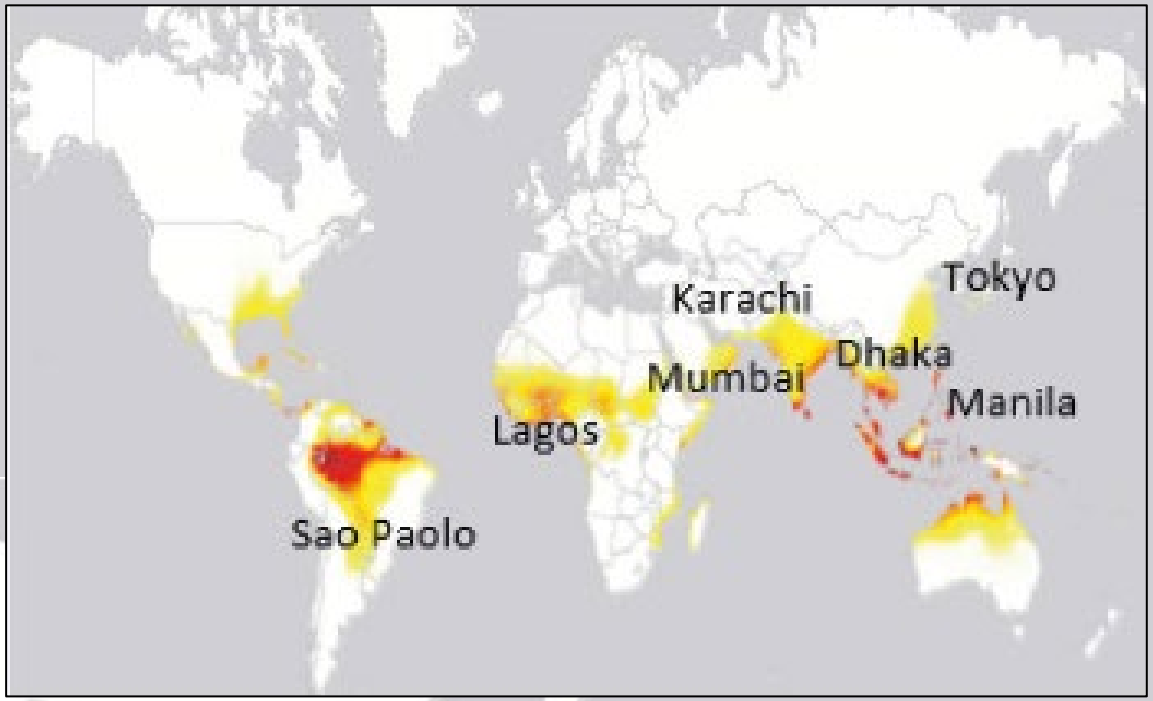
Our World in Data

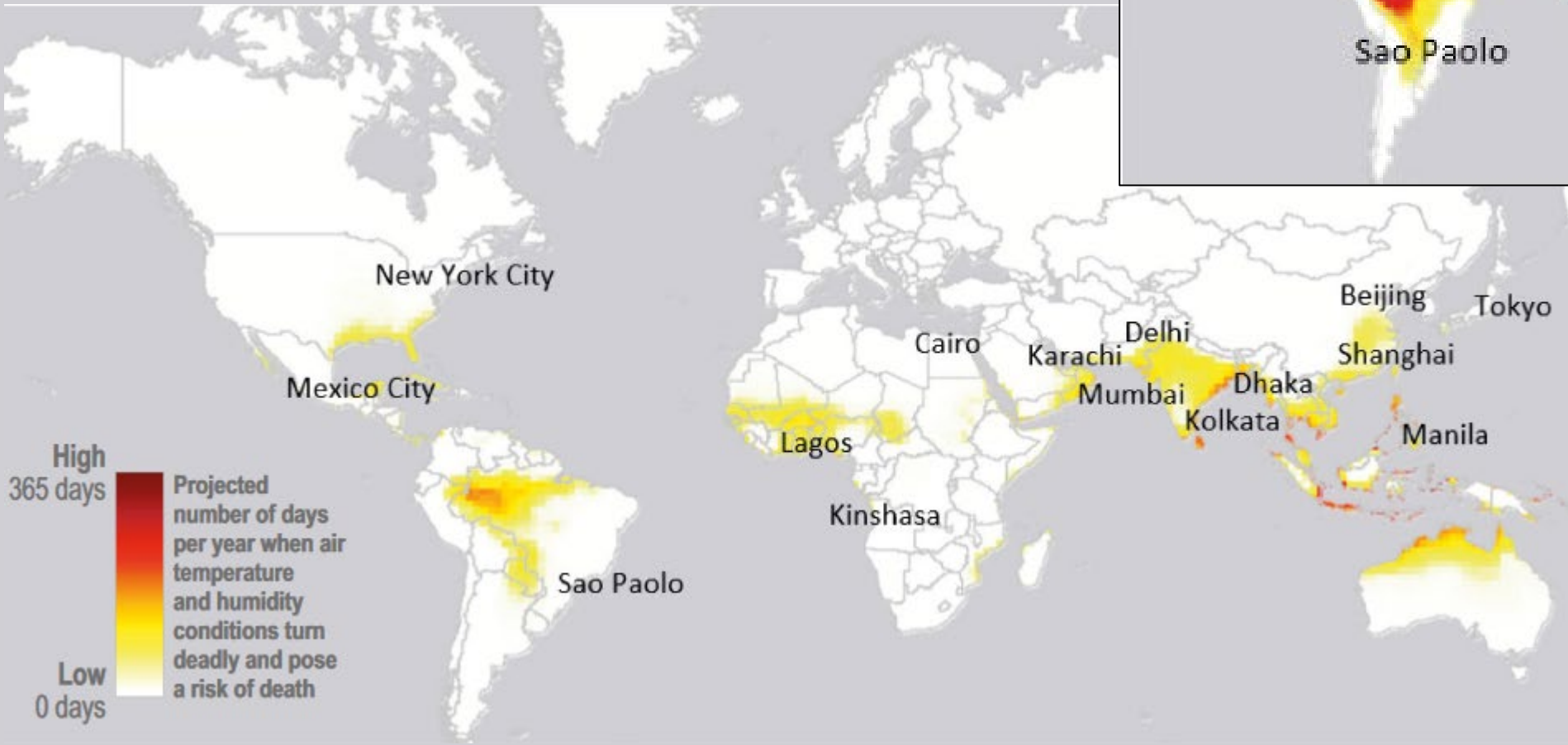


Source: IHME, Global Burden of Disease

Global distribution of population exposed