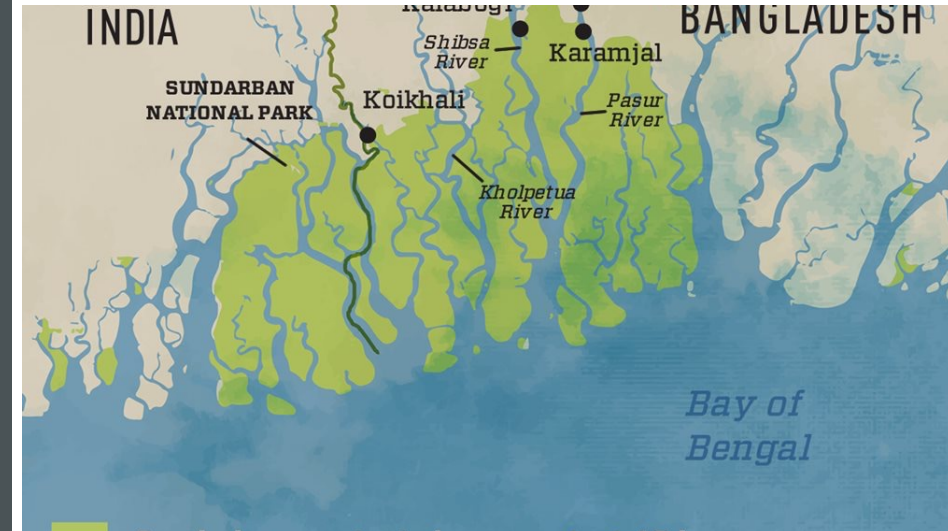


# EFFECT OF CLIMATE CHANGE EVENTS AND DISTRESS DIVERSIFICATION ON HOUSEHOLD FOOD SECURITY AND CHILDREN'S DIETS AMONG AGRICULTURAL AND NON- AGRICULTURAL HOUSEHOLDS IN SUNDARBANS, INDIA

- **Ramya Ambikapathi<sup>1</sup>, Nilupa S. Gunaratna<sup>1</sup>, Upasona Ghosh<sup>2</sup>**
- **<sup>1</sup>Department of Public Health, Purdue University, USA**
  - **<sup>2</sup>Public Health Foundation of India, India.**



## Environmental change, livelihoods and conflict

### THEMATIC PARALLEL SESSION

Thursday 1 July, 14:20 BST

Chair: Brenda Akwanyi, Emergency Nutrition Network  
Esther Waruingi, JKUAT  
Kirsty Naicker, University of KwaZulu-Natal  
Ramya Ambikapathi, Purdue University  
Olusegun Fadare, University of Reading  
Amaka Nnaji, Lincoln University  
Emily Amondo, Center for Development Research



**ANH2021**



RESEARCH CONFERENCE 29 June - 1 July 2021  
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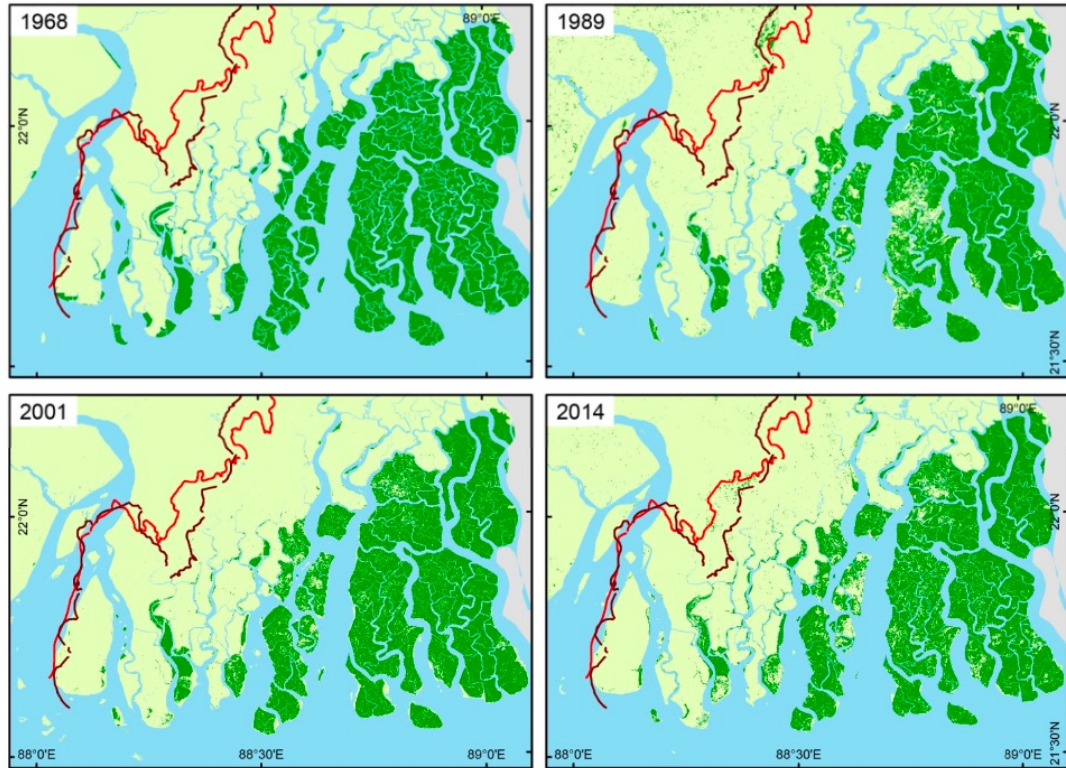
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# ECOLOGICAL AND LIVELIHOOD HISTORY

