



**Conferência sobre o
Impacto das Mudanças
Climáticas na Saúde**

The importance and challenges of addressing non-communicable diseases in the setting of climate-induced disasters

Saria Hassan, MD, MPH

*Associate Vice Chair of Research, General Internal
Medicine, Department of Medicine, Emory
University School of Medicine*

Data: 11/02/2023





The importance and challenges of addressing non-communicable diseases in the setting of climate-induced disasters

Conference on the Impact of Climate Change on Health
November 2, 2023 | Maputo

Saria Hassan, MD, MPH

Assistant Professor

Department of Medicine, Emory School of Medicine

Hubert Department of Global Health, Rollins School of Public Health

 @DrSariaHassan

NIH/NHLBI: K23HL152368

Speaker Disclosures

- Relevant Financial Relationships

None

- Relevant Non-Financial Relationships

None

Take Home Points

- Climate change is a critical driver of noncommunicable disease disparities world-wide
- Persons with non-communicable diseases are among the most vulnerable to the impact of climate change
- A multi-level approach is needed to address the needs of persons living with NCDs in the setting of disasters

Outline

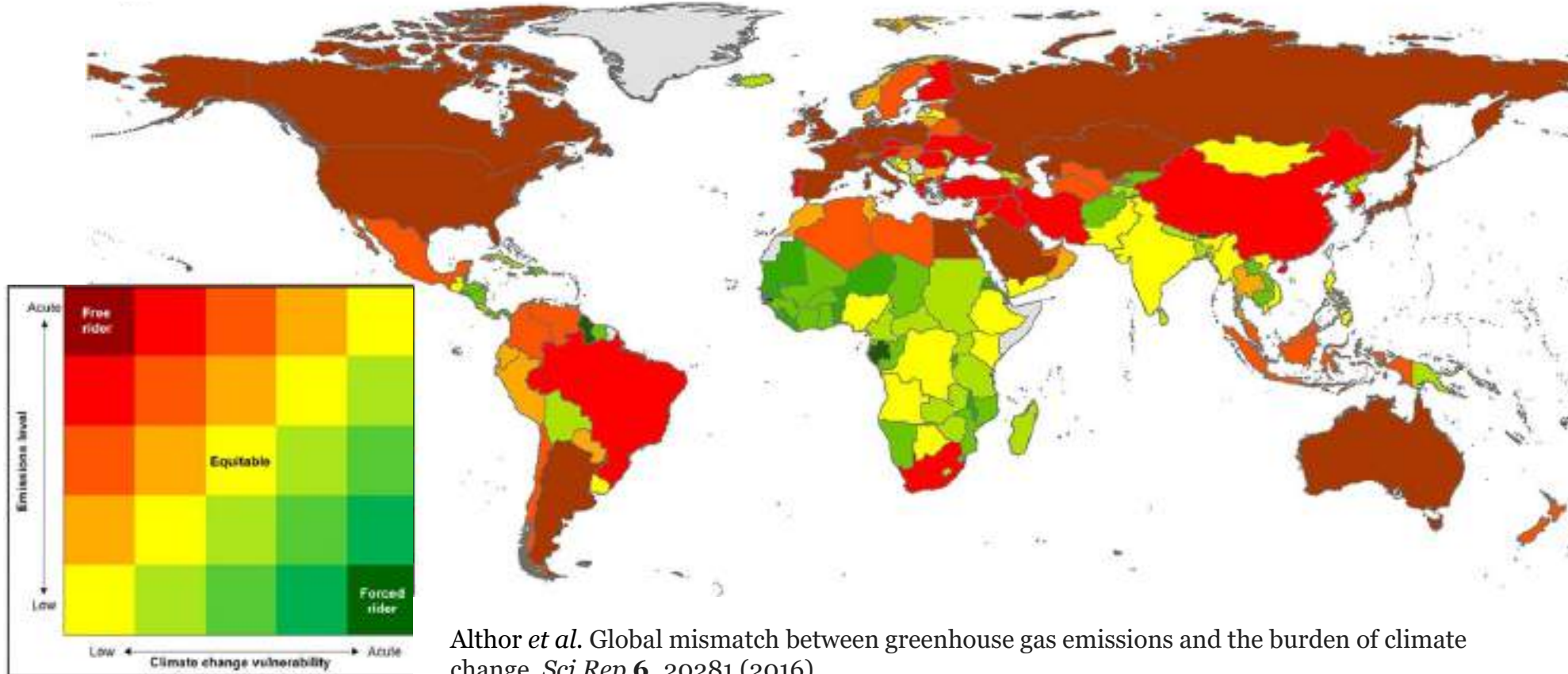
- Discuss climate change inequity and NCD disparities
- Understand that vulnerability to the impact of climate change on health is a function of exposure, sensitivity, and adaptive capacity
- Describe evidence from other parts of the world on the impact of climate-induced disasters on NCD morbidity and mortality
- Discuss strategies to address NCD needs in disasters in Mozambique

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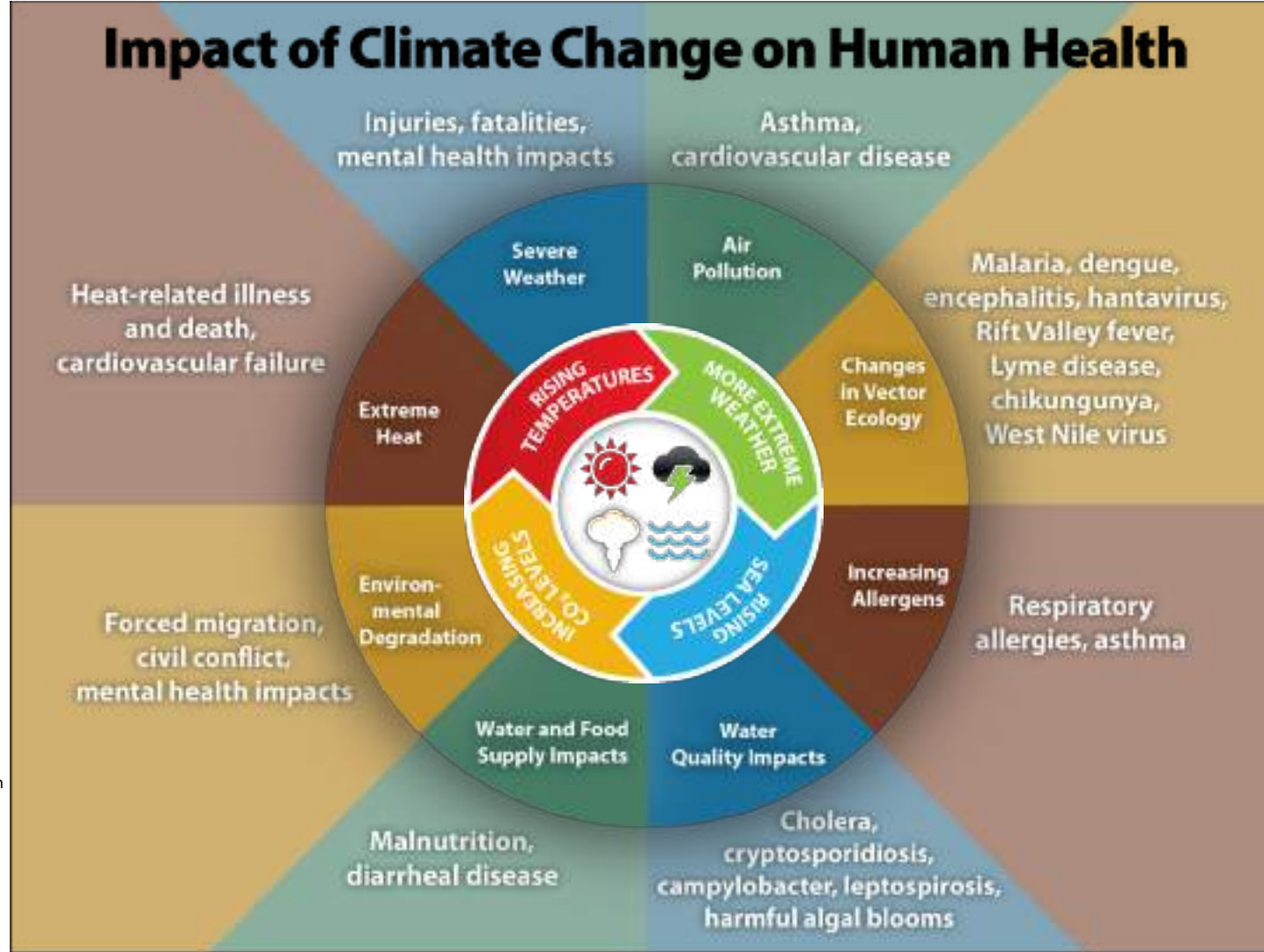
The Inequitable Effects of Climate Change

