



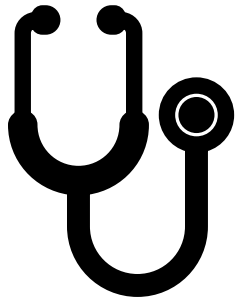
Droughts and Despair: A Cutting-Edge Tool for Assessing Climate Change's Economic Impact on “Diseases of Despair” in Farming Communities

Team: Olatunji-Fairbrass-Lucas

Wellcome Data Science Ideathon 2023

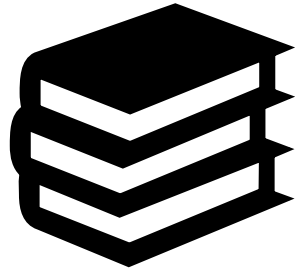
12/07/23

Our Team



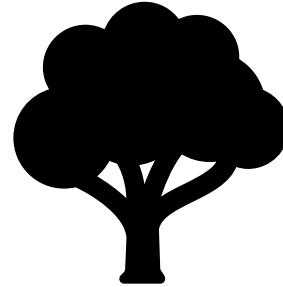
**Olatunji Johnson –
University of Manchester**

Statistical methods in health



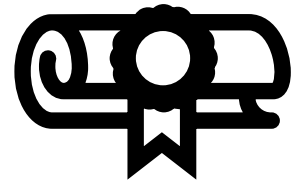
**Alison Fairbrass –
University College
London**

Environmental economics



**Tim Lucas – University of
Leicester**

Environmental health



**Postdoctoral researcher –
University of Manchester**

Leading project

Our Challenge

How can Data Science unravel the intricate correlation between Climate Change, Economy, and Health?



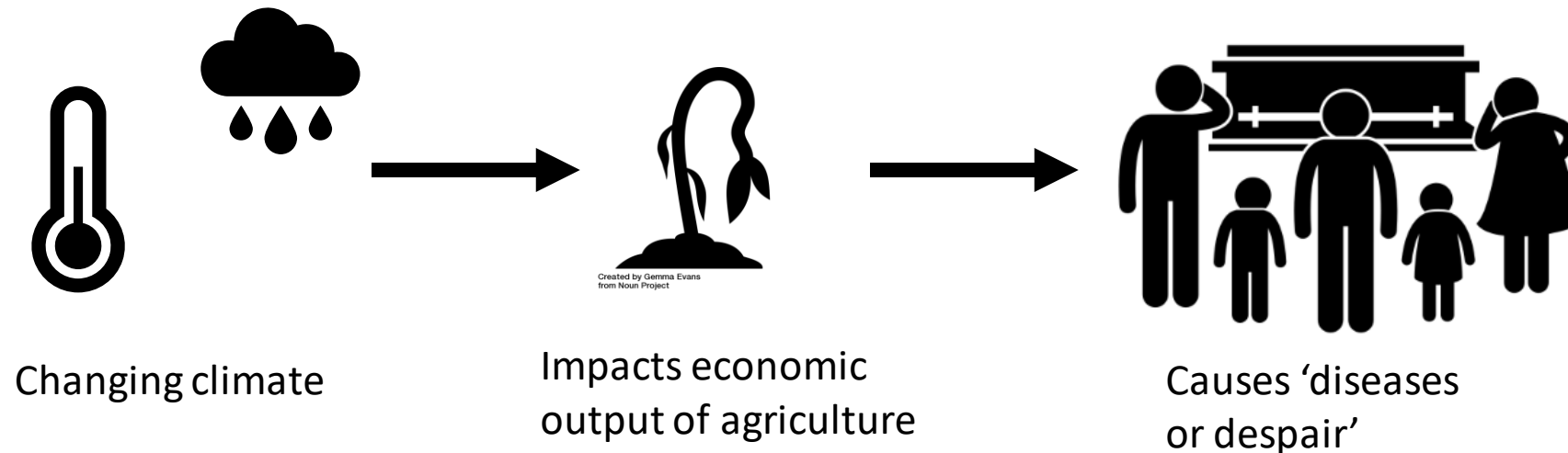
Unraveling Climate Change's Indirect Health Impact

Research question: How is climate change's economic impact leading to 'diseases of despair' in farming communities?