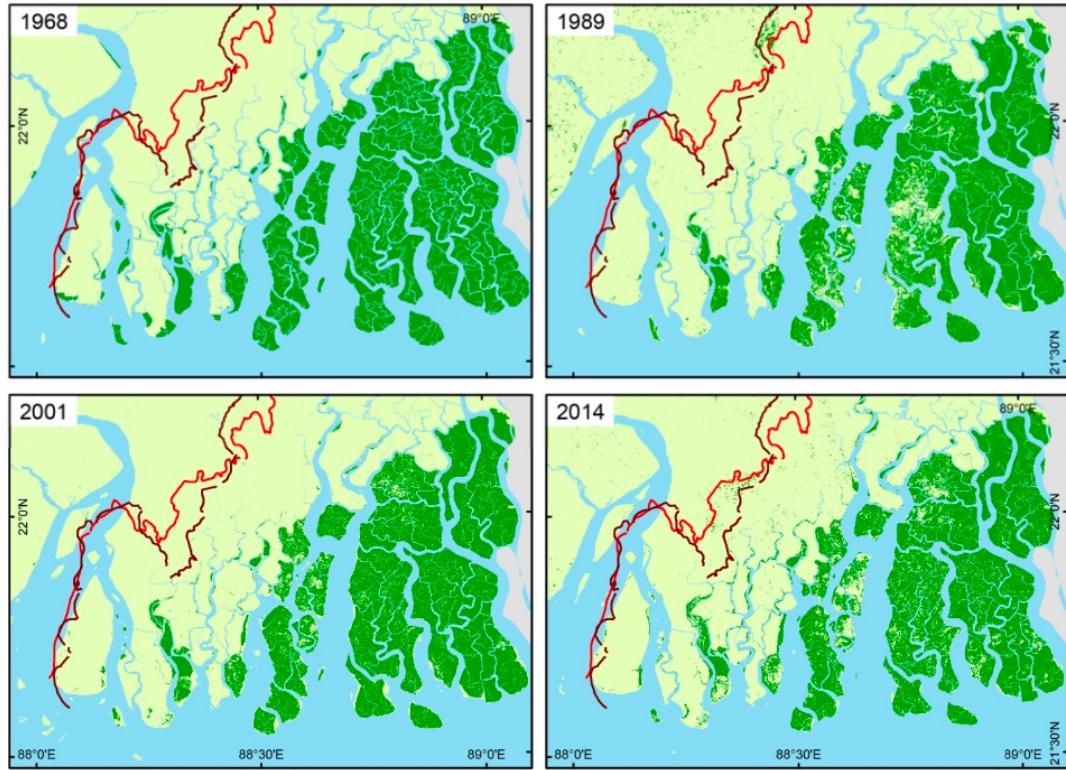
Sundarbans known for dense mangrove, biodiverse, Tiger reserve, World Heritage Site



Ghosh et al, 2015

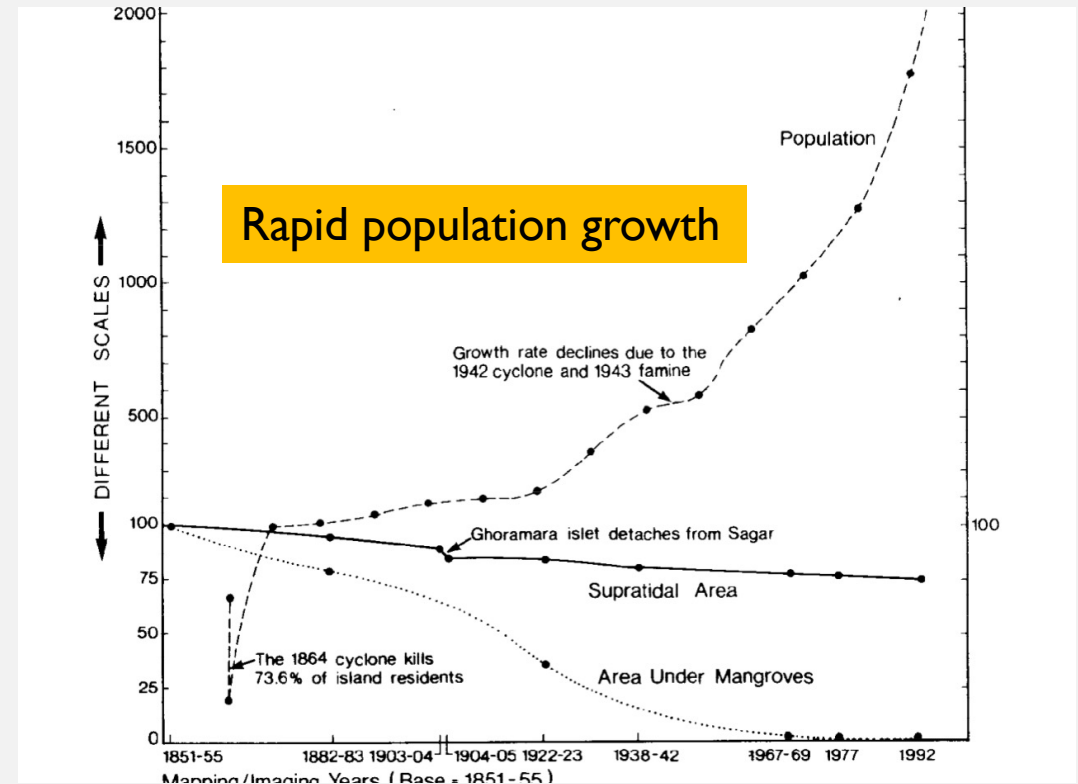
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Sundarbans experienced rapid population growth and sustains nature-based livelihood