Global mismatch between greenhouse gas emissions and the burden of climate change



Althor *et al.* Global mismatch between greenhouse gas emissions and the burden of climate change. *Sci Rep* 6, 20281 (2016)

Impact of Climate Change on Human Health



PREPARING FOR
THE REGIONAL HEALTH
IMPACTS OF
CLIMATE CHANGE
IN THE UNITED STATES,
CDC Climate and Health
Program
July 2020 report
https://www.cdc.gov/climateandhealth/docs/Health_Impacts_Climate_Change_508_final.pdf

EXPOSURE

Exposure is contact between a person and one or more biological, psychosocial, chemical, or physical stressors, including stressors affected by climate change.

SENSITIVITY

Sensitivity is the degree to which people or communities are affected, either adversely or beneficially, by their exposure to climate variability or change.

ABILITY TO ADAPT

Adaptive capacity is the ability of communities, institutions, or people to adjust to potential hazards such as climate change, to take advantage of opportunities, or to respond to consequences.



VULNERABILITY

of Human Health to Climate Change

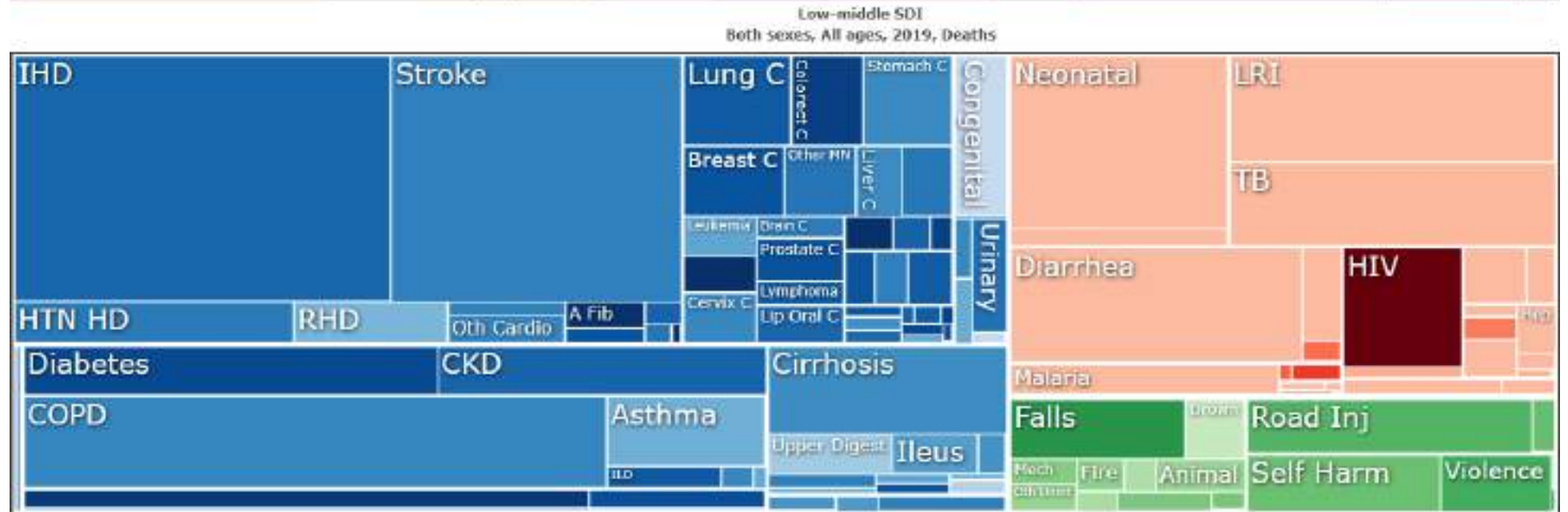
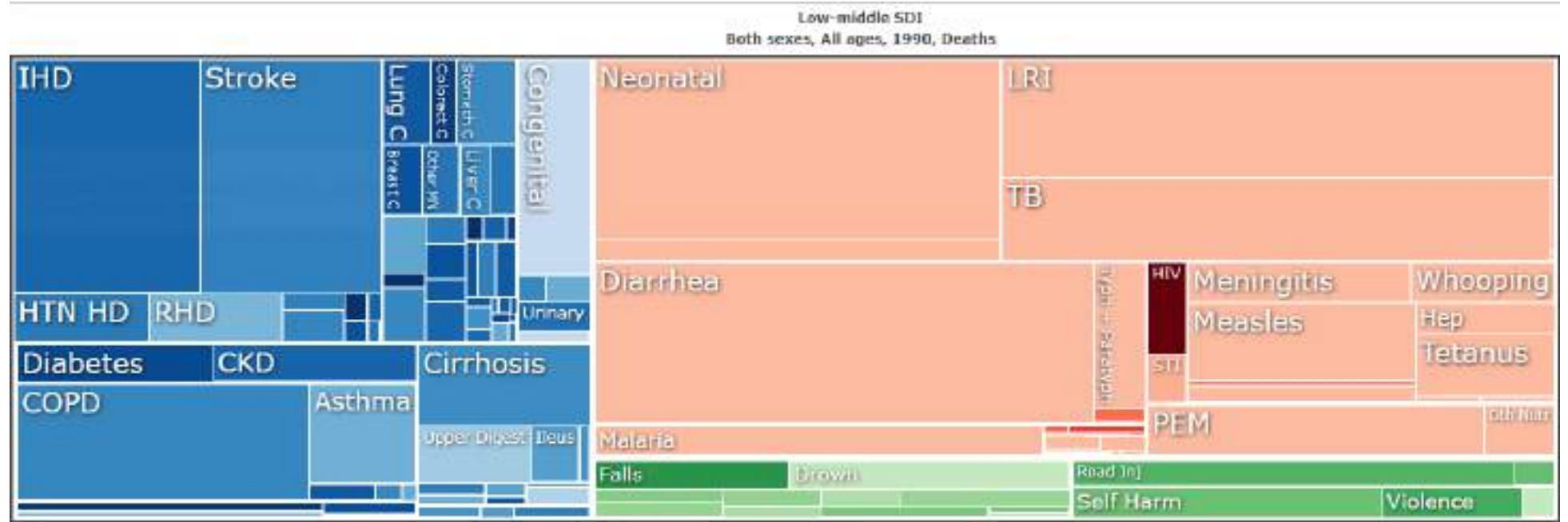


HEALTH OUTCOMES

Injury, acute and chronic illness (including mental health and stress-related illness), developmental issues, and death.