Causal Inference Approach:

Climate Change → Decreased Agricultural Productivity

Decreased Agricultural Productivity → Increased Suicide Prevalence

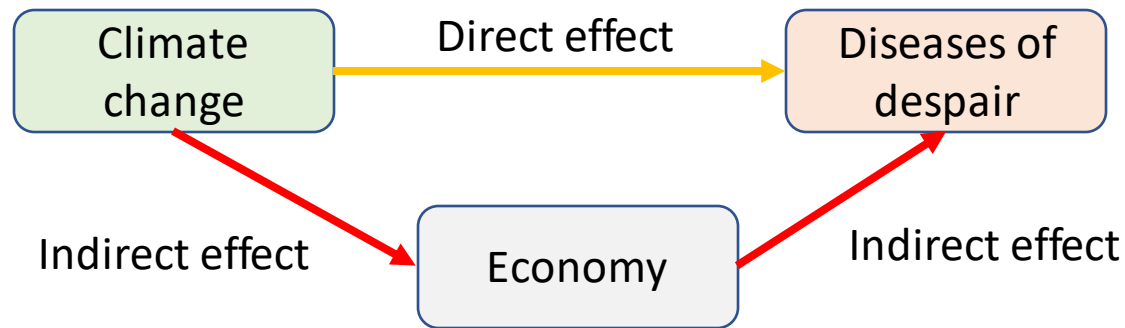


With data science, we aim to trace the ripple effect of climate change from our fields to our minds.

Our Two-Pronged Proposal: Modelling and Communication

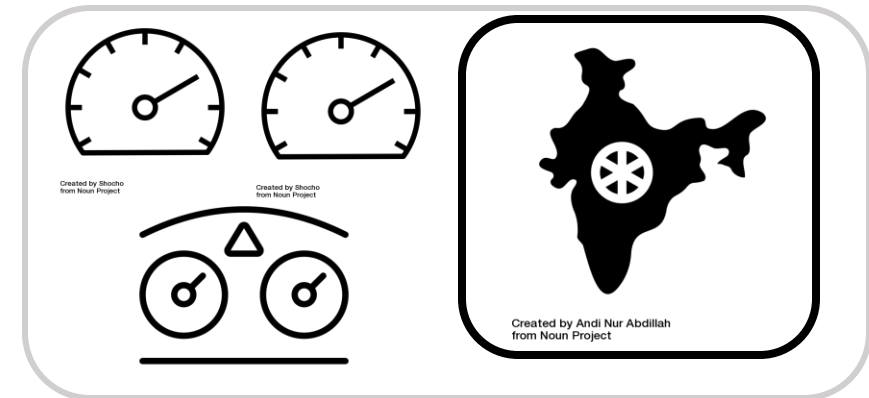
We aim to measure climate change's indirect impact on diseases of despair and communicate its policy implications effectively. We build on a prototype we have developed during the Ideathon.

1. Causal Inference Statistical Model



The model estimates the indirect impact of climate change on farming communities' health via its effect on agricultural productivity.