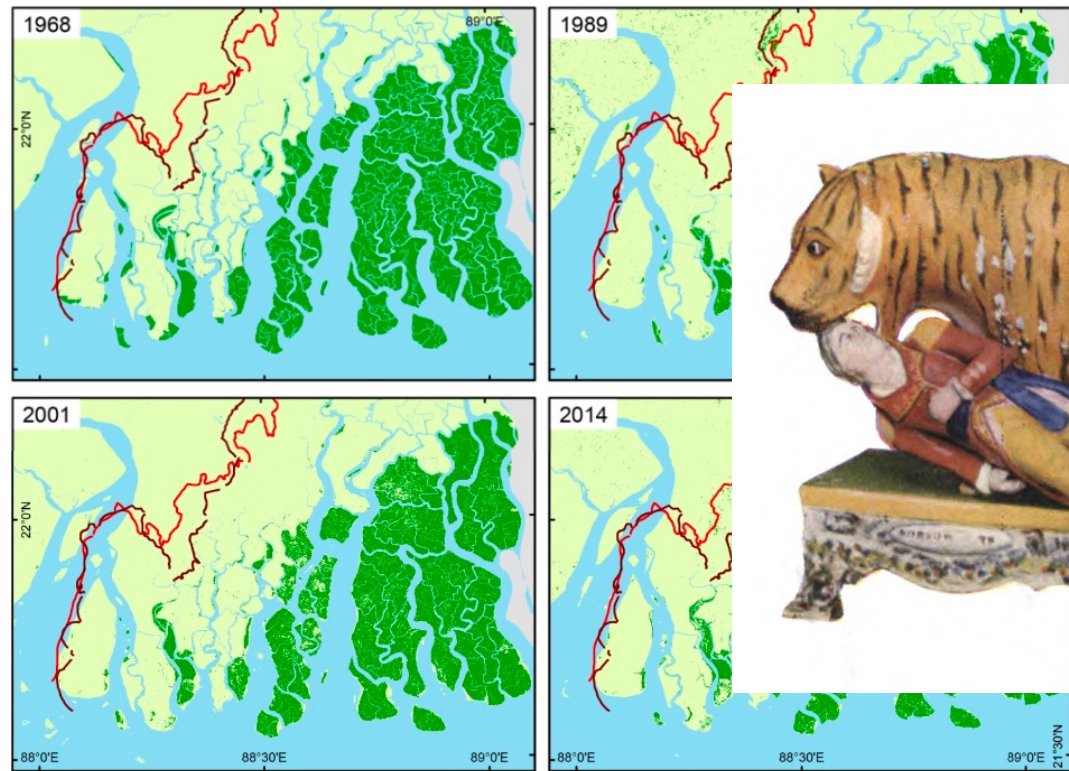


Bandyopadhyay, 1997



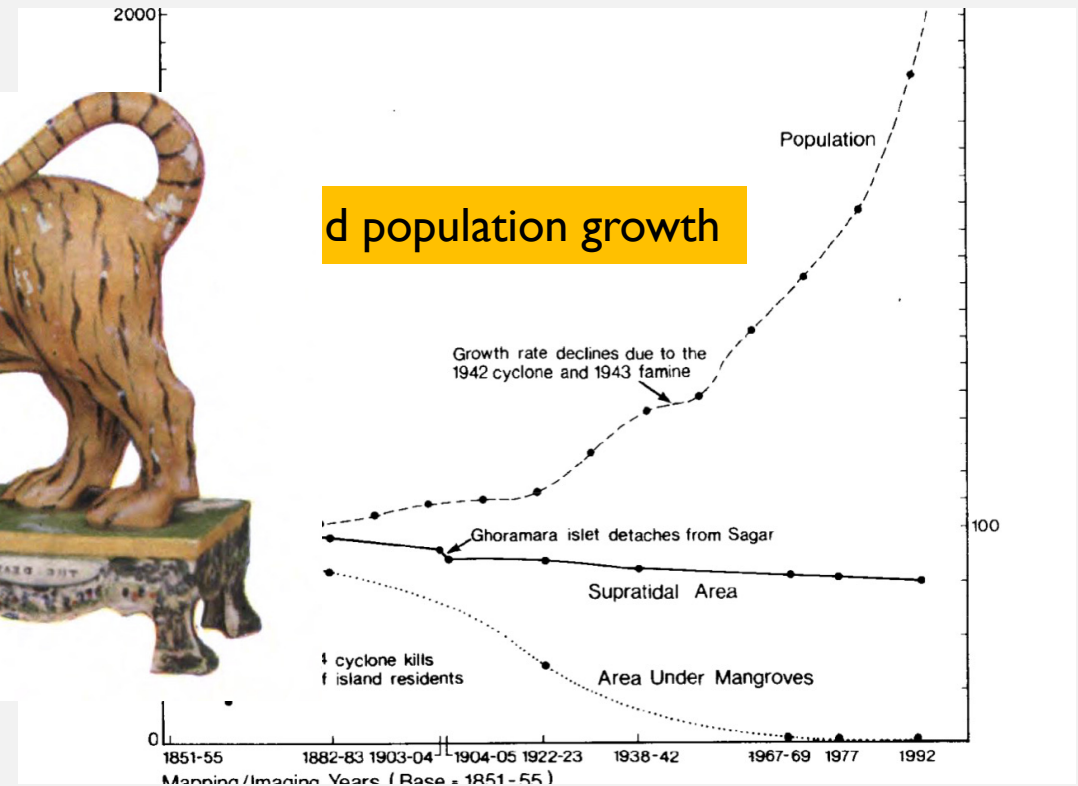
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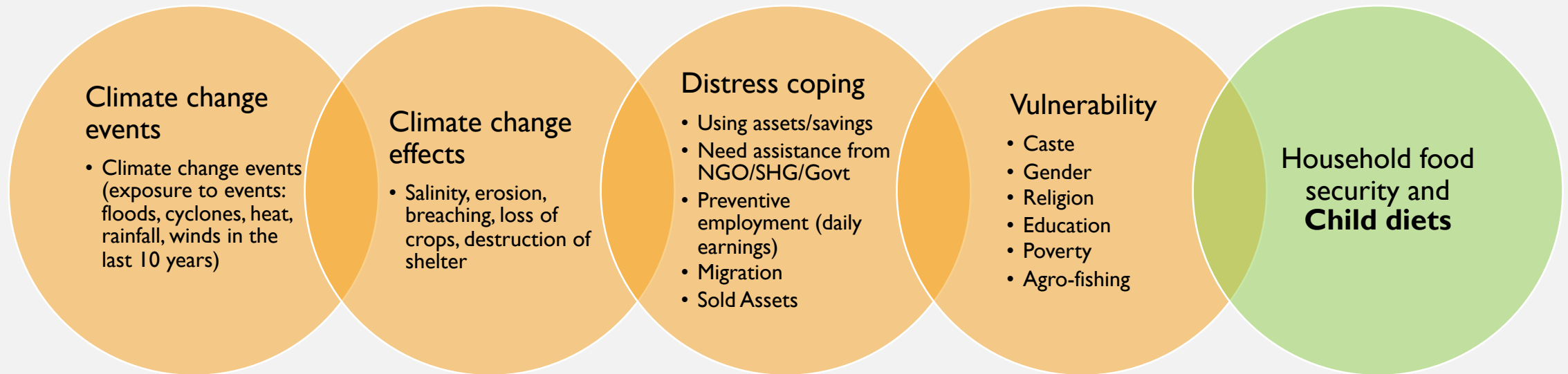
Ghosh et al, 2015

Sundarbans experienced rapid population growth and sustains nature-based livelihood



Bandyopadhyay, 1997

## AIM – BIG PICTURE



**AIM:** Explore pathways through which long-term climate events and effects, distress coping strategies, household vulnerabilities, affect children's diets.

## MIXED METHODS APPROACH

Qualitative: Framework analysis using participatory rural appraisal method

Interview with 18 caregivers and health system providers on climate shock history