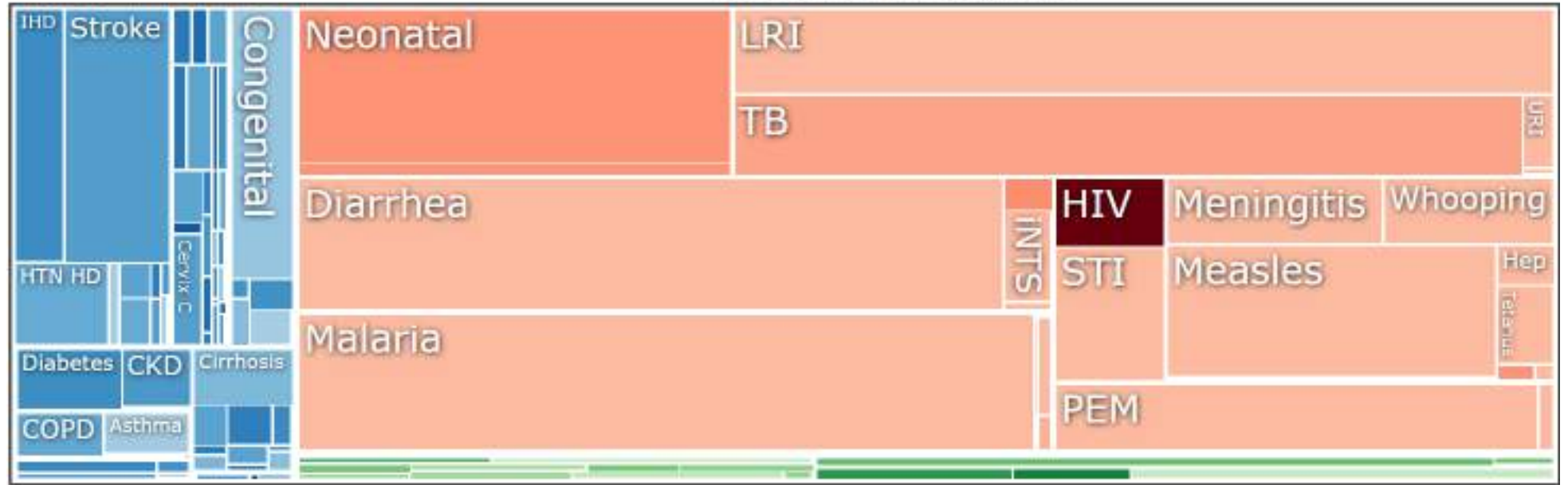
Back to Global Health Inequities

80% of pre-mature mortality due to NCDs occurs in LMICs

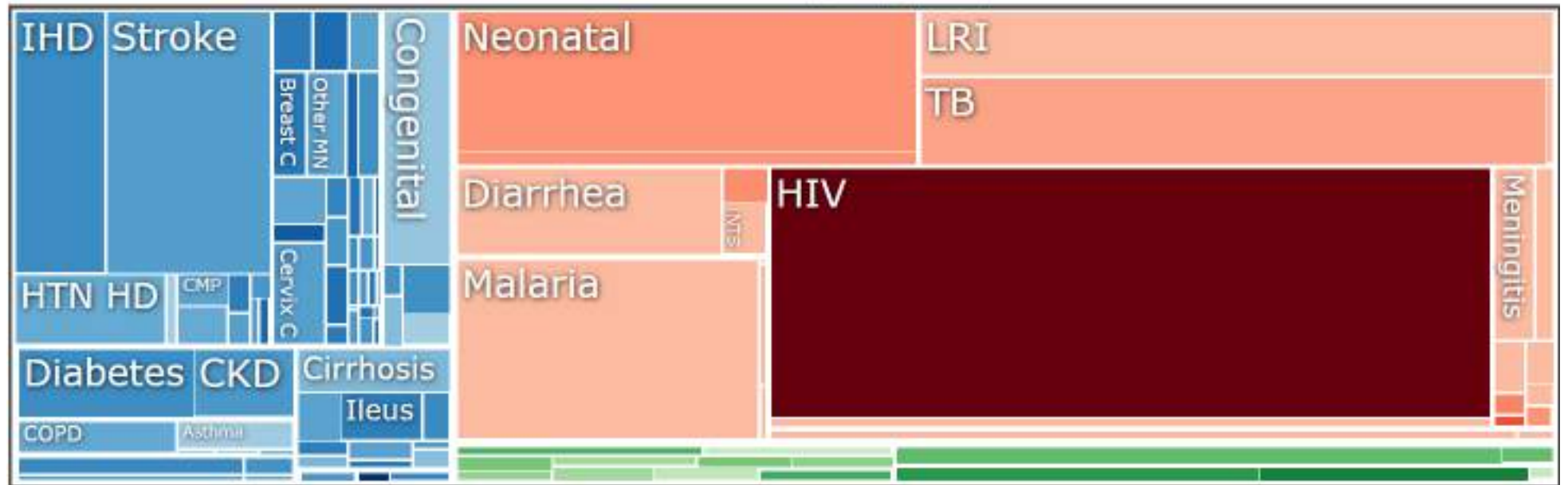


Epidemiologic transition in Mozambique

Mozambique
Both sexes, All ages, 1990, Deaths



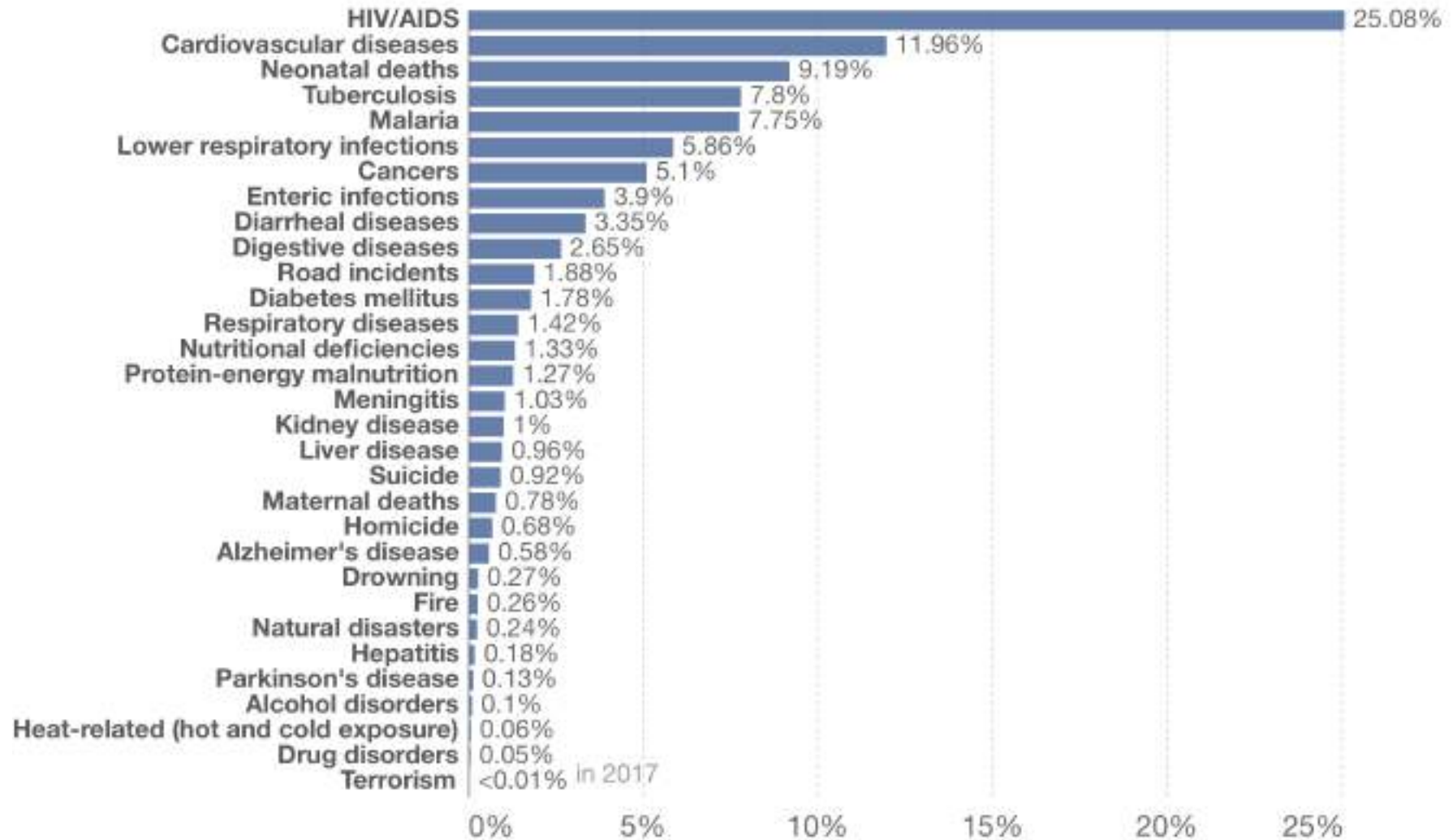
Mozambique
Both sexes, All ages, 2019, Deaths