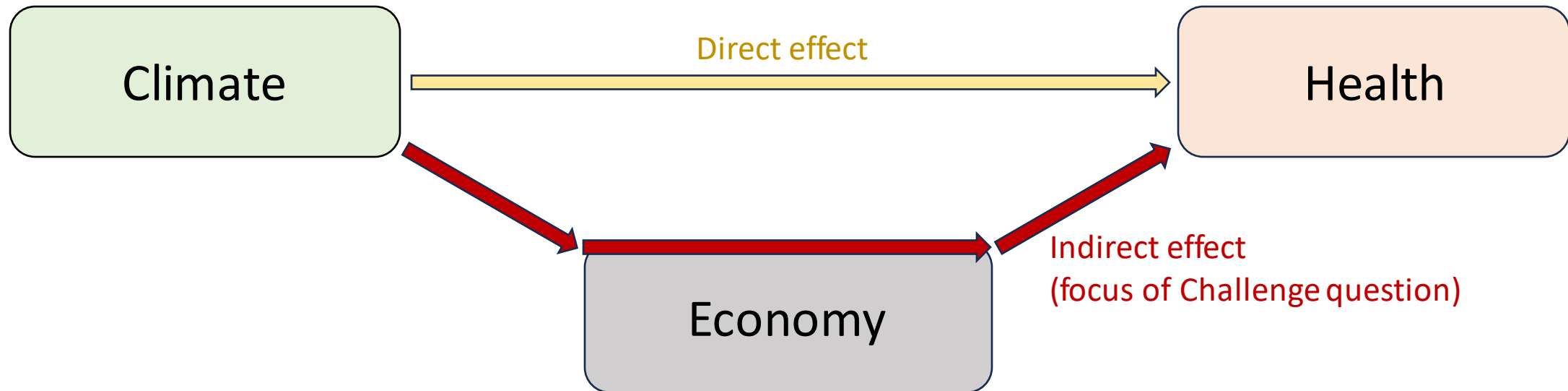
2. Online Application



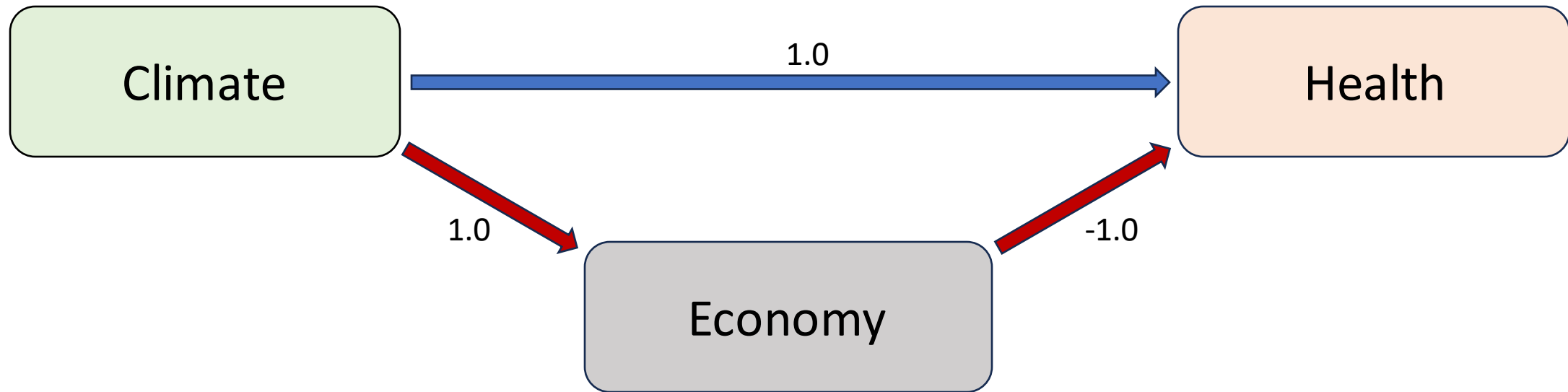
Communicates model estimates. Enables users to explore potential impact of policy changes on the relationship between climate change, agriculture, and health.

GOAL: empowering policymakers to create effective strategies based on the economic pathway of climate change's impact

What are we trying to estimate?