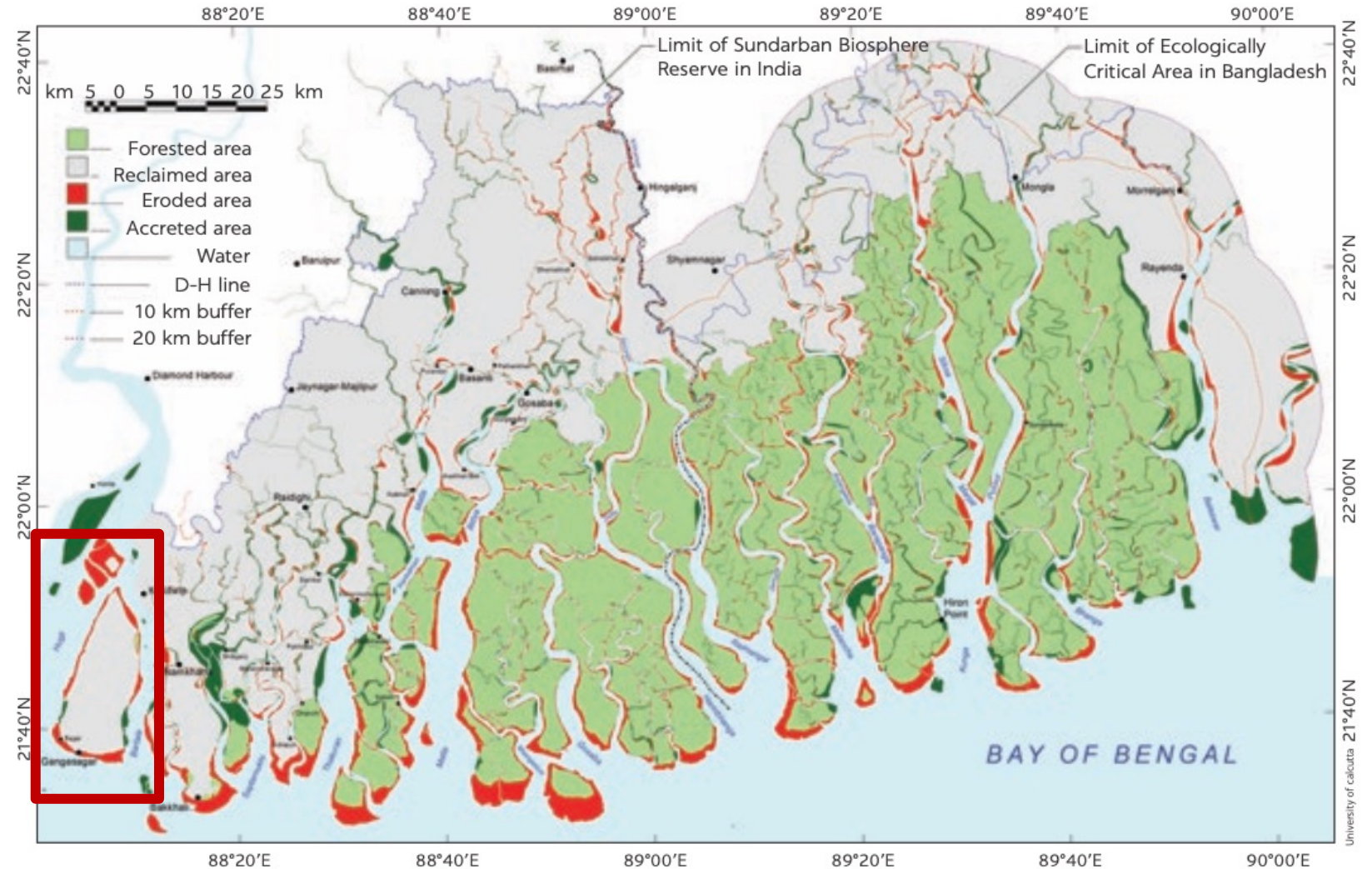
Quantitative: Structure Equation modelling using randomly sampled 1,256 HH across 3 islands

Collected cross-sectional survey on livelihood, climate change events, exposure, coping capacity, food security, child diets, anthropometry, and other household demographics.

# STUDY SETTING & SAMPLING

Sampled based on 3 islands that vary in climate change exposure (Ghoramara, Dhaspora, Rudranagar) and within those islands, households with under 5 were randomly sampled in 2016

## Sundarbans' accretion and erosion, 1904-24 to 2015-16



Source: Bandyopadhyay et al. 2018b.

Note: km<sup>2</sup> = square kilometer.

Dasgupta et al, 2020



## QUALITATIVE FINDINGS

***“Don’t ask a starving mass what hunger is. Let us deal with the uncertainty of life first, the rest we can take care of. In my childhood I have seen my grandfather owning 10 acres of land. In my young days I used to grow vegetables on my land for own consumption as well as for sale outside Ghoramara. Five years ago all my land was washed away. I somehow manage with the homestead. Ghoramara was once famous for producing vegetables. Now, nothing goes out from Ghoramara. Instead, vegetables come from Kakdwip twice a week. We have to buy those vegetables at a high price or just survive on salt and rice.”***

A 65-year-old farmer of Ghoramara who had lost his agricultural land due to coastal erosion

Figure 7.2: Temporary Embankments



Source: IIHMR

Ghosh, Bose, Bramachari, 2018



# QUALITATIVE FINDINGS

Island geography	Climate exposure	Climate effects	Distress coping strategies	Outcomes
Ghoramara  (47% agro-fishing from quantitative data but mostly ag-labor)	Extreme climate change exposure	<ul style="list-style-type: none"> <li>- Water logging in household for months</li> <li>- Loss of pond fishing due to salinity intrusion</li> <li>- Loss of agro-products due to salinity intrusion</li> </ul>	<ul style="list-style-type: none"> <li>- Stayed on the boat or embankment for two to three months</li> <li>- Built houses with paper and plastic</li> </ul>	<ul style="list-style-type: none"> <li>- Suicidal tendencies among women</li> <li>- Mothers cutting down meal</li> <li>- Switching to cheaper meals</li> <li>- Access to health center/ Anganwadi center (nutrition center) reduced.</li> </ul>
Dhaspara  (27% agro-fishing)	Mild climate change exposure	<ul style="list-style-type: none"> <li>- Heavy rainfall</li> <li>- Destruction of mud houses</li> <li>- Loss of betel farming</li> </ul>	<ul style="list-style-type: none"> <li>- Borrowing from micro-finance group to rebuild the houses/ money lenders</li> <li>- Spends saving</li> <li>- Unskilled male migration</li> </ul>	
Rudranagar  (19% agro-fishing but mostly farming on own land)	Least climate change exposure	<ul style="list-style-type: none"> <li>- Heavy rainfall</li> </ul>	<ul style="list-style-type: none"> <li>- Borrow money / food directly from vendors for labor</li> </ul>	

