The Global Food Syndemic in Kiribati

Prepared for the January 2024 ASSA Conference

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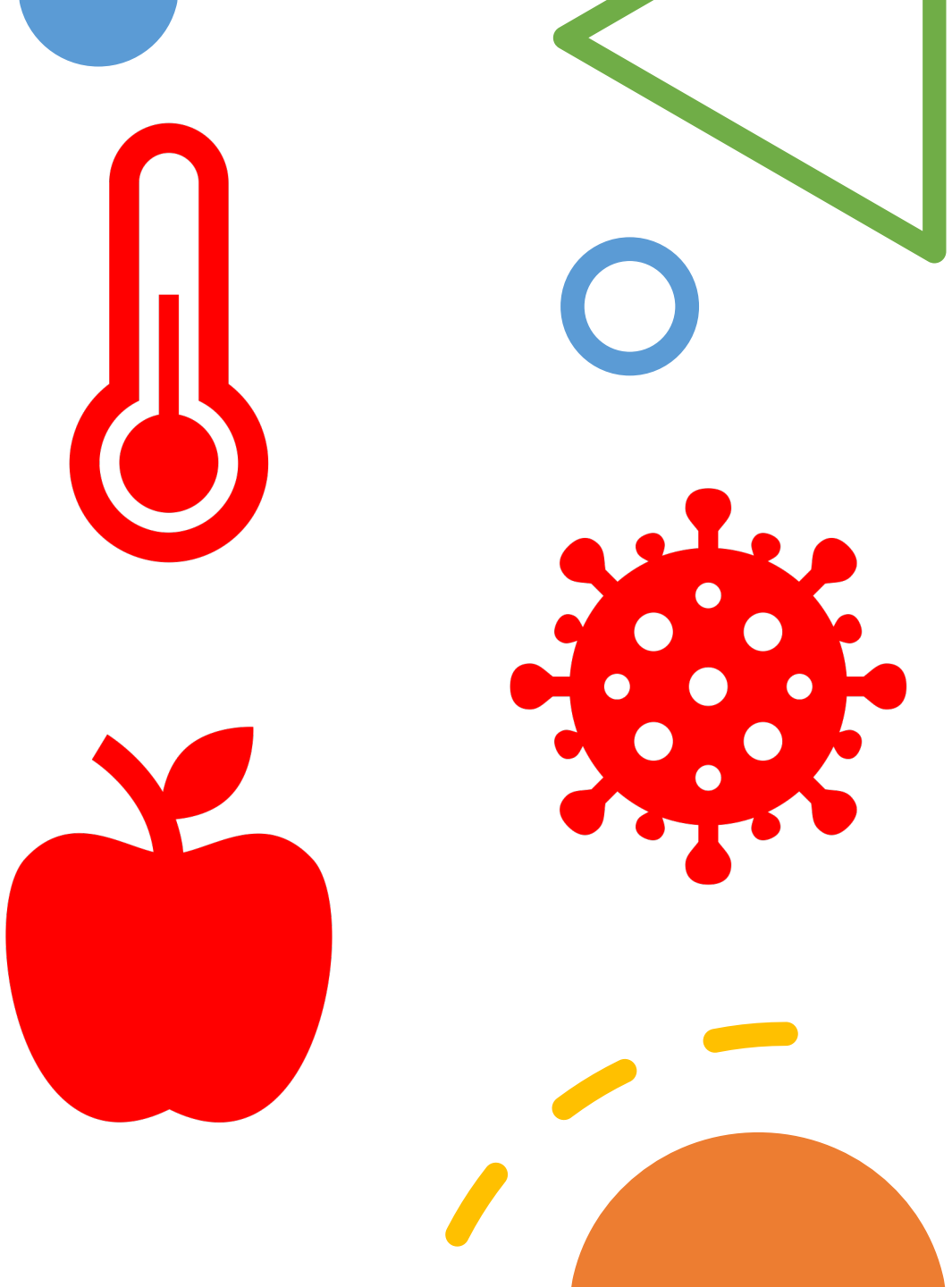
Kiribati

Image Credit: Cauchi et al. (2021).