to hyperthermia from extreme heat and humidity

2020 and 2050 (mid-range GHG scenario)





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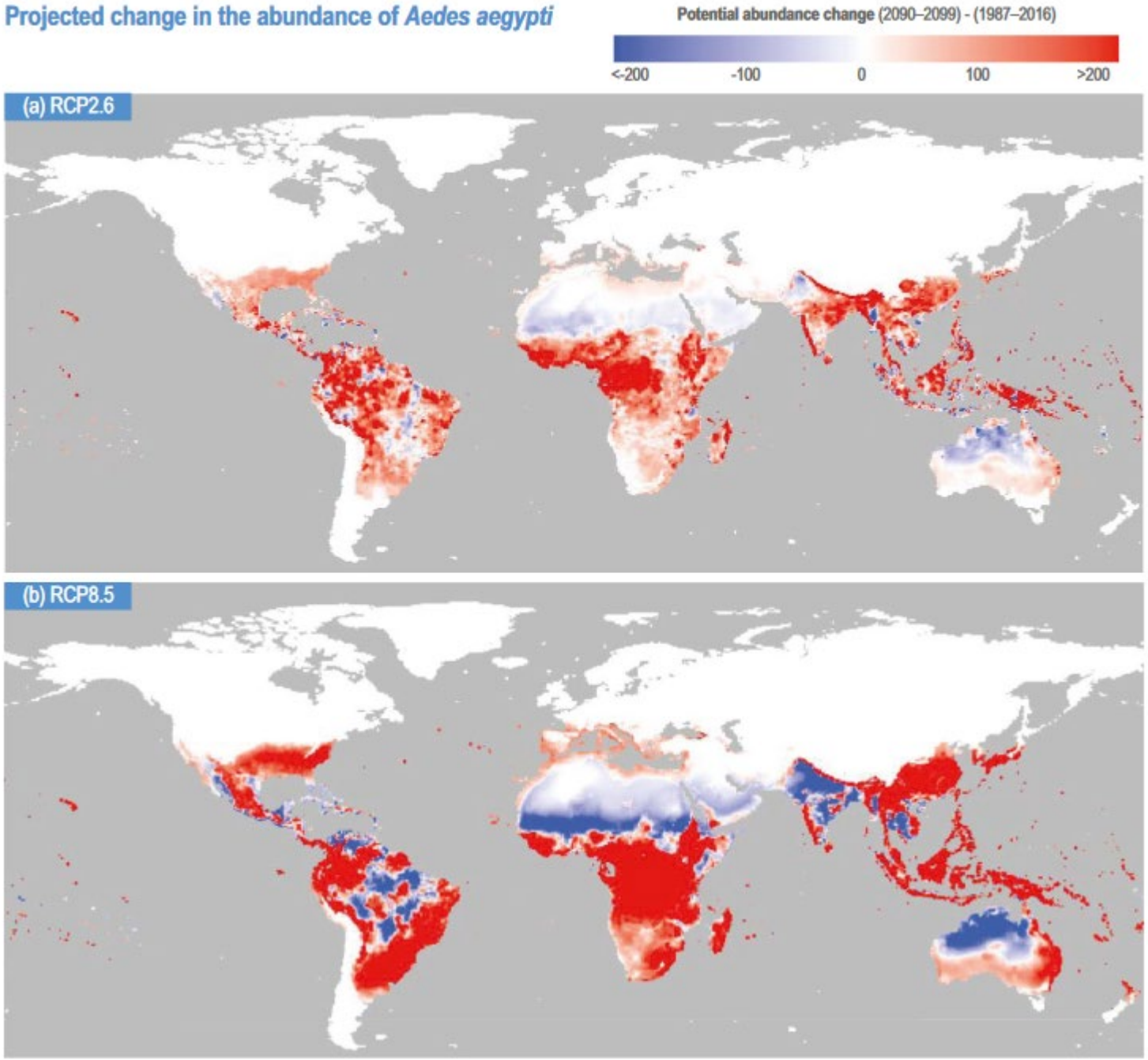