Figure 7.3: Temporary Tents on the Embankments (for families who lost their houses after Cyclone Aila)

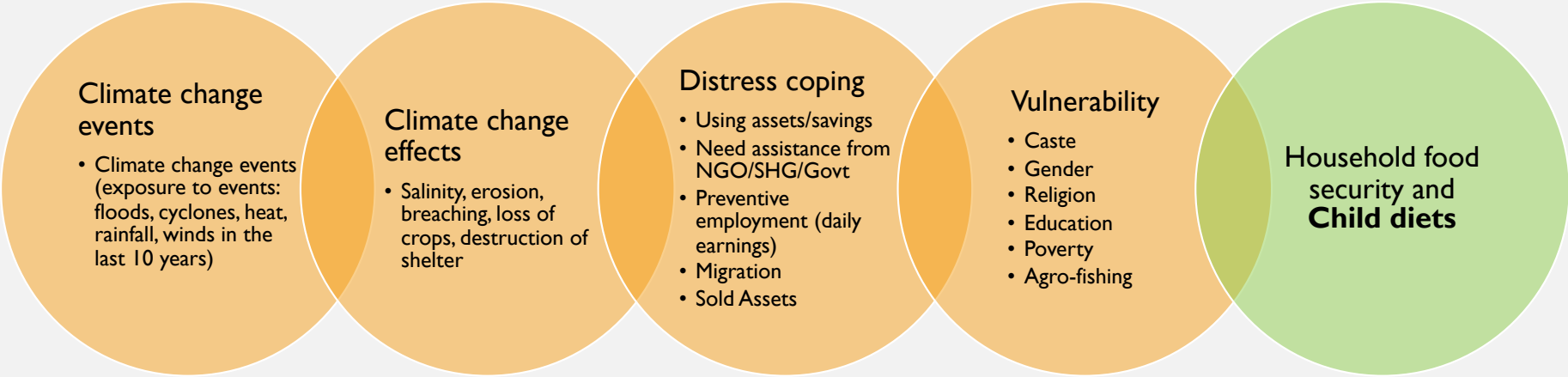


Source: IIHMR

Ghosh, Bose, Bramachari, 2018

***“If I won’t reach to them in their emergencies, how will they accept me well later? Trust cannot be build like this”- ASHA (health worker) from Dhaspara.***