Epidemiologic transition in Mozambique

Share of deaths by cause, Mozambique, 2019

Data refers to the specific cause of death, which is distinguished from risk factors for death, such as air pollution, diet and other lifestyle factors. This is shown by cause of death as the percentage of total deaths.



Source: IHME, Global Burden of Disease (2019)

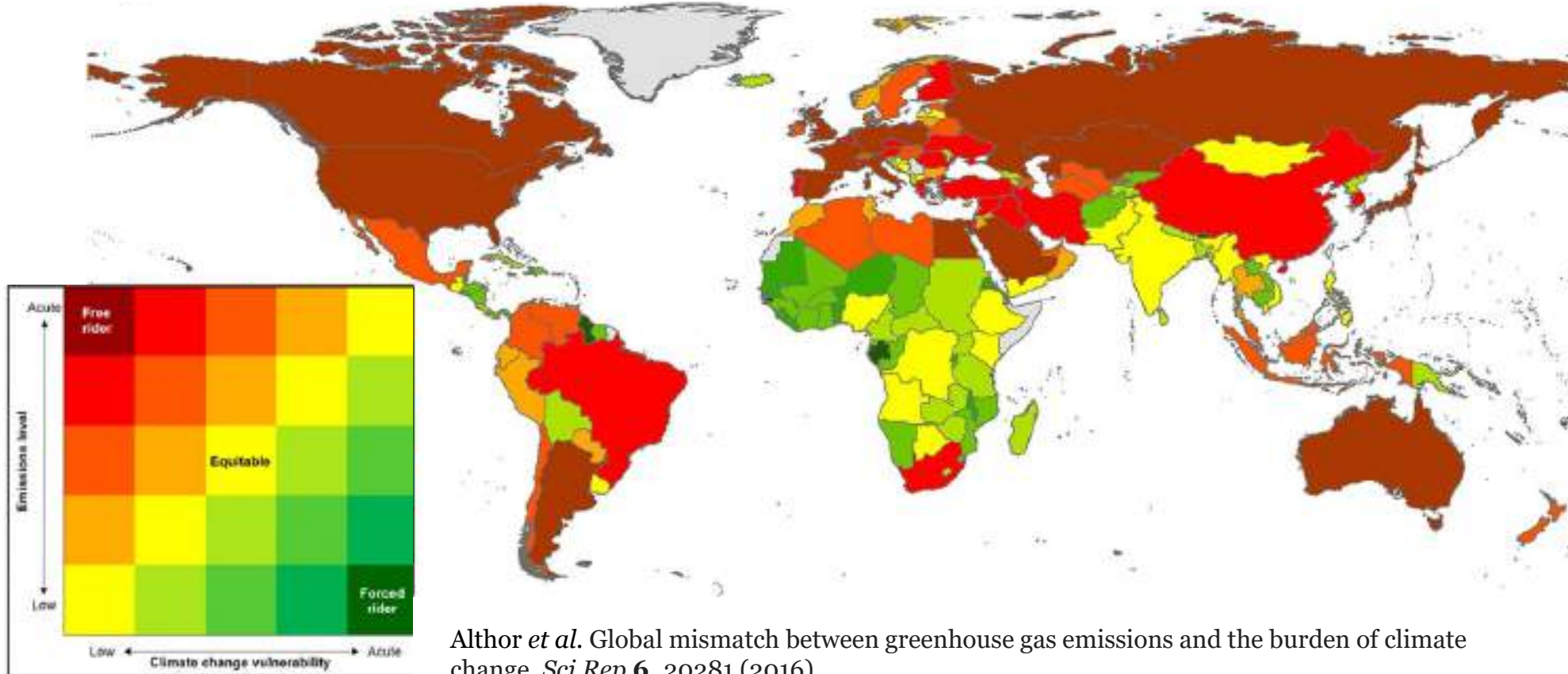
Climate Change and Non-Communicable Diseases

Table 1 The direct and indirect pathways from climate change to NCDs^a

Climate change impacts	Pathway from climate change to NCDs	NCD outcome	Direction of health risk
<i>Direct</i>			
More frequent and increased intensity of heat extremes	Heat stress	CVD Respiratory disease	Increased risk
Increased temperatures and less rainfall	Higher ground-level ozone and other air pollutants	CVD Respiratory disease (e.g., bronchitis, asthma)	Increased risk
	Increases in airborne pollens and spores	Respiratory disease (e.g., bronchitis, asthma)	Increased risk
Changes in stratospheric ozone and in precipitation and cloud coverage	Increased exposure to solar UVR	Autoimmune diseases (multiple sclerosis)	Reduced risk
Higher winter temperatures in temperate latitudes		CVD Respiratory disease	Reduced risk
Extreme weather event (fires, floods, storms)	Structural damage	Injuries	Increased risk
<i>Indirect</i>			
Drought, flooding	Impaired agriculture, reduced food yields, and nutrition insecurity	Poor general health	Increased risk
Extreme weather event (fires, flooding, storms)	Trauma	Mental health (posttraumatic stress disorder)	Increased risk
Extreme weather event (fires, flooding, storms)	Impaired livelihood, impoverishment	Mental health (anxiety/depression)	Increased risk

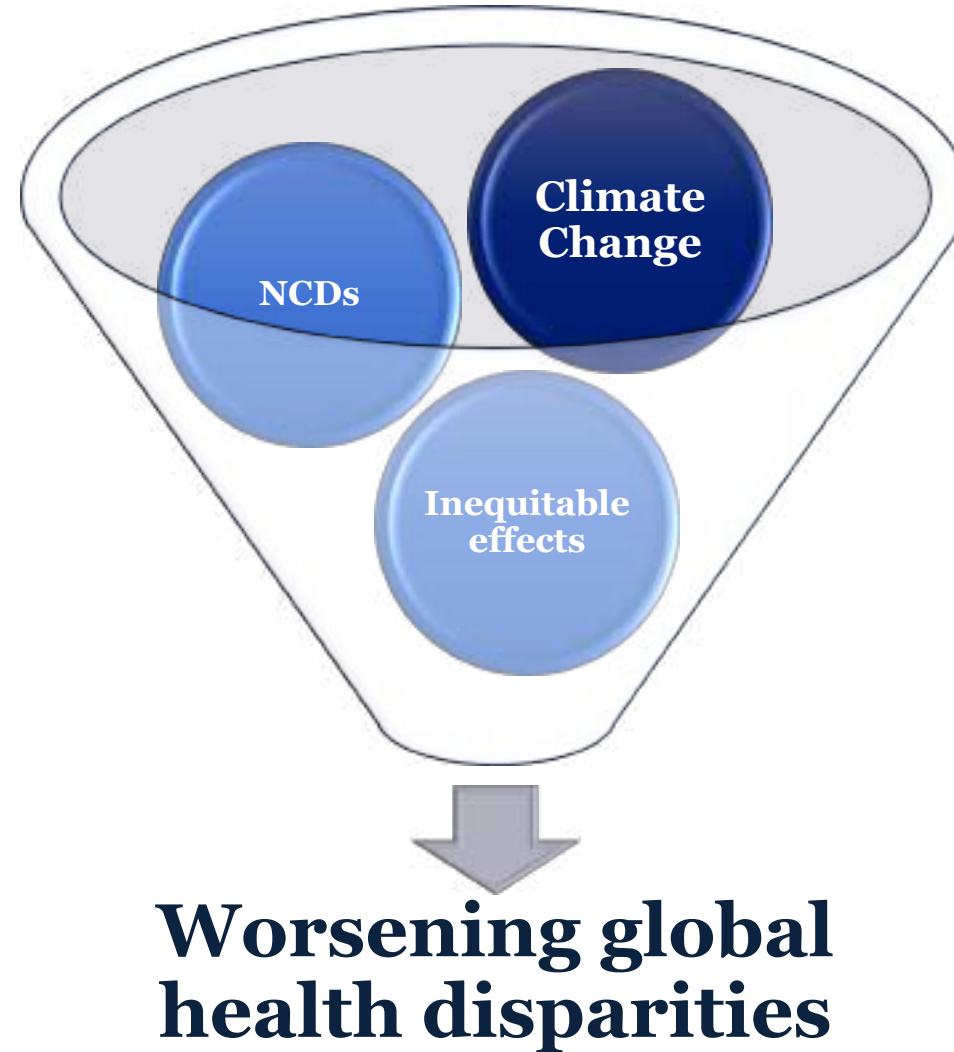
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Climate Change & NCDs: A new “double burden”