LMICs will likely bear increasingly larger burden of mosquito-born illness (e.g. zika, dengue, yellow fever)

RCP 2.6 is low scenario for greenhouse gas concentrations
RCP 8.5 is the highest scenario

Source: IPCC, 2022

Challenges particular to LMICs

- Economies are developing → **increased environmental hazards**
  - More pollution from urbanization and industrialization
- Lack of urban planning/standards → **at-risk housing & communities**
  - Housing and settlements built poorly and in unsafe places
- Population works outdoors → **increased exposure**
  - Agricultural work, labor informality
- Inadequate health care systems → **increased vulnerability**
  - Quickly overburdened with environmental challenges
- Insufficient wealth to invest in technologies → **poor adaptation**
  - Cooling to buffer against impacts of extreme heat/humidity

Challenges particular to older adults in LMICs

- Greater health burden which exacerbates adverse environmental impacts
- Lack of access to health care
- Limited social protection programs targeted towards older adults
- Urbanization/economic development changes family configurations
- Inadequate economic resources for recovery in event of environmental adversity

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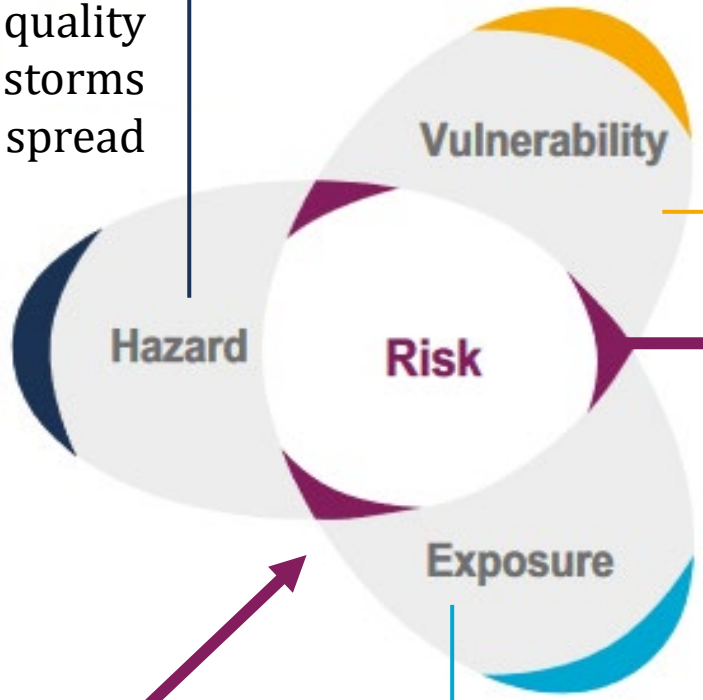

Outcomes

- Adverse health
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Resilience/Adaptation

Outdoor labor
Housing quality
Location/local geography
Livelihood type

Adapted from: IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability

Opportunities for resilience (adaptation) in LMICs

Resilience/Adaptation:
"Human vulnerability is influenced by the adaptive capacity of physical (built) structures, social processes (economic, well-being and health) and institutional structures (organisations, laws, cultural and political systems/norms)."
(IPCC2022)

- Early warning systems
- Urban development
- Rural investment
- Resilient transportation infrastructure
- Increase capacity of health care systems
- Insurance schemes
- Uptake of innovative technologies
- Family and community supports

Example: Road Conditions & Weather

Hazard: rain
Exposure: location, livelihood type
Vulnerability: age, gender, mobility, poverty

World Bank project in India to improve roads to connect villages

At risk of making travel difficult (or impossible if washed out) during wet season.

Improves access to education, health care, and economic opportunities.
More resilient to weather conditions.