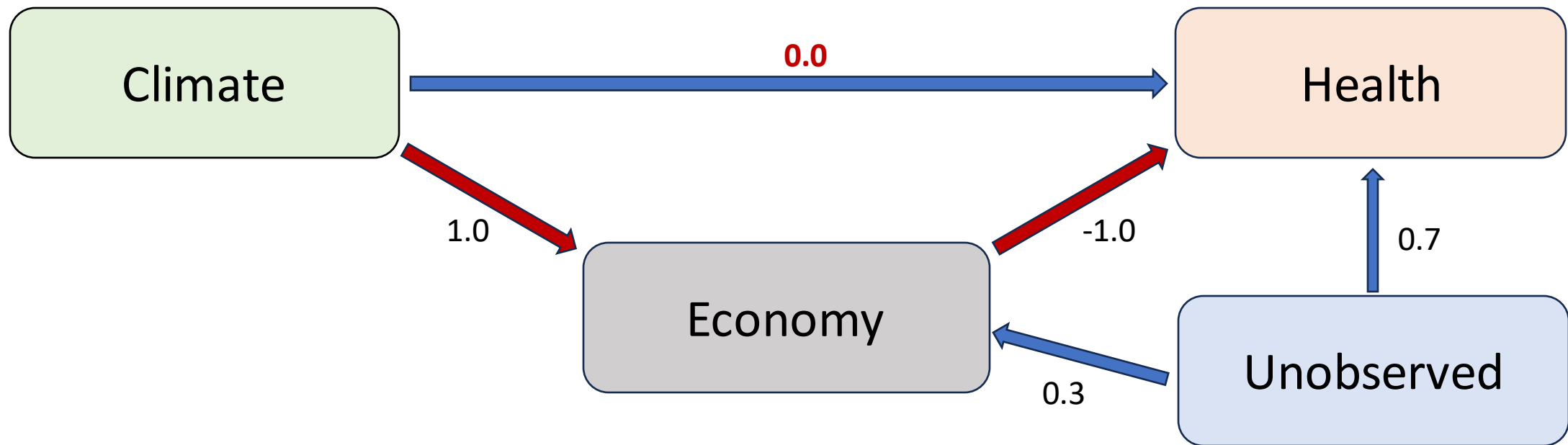


Strong direct effect leads to biased estimate



True indirect effect = -1.0
Estimated indirect effect = **-0.004 (Biased!)**

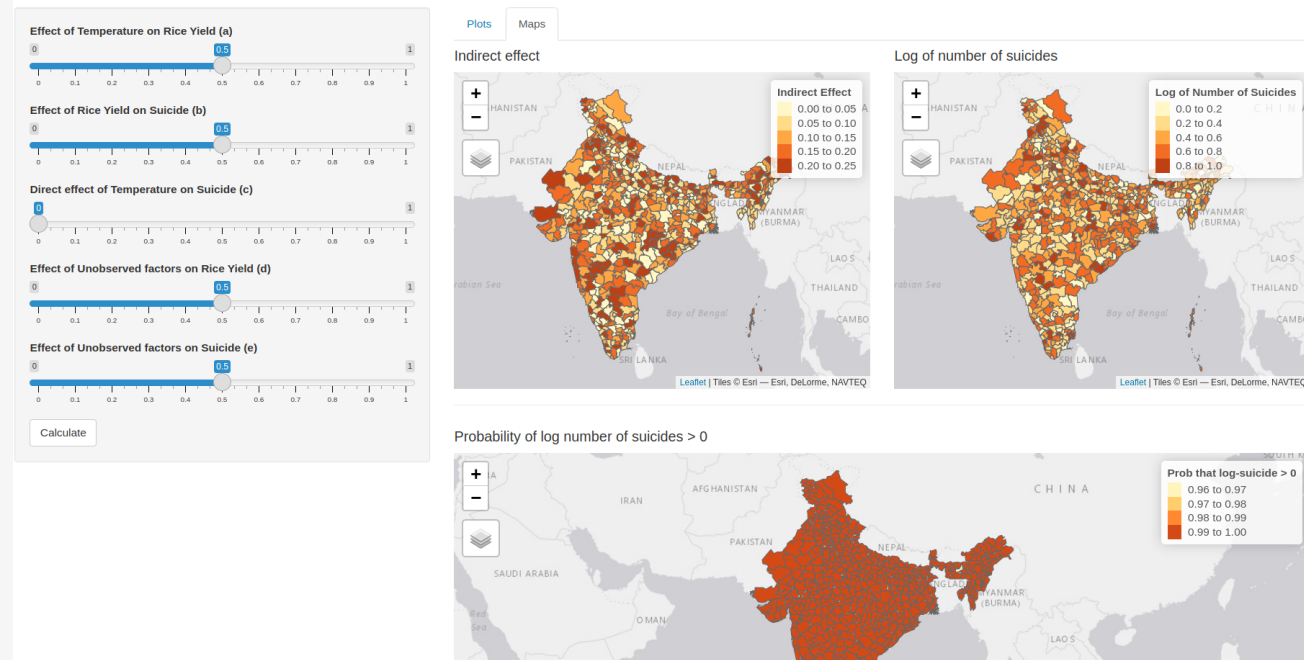
The Indirect effect is unbiased, if the direct effect is small and accounted for unobserved.