**Worsening global
health disparities**

Outline

- Discuss climate change inequity and NCD disparities
- Understand that vulnerability to the impact of climate change on health is a function of exposure, sensitivity, and adaptive capacity
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- Describe a path forward to address NCD needs in disasters in Mozambique

“Climate change affects us all, but it does not affect us all equally. Those who are least able to cope are being hit hardest”

Ban Ki-Moon 2013

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VULNERABILITY

of Human Health to Climate Change



HEALTH OUTCOMES

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Climate-induced severe weather events: Cyclones



Cyclone Idai; Beira, Mozambique 2019

Figure 1 in IPCC, 2021: Chapter 11. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1513–1766, doi: [10.1017/9781009157896.013](https://doi.org/10.1017/9781009157896.013).

FAQ 11.2: Will climate change cause unprecedented extremes?

Yes, in a changing climate, extreme events may be unprecedented when they occur with...



Larger magnitude



Increased frequency



New locations



Different timing



New combinations (compound)

New types of unprecedented extremes that will occur as a result of climate change.

Figure 1 in IPCC, 2021



**Hurricane Maria
(2017) Puerto Rio**



**Hurricane Irma (2017)
batters the Virgin Islands**



**Hurricane Dorian (2019)
batters the Bahamas**

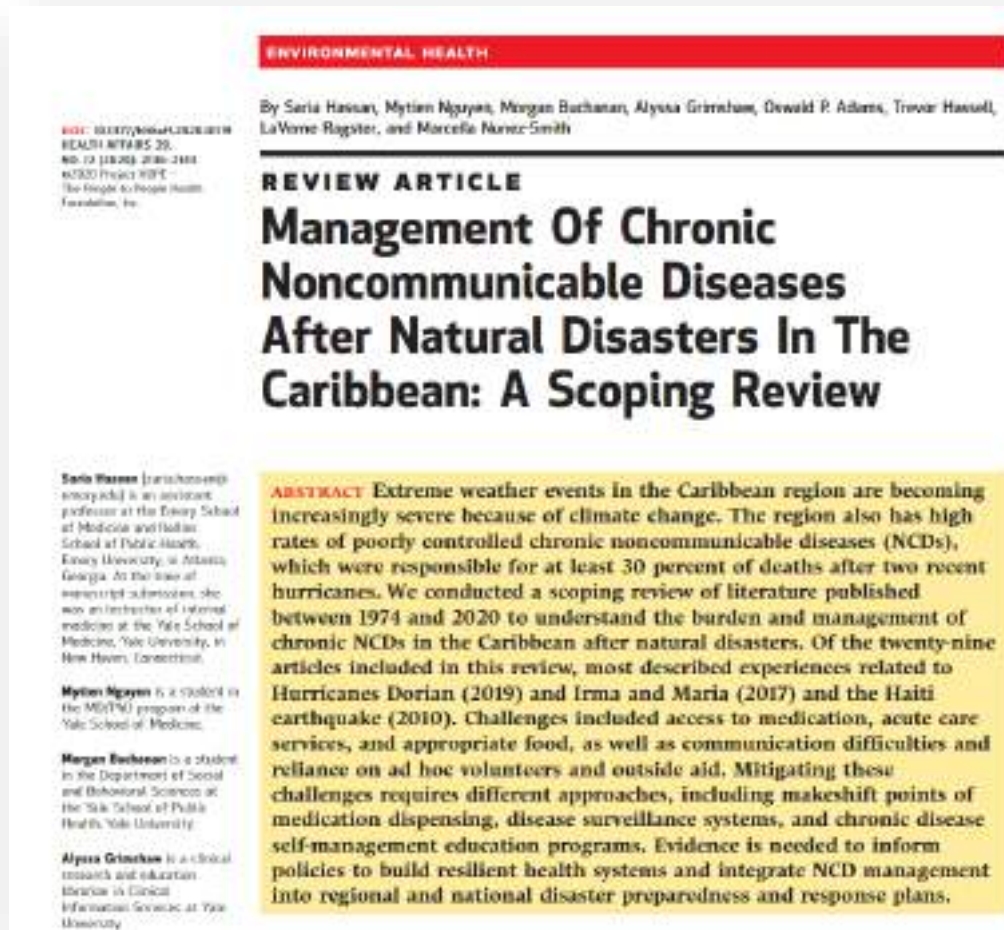
Disasters and NCDs

- At least 30% of deaths after Irma/Maria due to uncontrolled NCDs
- Non-communicable diseases
 - 7% increase in stroke, 22% increase in MI after floods/storms (Salunier *et al*, 2017)
 - One year after Katrina, 47% increase in mortality due to NCDs (Ryan *et al*, 2015)
 - Diabetes, CVD, neurologic problems constituted 59.8%, 13.3%, 10% of visits to health center after hurricane Maria/Irma (Schnall *et al*, 2019)
 - 35% of confirmed deaths in Florida/Georgia/NC after Irma due to existing medical condition exacerbation (Issa *et al*, 2018)

Disasters and NCDs

- Mental health disorders
 - Six months after hurricane Maria, rates of PTSD among Puerto Ricans displaced to Florida and still in Puerto Rico was high at 65.7% and 43.6% respectively (Scaramutti *et al*, 2019)
 - 17.8% of deaths after hurricane Irma associated with NCDs were due to exacerbation of underlying mental health disorder (Issa *et al*, 2018)
 - Depression associated with 33% higher risk of hospitalization and mortality after hurricane Katrina (Edmondson *et al*, 2013)

Mortality due to NCDs after Disasters: Why?