The Syndemic in Kiribati

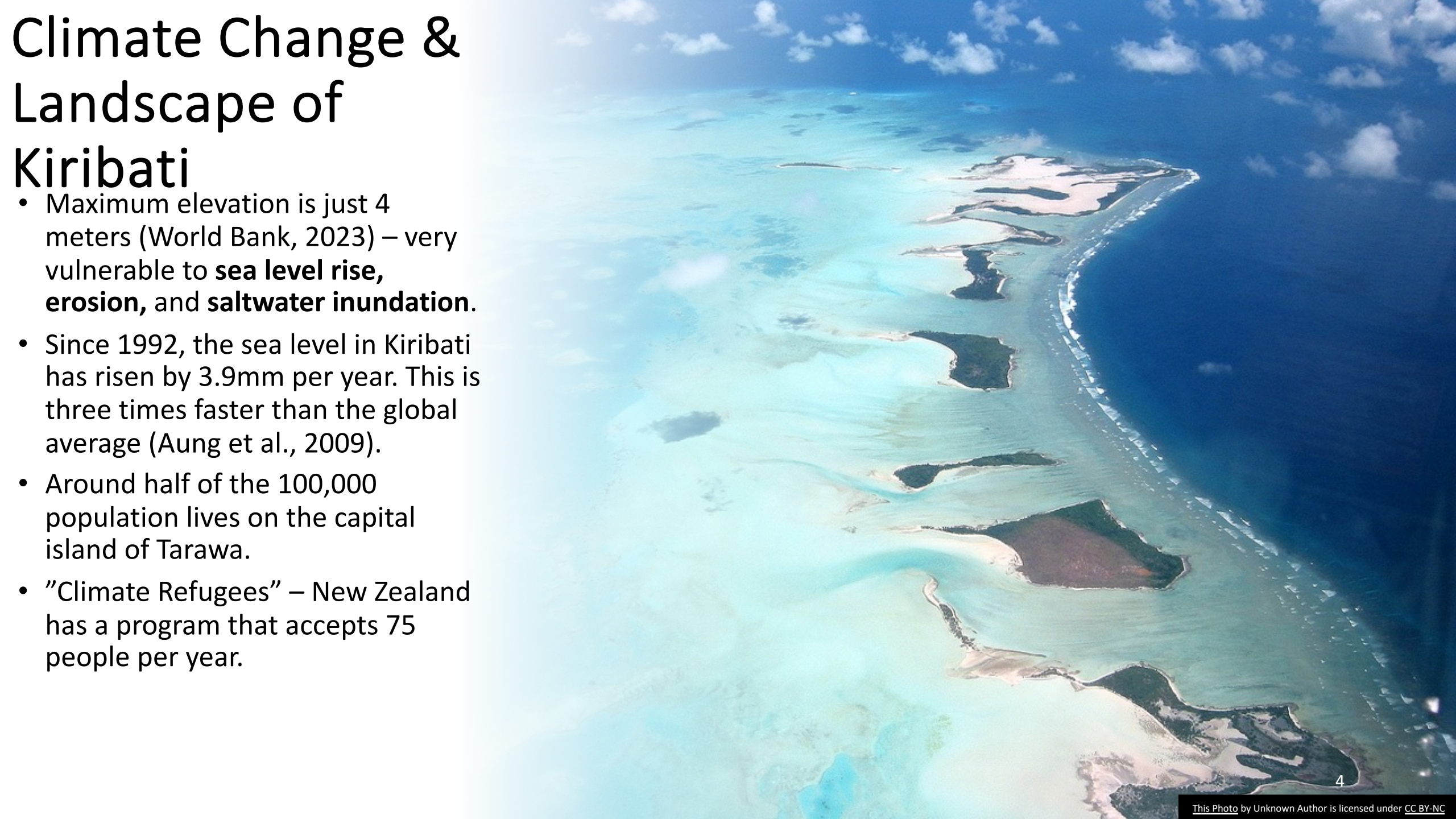
Climate Change

Food Insecurity

Non-Communicable Diseases (NCDs)

Climate Change & Landscape of Kiribati

- Maximum elevation is just 4 meters (World Bank, 2023) – very vulnerable to **sea level rise, erosion,** and **saltwater inundation**.
- Since 1992, the sea level in Kiribati has risen by 3.9mm per year. This is three times faster than the global average (Aung et al., 2009).
- Around half of the 100,000 population lives on the capital island of Tarawa.
- ”Climate Refugees” – New Zealand has a program that accepts 75 people per year.



Food Insecurity

- Typically measured using the FAO's FIES.
- "Lacking consistent access to sufficient, safe, and nutritious food for development and an active and healthy life" (FAO, 2023).
- Measured based on people's responses to 8 questions.
- Kiribati is the poorest country in the Pacific Islands; 22% lived below the poverty line in 2019 (ADB, 2020).
- Its distance from major ports means that imported food is lacking in variety (dietary diversity) and filled with many preservatives (Cauchi et al., 2019).
- Excess fish/seafood consumption is harmful (neurotoxins).

Non-Communicable Diseases (NCDs)

- What is an NCD?
- Kiribati has the second highest prevalence of NCDs among MICs/LICs (Relief Web, 2023).
- Almost half of adults are obese (Global Nutrition Report, 2020), despite the fact that 61% of adults have low dietary diversity and micronutrient deficiencies (Eme et al., 2019).
- About 25% of the population has type 2 diabetes (Global Nutrition Report, 2020).
- Other issues exist …
- A lack of healthcare availability exacerbates the situation.