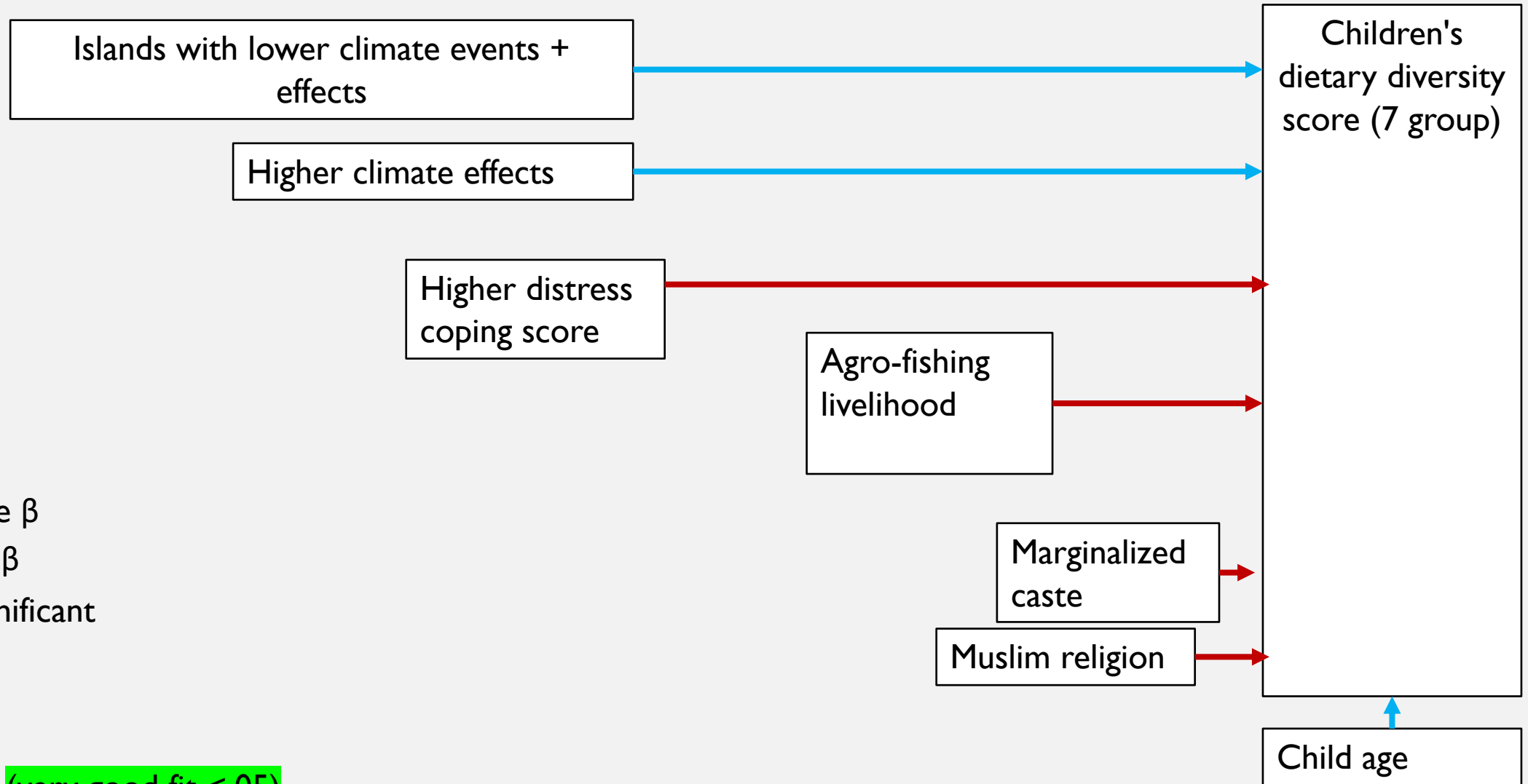
QUANTITATIVE FINDINGS



	CC events	CC effects	Distress coping score	Vulnerability	Child diets
Agro-fishing household (n=393)	82% of HH exposed to extreme events with median of 3 events*	2.8 out of 5 climate effects*	1.9 distress coping strategies out of 9* <ul style="list-style-type: none"><li>- 51% own land*</li><li>- 0.1 HH member migrated*</li></ul>	32% marginalized caste <ul style="list-style-type: none"><li>- 36% Below poverty line*</li></ul>	Dietary Diversity Score = 2.7 food* groups; 42% food secure*