Research Challenges & Opportunities

- Data on environmental conditions
  - Environmental data may be sparse in LMIC settings
  - Typical administrative data does not have adequate coverage
  - Surveys can innovate (e.g., personal air pollution monitors, interviewer observations of environmental conditions)

Environmental data can be limited in LMICs

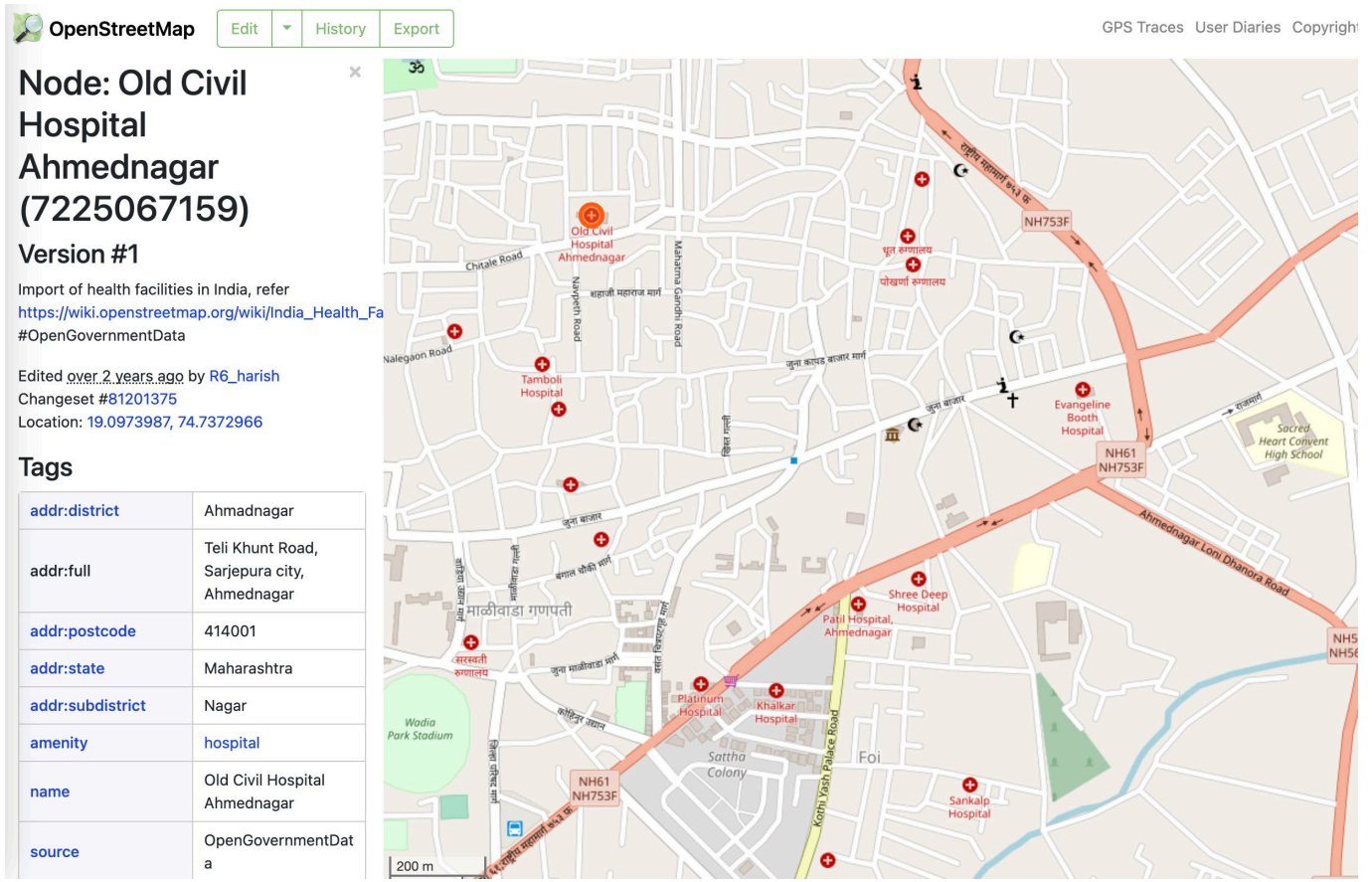
Use of satellite data and other data capture systems like google street view

Aerial Images from Satellites

Google Street View

Open street map provides a lot of useful information

- Open geographical data, including a variety of map features
  - Roads and their types
  - Building outlines (mostly for urban areas)
  - Points of interest
  - Land-use functions



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- Conceptualization of environmental impacts
  - Risk for poor outcomes results from interaction of hazard, exposure, vulnerability – but these will differ across settings
  - Need content and context experts to think about measuring environments and modelling effects

Research Challenges & Opportunities

- Modeling considerations
  - Timing and duration of exposures
  - Heterogeneity in exposure, risk, and impacts
  - Multiple exposures
  - Synergistic impacts between physical and social environmental hazards and stressors