Previous Literature

- McLennan & Ulijaszek (2014) link the obesity epidemic in the Pacific Islands to colonialism.
  - Kiribati was colonized by the British until 1979.
- Food insecurity in adults has been linked to:
  - An increased risk of diabetes and hypertension (Perez-Escamilla et al., 2014)
  - Poorer mental health (Cole and Tembo, 2011; Trudell et al., 2021)
  - Mild cognitive impairment (Koyanagi et al., 2019)
- Climate change has a “multiplier effect” on food insecurity (Cauchi et al., 2019)
- Cauchi et al. (2021) conducted interviews and found that soil salinity has resulted in smaller fruit size. This is just one of many examples…

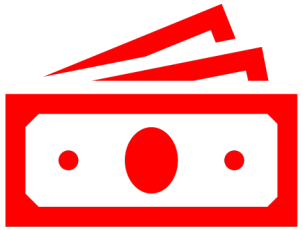
Our Contributions

Cauchi et al (2019) - "There is little research on the interaction of climate change and food security where Kiribati is concerned."

To our knowledge, we are the first to look at the impacts of climate change, food insecurity, and chronic illness in Kiribati.

Investigate impacts of UNDP programs.

Data



2019-2020 Household Income and Expenditure Survey (HIES)

Cross-sectional, nationally representative household data.

Village Resource Survey (VRS)

Village level data regarding impacts of climate change. Chief was interviewed. We aggregate the villages to the island level, as that is where we have the identifying information.

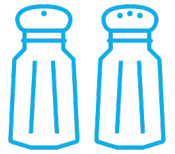
Summary Statistics

- 2,182 households.
- 67% of household heads are male.
- Most HH heads are between 25 and 54 years old (range is 15-65+, we don’t have exact ages).
- 48% of HH heads have only completed up to lower secondary school (the highest requirement in the country).
- Only 53% were using an improved sanitation source, but nearly 80% were using an improved water source.
- 40% of our sample lives with at least one self-reported NCD.

Climate Summary Statistics

18% of islands reported that **sea level rise** reduced freshwater availability.

78% of islands were negatively impacted by **erosion**.



59% of islands were impacted by **saltwater inundation**.

Food Insecurity Experience Scale (FIES) Summary Statistics

In the last year, have you, or any members of your household…

- Not enough to eat: 51%
- Unable to eat healthy: 54%
- Minimal food variety: 52%
- Skipped meals: 24%
- Ate less than they should: 38%
- Ran out of food: 23%
- Hungry but didn't eat: 13%
- Didn't eat the whole day: 10%

Food Insecurity

- 35% are completely secure (answered no to all questions)
- 5% are completely insecure (answered yes to all questions)

Methodology: OLS

- We begin by running 3 OLS regression with the raw FIES score (0-8), for each of our 3 (erosion, saltwater inundation, and sea level rise) climate variables:

$$FIES = \beta_0 + \beta_1 X + \beta_2 climate + \epsilon$$

Where X is a vector of household-level controls

- We repeat the procedure using the probabilities of severe and moderate-to-severe food insecurity (derived from the Rausch model).

Results

- Control variables:
  - HH head completion of higher secondary education makes a HH more likely to be food secure, as compared to those with no education.
  - Those in the richest income quintile are less likely to be severely food insecure than those in the poorest group.
  - Age and gender have no influence on food insecurity.
  - Phone ownership (a proxy for information) reduces probability of food insecurity.
  - Households where individuals have chronic illnesses have FIES scores that are about 0.2 higher.

Climate Results

- Climate variables:
  - Salt inundation not significant
  - Get unexpected signs:
    - Sea level rise (reducing availability of freshwater):
      - 17% more likely to be food secure if you live on an impacted island.
      - 7% less likely to be severely food insecure if you live on an impacted island.
  - Results explainable by seafood price inflation due to export concentration.

Regressions with Interactions

- What if the unexpected sign on our climate variables is driven by omitted variable bias?
- We add an interaction term: the existence of a UNDP program (2016-2022) that addressed sea level rise and built residents' resilience to food insecurity.
  - The program covered 3 islands (Abemama, Maiana, and Nonouti). This involves about 15% of the households in our sample.
- Then we find:
  - Climate shocks alone reduce insecurity (still unexpected).
  - The programs are successful in reducing insecurity.
  - The impact of the program and climate shocks together reduces food insecurity slightly.

Probit Model for the extremes

- 4% less likely to be secure if your household is afflicted by a chronic illness. No significant impact of chronic illness on food insecurity status.
- Still no significant impact of saltwater inundation
- Being impacted by sea level rise makes you 5.7% less likely to be insecure.
- Being impacted by erosion makes you 7.1% less likely to be insecure.
- Supports the theories that:
  - The impact of seafood inflation due to climate change is greater than inflation from processed imported goods.
  - Islands more impacted by climate change may receive more resources to bolster resiliency.

Conclusion

- Why does the existence of an NCD increase the risk of food insecurity?
- Why the unexpected relationship between food insecurity & climate change? [and do we have a way to measure it]
  - Migration?
  - Other climate change programs?
- Consider other climate related variables
  - Example: temperature, rainfall...

Thank you!

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