- Disrupted health care systems
 - Limited access to medication
 - No access to acute care services
 - No medical records
- Communication challenges
- Mental health challenges
- Reliance on adhoc volunteers
- Access to Clean water and Access to healthy food
 - Inadequate quantity
 - Poor quality

“Evidence is needed to inform policies to build resilient health systems and integrate NCD management into national and regional disaster preparedness and response plans”

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VULNERABILITY of Human Health to Climate Change

HEALTH OUTCOMES

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Evidence to Practice Gap

CHALLENGES

- Disrupted health care systems
 - Limited access to medication
 - No access to acute care services
 - No medical records
- Communication challenges
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- Reliance on adhoc volunteers
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EVIDENCE TO PRACTICE

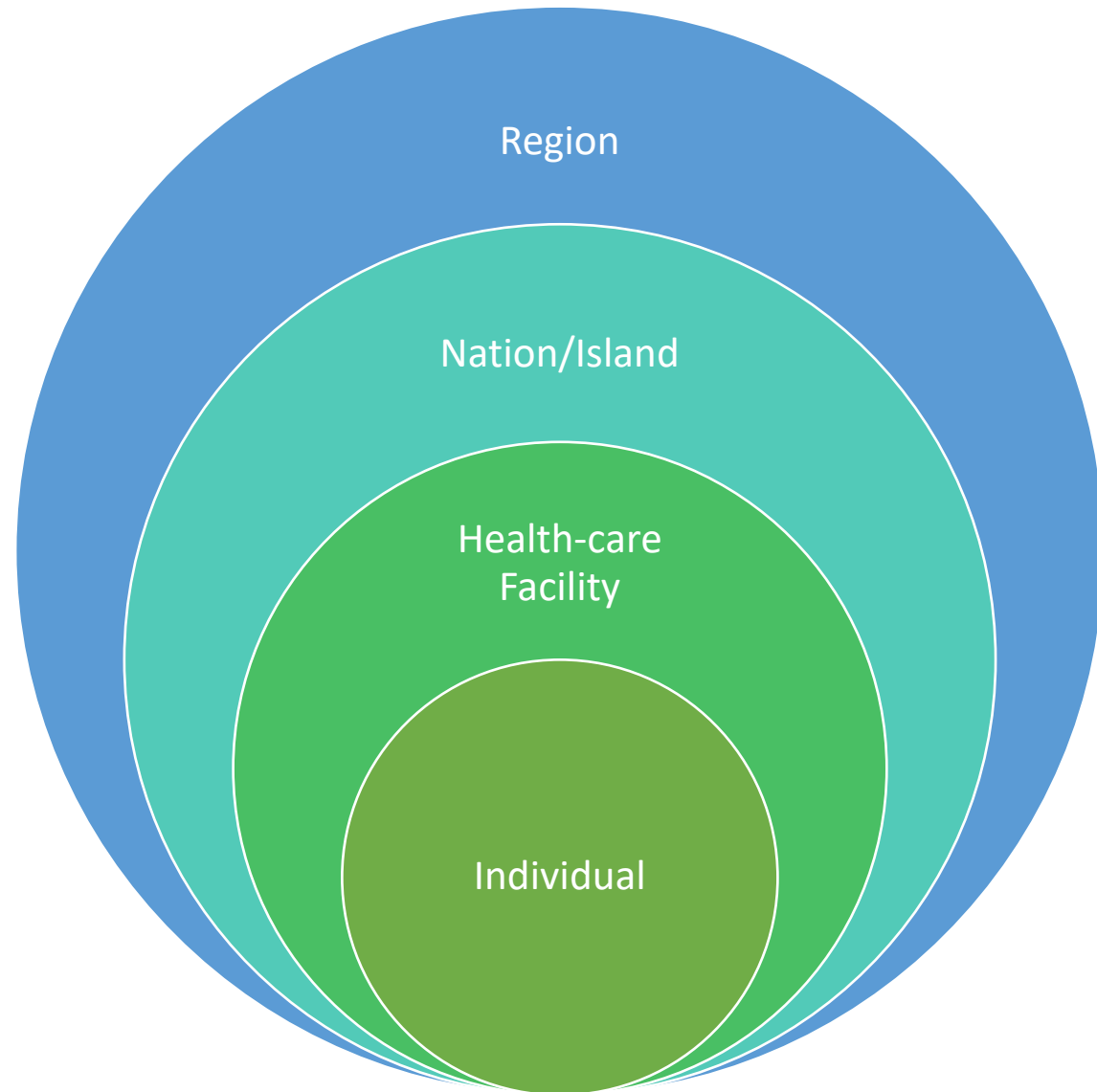
- We know how to address these challenges
- Need to translate them to the context of climate-induced disasters?

Defining Implementation Science



Using Implementation Science to Address Challenges to Managing NCDs in Disasters

Adaptive Capacity can Occur at Multiple Levels



Feasibility and Acceptability of using WHO NCD Kits in Disasters in the Caribbean

Expansion of the Interagency Emergency Health Kits (IEHK) to provide essential meds and devices for management of: hypertension, DM2, pulmonary, mental health, and neurologic disorders

Non communicable diseases kit 2016 (NCDK)

For 10 000 people for 3 months



Department of Medicine

Feasibility and Acceptability of using WHO NCD Kits in Disasters in the Caribbean

Objectives

- Understand current approaches to addressing NCD needs in a disaster in the Caribbean
- Determine feasibility and acceptability of using WHO Emergency NCD Kits to address challenges of managing NCDs in disasters in the Caribbean

Partners

- Ministry of Health
 - Emergency Preparedness
 - NCD
 - Finance
- Pan American Health Organization
- Civil Society
- Individuals with chronic disease
- Doctors/Nurses/Health Workers
- Communication specialists
- Climate change experts

Yale Institute for Global Health Faculty Hecht Award 2019



Yale School of Forestry and
Environmental Studies



Yale Center for Climate Change
and Health



Feasibility and Acceptability of using WHO NCD Kits in Disasters in the Caribbean

Methods

- Stakeholder engagement meeting Jan 2020
- Stakeholder mapping
- In-depth interviews with key stakeholders
- In-depth interviews with people living with NCDs in islands recently hit by hurricanes



Department of Medicine

Feasibility and Acceptability of using Emergency NCD Kits in Disasters in the Caribbean

Results

- Acceptable: opportunity to integrate NCD and disasters
- Acceptable: opportunity to overcome medication access challenges
- Feasible: if logistical barriers of cost-sharing, storage, and distribution can be overcome
- Feasible: COVID-19 has shown it us “it can be done”
- Presents opportunity to “build back better”

“We have four sub-regional warehouses, one in Barbados, Trinidad, Antigua, and Jamaica. If it is something that has a particular shelf life and can be stored for a period of time, there’s a possibility of prepositioning within the warehouses.”

Stakeholder in Disaster

“Basically, the kit needs to be a slightly adaptable kit so that people can get what they need, basically, as opposed to wasting resources. What I would suggest, or what makes sense to my simple brain, is making sure that you have an essential component for hypertension, diabetes, and maybe heart failure, or something like that.”

MoH

La Soufrière Volcanic Eruption

sky news

St Vincent: Drone video shows idyllic island blanketed with volcanic ash after La Soufriere eruption

The hurricane season is also weeks away, prompting fears the island could be hit while it's still trying to recover.

Tuesday 27 April 2021 15:26 UK

Caribbean



Drone video shows island blanketed in ash

News | Environment

St Vincent volcano erupts again, spewing more gas and ash

Experts raise concerns about residents who refuse to evacuate as 'huge explosion' reported at La Soufriere volcano.