True indirect effect = -1.0
Estimated indirect effect = -1.0006 (**Unbiased**)

Communicating policy assessment

Causal Analysis Toolkit for Climate, Economy and Health

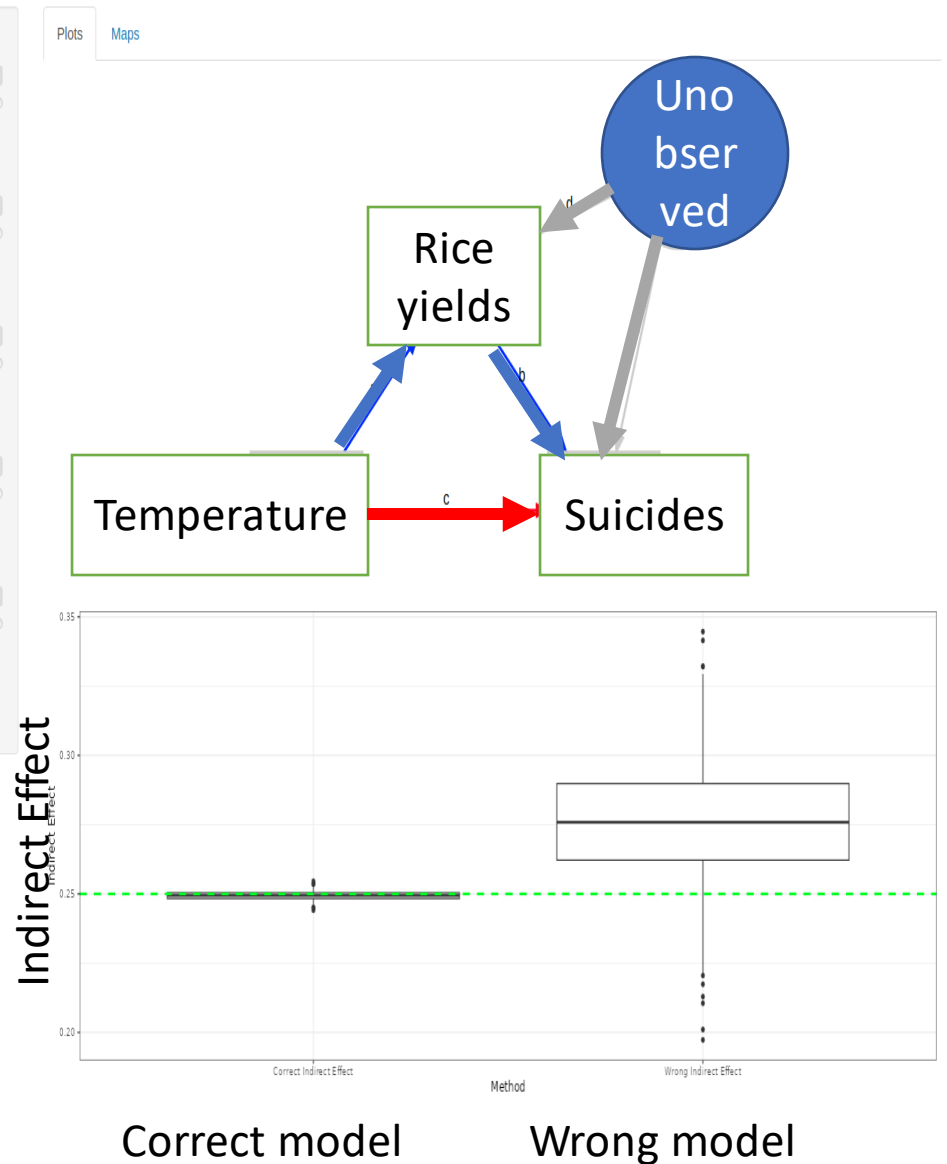
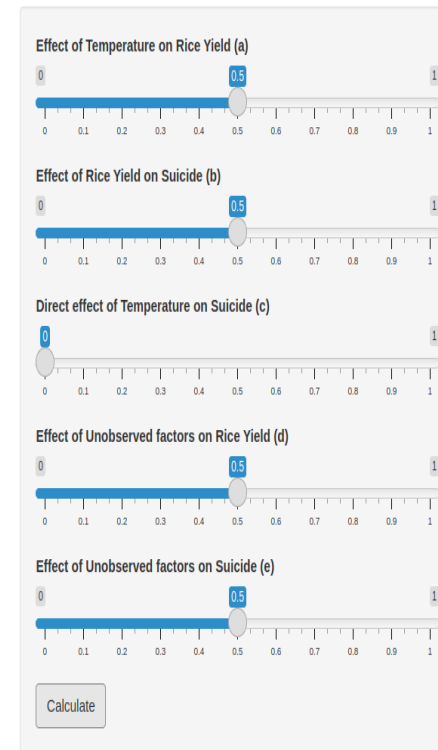