Non-Agro-fishing household (n=863)	71% of HH exposed to extreme events with median of 2 events*	2.4 out of 5 climate effects*	1.7 distress coping strategies out of 9* <ul style="list-style-type: none"><li>- 36% own land*</li><li>- 0.3 member* migrated</li></ul>	32% marginalized caste <ul style="list-style-type: none"><li>- 31% Below poverty line*</li></ul>	2.9 food groups*; 52% food secure*

\* Significant different by livelihood

# QUANTITATIVE FINDINGS: RESULTS FROM THE STRUCTURE EQUATION MODELLING (DIRECT RELATIONSHIPS)



## Goodness of fit

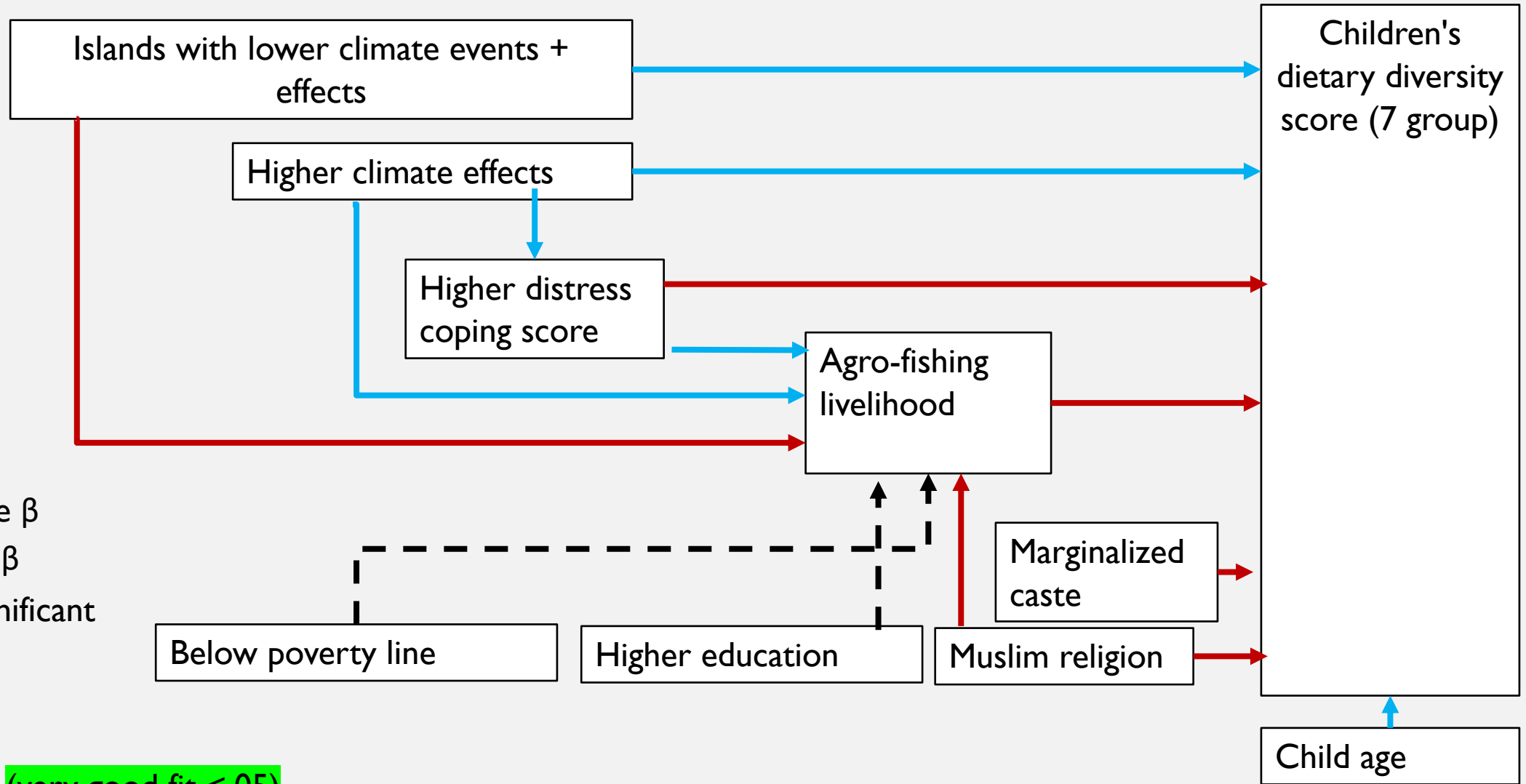
RMSEA = 0.030 (very good fit  $<.05$ )