Ash and smoke billow as La Soufriere volcano erupts in Kingstown on the eastern Caribbean island of St Vincent [Robertson S Henry/Reuters]

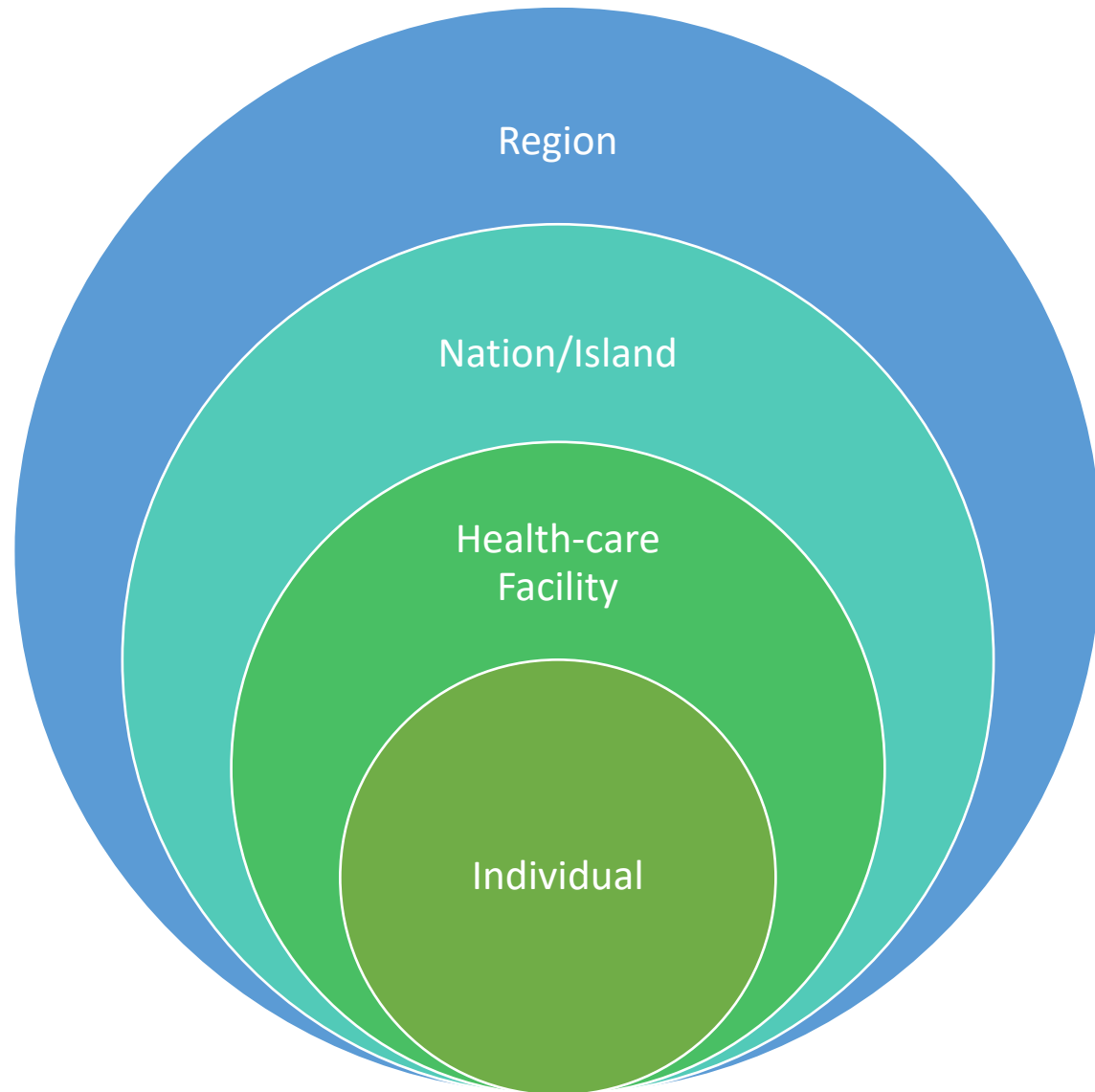
Deploying Emergency Kits for Noncommunicable Diseases, Following the Volcano Eruption in Saint Vincent and the Grenadines

21 Jun 2022



Using Implementation Science to Address Challenges to Managing NCDs in Disasters

Adaptive Capacity
can Occur at
Multiple Levels



Our goal: to strengthen capacity at the individual and institutional level to address the needs of people living with NCDs in the setting of climate-induced disasters

Setting: US Territories of the US Virgin Islands and Puerto Rico

FQHCS ARE SPECIAL

- Community Health Centers
- Underserved communities
- Under-insured and uninsured
- Refugee and immigrant populations
- Lower socio-economic status
- Racial/ethnic minorities



- Two FQHCs in the USVI
- Twenty FQHCs in Puerto Rico



Understand the experiences of the FQHC as an organization and their patients in addressing NCDs in the setting of recent climate-induced disasters

Facilitators

Health facility: strong leadership, prioritizing wellbeing of employees and patients, willingness to learn and improve

Community: strong relationships between health facility and community

Challenges

Health facility: double burden on employees, variable engagement with government programs

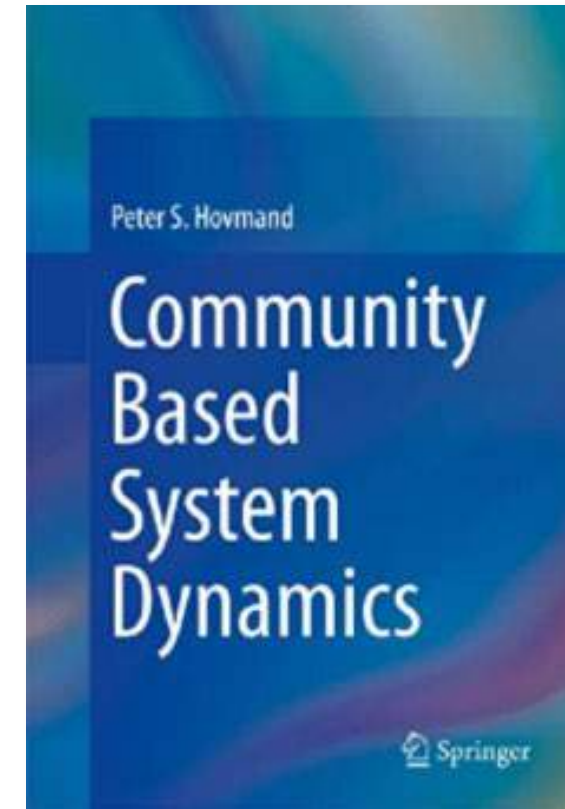
External to health facility: reliance on relief organizations, policies impacting access to medication

Individual-level: significant mental health challenges, limited self-management knowledge, limited disaster preparedness knowledge

To engage affected communities and interested parties to identify strategies to reduce morbidity and mortality due to NCDs in the setting of climate-induced disasters

Participatory Group model building (GMB) is a means of engaging diverse stakeholders in a process for jointly understanding and addressing complex issues

- One of several methods within systems science (agent-based modeling, network analysis)
- Method for framing, understanding, and discussing challenges embedded within complex systems
- Effective communication across disciplines
- **Stakeholders transform mental models into explicit causal diagrams (graphical depiction of the salient variables and their cause-effect relationship)**



Participatory Group Model Building

Story 1: *The important role of mental health.* Poorly managed mental health worsens NCD management. Poor NCD management leads to financial consequences that worsen mental health problems.

Story 2: *Food insecurity.* Food insecurity worsens NCD management. Financial consequences worsen food insecurity.

Story 3: *Housing insecurity.* Housing insecurity worsens NCD management. Financial consequences and disasters worsen housing insecurity.

Story 4: *Lack of providers.* At baseline limited providers, this worsens ability to educate and assist in management of NCDs. Disasters and financial consequences lead more people to leave the island, worsening lack of providers.

Story 5: *Access to medication.* Lack of access to medication in a disaster worsens NCD management. Lack of access is multifactorial (policies, pharmacies). Resultant financial consequences and disrupted health services make it more difficult to access medication.

Story 6: *Social/community support.* Lack of social/community support worsens isolation that makes NCDs difficult to control. Poor NCD management leads to more people leaving the island, increasing social isolation

Story 7: *Awareness of the role of NCDs in disasters.* The more aware people are of NCDs in disasters the better prepared people with NCDs are for a disaster. This reduces the number of people with poorly controlled NCDs in a disaster.