- Open access and open source
- User friendly
- Visualise indirect effect, impact on health metrics and uncertainty
- Download estimates
- Allows continuous update with new data

Model Transparency

- Allow many scenarios
- Build trust via simulation
- Demonstrate the robustness of the effects.

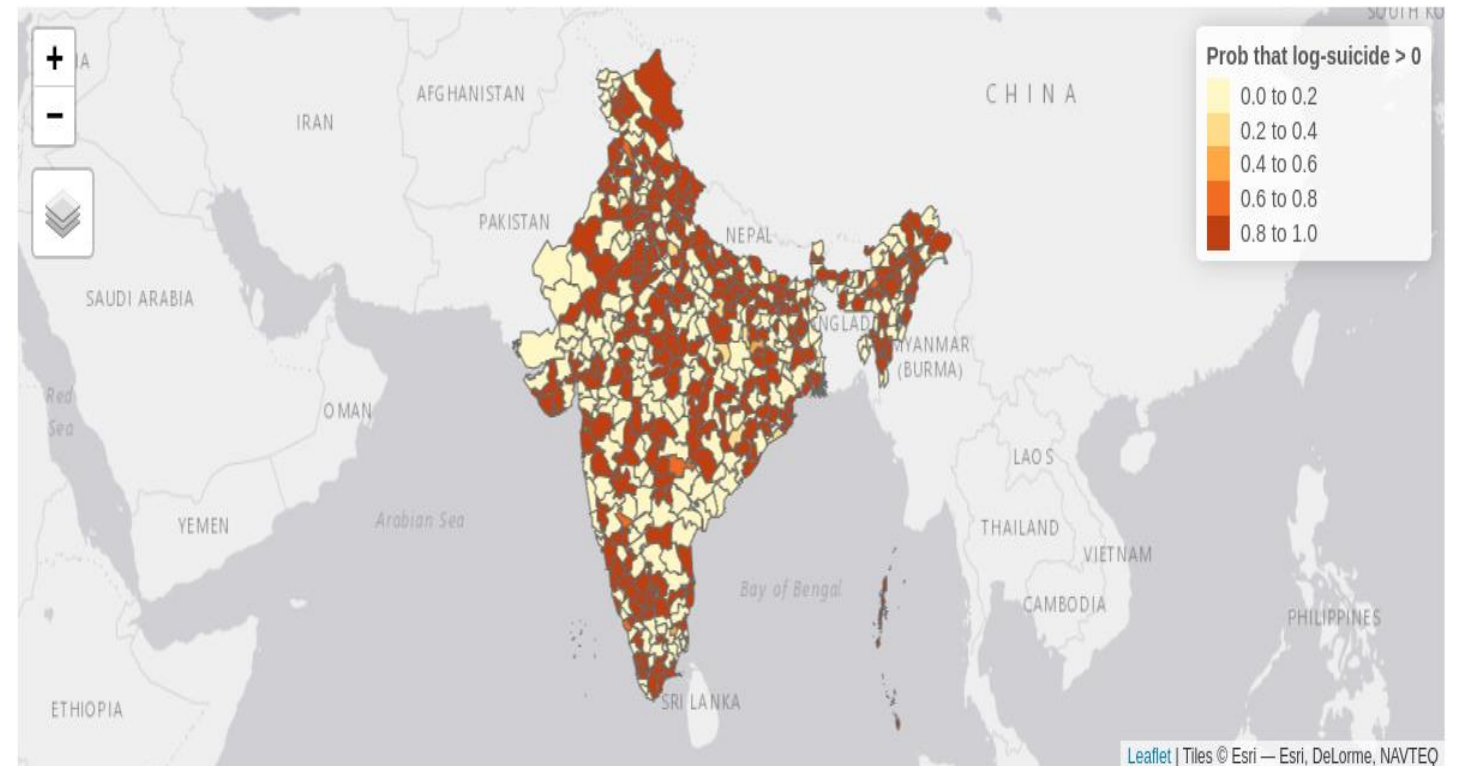
Causal Analysis Toolkit for Climate, Economy and Health