CFI:0.976 & TLI 0.943 (good fit  $>0.90$ )

Standardized root mean squared residual: 0.017 ( $>0.05$  = close fitting model)



# QUANTITATIVE FINDINGS: RESULTS FROM THE STRUCTURE EQUATION MODELLING (ALL RELATIONSHIPS)



## Goodness of fit

RMSEA = 0.030 (very good fit <.05)

CFI:0.976 & TLI 0.943 (good fit >0.90)

Standardized root mean squared residual: 0.017 (>0.05 = close fitting model)

# WHY DO WE WE SEE POSITIVE RELATIONSHIP BETWEEN CLIMATE EFFECTS ON CHILD DIETS?

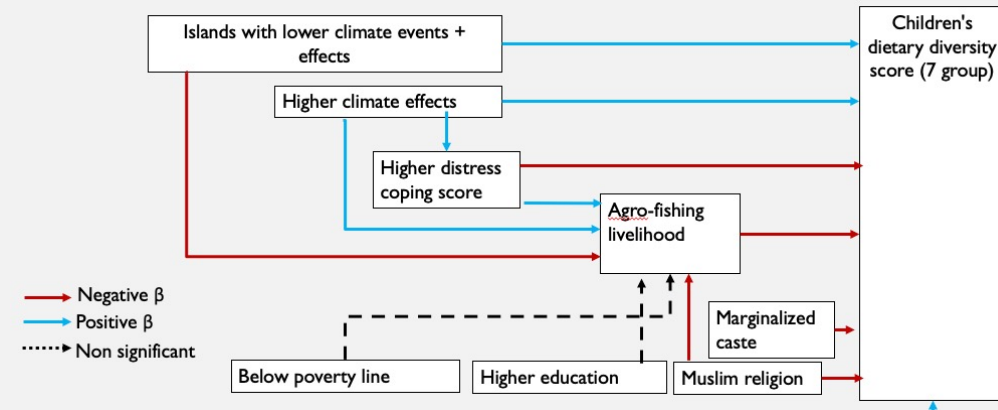
From qualitative work:

People who have experienced many climate events in the last 10 years have lost land and sell (remaining) land to fund out-migration of male members. There is also greater dependence on daily wage labor.

With selling land and migration remittances, women have more cash on hand.

This enables food purchase from markets rather than on self-production, coinciding with the changes in the local food system.

**These circumstances together give a better child diet (today) but in terms of long-term security, there is lower assets and wealth and fragmentation of family.**



(\*\*Male migration is mostly unskilled laborers so its not transformative or promotive employment opportunities.)

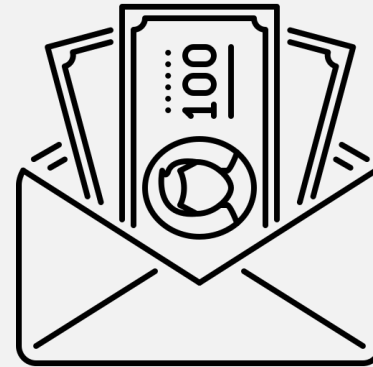
# KEY TAKEAWAYS



Experience of climate exposure/effects varies, there are microvariations based on geography, livelihood, and vulnerability.



Demographics and risk profiles are rapidly changing with implications for programs and policies.



Need to address livelihood as a means of addressing nutrition.



Long term climate change safety program to address the challenges in Sundarbans, especially integrating health and food system.



Much of this work has been contextualized due to ethnography, ideally longitudinal mixed-methods for future interventions.