Participatory Group Model Building

Strategies to address emergent stories

- Individual-level: awareness
 - Ability self manage disease
- Institutional-level: awareness, mental health
 - Educational material to raise awareness about NCDs in Disasters
 - Mental health and psychological first aid training
- System-level: medication food/housing insecurity
 - Payment reimbursement for services and medication
 - Resources to access healthy food and safe shelter

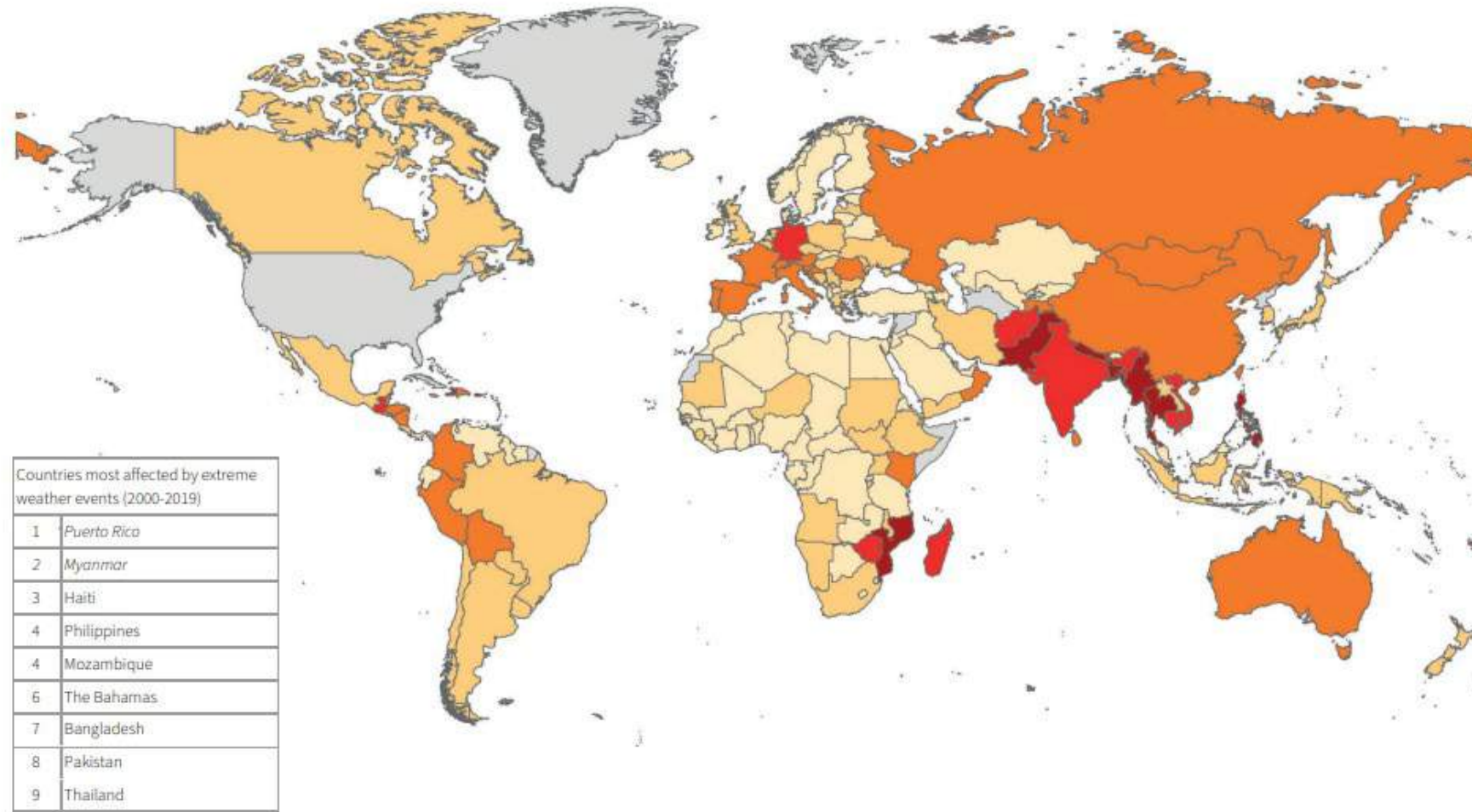


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Figure 1: World Map of the Global Climate Risk Index 2000 – 2019

Source: Germanwatch and Munich Re NatCatSERVICE



© 2021 Germanwatch

Italics: Countries where more than 90% of the losses or deaths occurred in one year or event

Climate Risk Index: Ranking 2000 - 2019



South-South Collaboration: from Caribbean to Mozambique



Emory Collaboration with Instituto Nacional de Saúde
Funded by Emory Global Health Institute



Challenges to NCD management in Disasters in Mozambique



Erika Canda, MPH Candidate, Emory Rollins School of Public Health



Challenges of Addressing NCDs in Disasters in Mozambique

Similar Challenges in Mozambique:

- Access to Medication
- Importance of self-management
- Health service delivery disruption
- Coordinated multi-disciplinary efforts

“Generally, a few are neglected because some patients need to take medication daily, and with cyclones, they lose their medications, lose their cards, their identification, and there hasn't been a quick response to these patients.” - EIC_ OMS_30.05.2023

“I had some medications, but they were not sufficient, I end it up with hypertension, having to drink water a lot of the times, doing this and that, to find ways fix myself” - Buzi_07_Membro_Comunidade_Paciente_DCNT_14.12.2022

“We are in an emergency that everything submerged, how will we be able to continue the follow-up of this patient [cancer]? Of course, it's complicated. Everything is submerged, none of the materials are sterile, there is no way.” Surveillance_Buzi_District_14.12.2022

“[...] The challenge is this. The lack of coordinated work. There has to be an effort from all stakeholders and not just relying on the health sector. All stakeholders should make an effort, the government and civil society, to prevent these health outbreaks.” - Cidade de Tete_09.05.2023

Addressing NCD Needs in Disasters in Mozambique

- Data → what is the impact of disasters on NCD-related morbidity and mortality?
- Data → where are the NCD needs greatest? Thinking specifically about climate-sensitive conditions: asthma, insulin-dependent diabetes (type1 and type2), cardiovascular disease, existing mental health conditions.



Addressing NCD Needs in Disasters in Mozambique

- Surveillance → integrated approach for surveillance of communicable and non-communicable diseases (SISMA, SEGILA)
- Disaster preparedness and response → an integrated approach to preparedness and response



Summary

- Persons with NCDs have increased vulnerability to climate change (exposure, sensitivity, adaptive capacity)
- Climate change will worsen global health disparities in NCDs unless we act
- Action requires a multi-level approach from the systems, to health facility/organization, to the individual level
- We must engage stakeholders and community members to develop multi-level strategies to strengthen adaptive capacity to the impact of climate-disasters on NCDs
- We must recognize the importance of data to inform policy and action related to NCDs in disasters. Integration of data systems for surveillance and emergency response is critical.

Acknowledgements

Caribbean Partners and Champions

Hector Villanueva
Jean Ortiz
Estrella Santiago and Enlace
Cruz Nazario
Rosa Rosario
Maxine Nunez
LaVerne Ragster
Lyna Fredericks
Tess Richards
Moletto Smith
Masserae Webster
Janis Valmond
Silvana Luciani
Sir Trevor Hassell
Slim Slama

Mozambique Project Team

Eduardo Samo Gudo
Tatiana Marrufo
Osvaldo Inlamea
Vanio Mugabe
Uriel Kitron
Alastair Ager

Mentor Team

Marcella Nunez-Smith
Venkat Narayan
Doug Bodner
Adithya Cattamanchi
Dabney Evans
Peg Weeks

Students

Michelle Wiciak
Karla Escobar
Myrna Gonzalez-Perez
Stephen Perez
Claudia Orobio
Erika Canda
Maria Kersanach

Funding

NIH/NHLBI K23 HL152368

 @DrSariaHassan

Saria.Hassan@emory.edu



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OBRIGADO

Saria Hassan, MD, MPH

Saria.Hassan@emory.edu