Communicating uncertainties

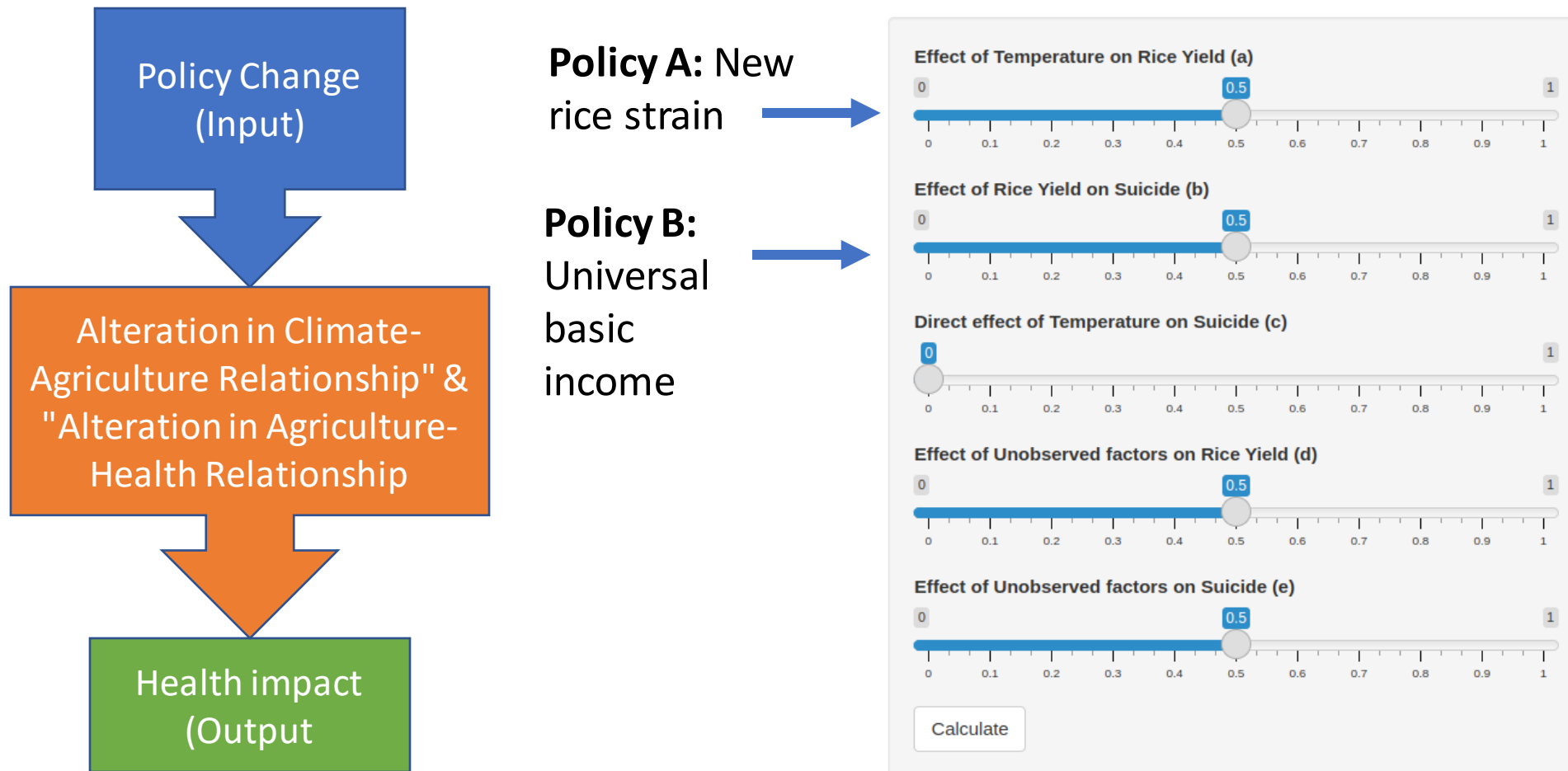
- Communicates uncertainty with *exceedance probability*
- Probability (accounting for uncertainty) that health metric exceeds policy relevant threshold.

Probability of log number of suicides > 0



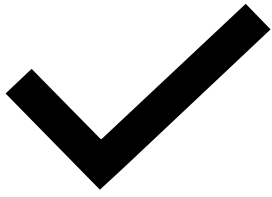
Interactive Policy Impact Exploration

Exploring the health impacts of policy shifts on climate-agriculture-health relationships through our online application.



The application allows users to intuitively adjust policy parameters, offering visualised results for immediate understanding of potential health outcomes.

Ensuring Robustness and Extensibility in Our Application



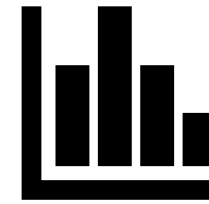
Good Software Engineering

Adherence to best practices in coding
Modular design for easy updates and modifications



Generalisability Across Countries

Flexible model suitable for various scenarios
Ability to incorporate diverse datasets from multiple countries



Robustness to Data Updates

Seamless integration of new data
Robust against changes in input data

By committing to high-quality software engineering, we will develop a tool that is not only robust and adaptable but also has the potential for widespread adoption and meaningful impact.

Allocating Our £100K Funding



Postdoctoral
Researcher



Supportive research
environment



Training and
development



Advisory Group



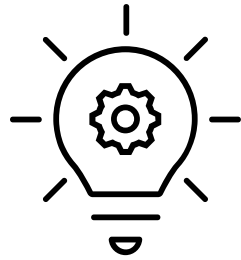
Dissemination and
Outreach

Outcome: deepen our understanding of the indirect health effects of climate change, offering valuable insights for policymakers worldwide and facilitating significant advancements in the mitigation of climate-related health risks in vulnerable communities.

Summary: Tackling Climate-Economy-Health Policy Challenges

1. The Challenge & Solution

- Need for robust climate-economy-health policy assessment
- Engagement with stakeholders to foster trust
- Policy assessment as a causal problem
- **Our proposal:** Leverage causal inference for novel insights



2. Online Application

- Communicates robust, causal estimates
- Enables policy effect assessment
- Visualises uncertainty for full transparency



Created by ibrandify
from Noun Project

GOAL: By harnessing the power of causal inference and interactive data visualisation, we aim to provide a novel tool to address the complex interplay of climate change, economy, and health, facilitating informed policy decisions.