Enabling research into the effect of climate on child poverty and well-being with an open data platform

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PARTNERS

Save the Children

committed to helping all children achieve their full potential by ensuring they grow up healthy, receive a good education, and stay safe.

unicef

works in over 190 countries to save children's lives, to defend their rights, and to help them fulfil their potential.

PROBLEM

Climate change is intensifying and increasing the frequency of **extreme weather events**. **Children** and their wellbeing are often more vulnerable to these effects.

There is an urgent need for evidence-based solutions to protect children from climate risk, but policy-makers and researchers **lack tools that enable this research**.

SOLUTION

The first version of an analysis tool to enable **multivariate statistical analyses** on the impacts of extreme weather on children.

An **open data** tool that reduces barriers for research by combining demographic survey data with (extreme) weather indicators.

In the pilot, we focused on **Nigeria**, with a view to **extend it** to other countries and additional extreme weather events.

METHODOLOGY

CHILD POVERTY AND WELL-BEING

As a measure of child poverty and well-being, we use a longitudinal, geolocated LSMS survey and extract poverty-relevant indicators, resulting in a **harmonized, geolocated dataset of household level poverty indicators**.

UNICEF Multidimensional poverty index

housing   water   nutrition

health   sanitation   education

Living Standards Measurement Survey

4 wave geolocated household survey conducted by the World Bank (2010 - 2016), focusing on harvest periods. Due to high attrition rate (50%), wave 4 is not considered.

As it is harvest focused, the survey can not be directly linked for all poverty indicators, requiring some **adaptations to two indicators**, e.g.:

> example: **Nutrition**
> **original**: Height and weight for calculating stunting
> **adapted**: Days without any (or not enough) food

For all 6 indicators we define a **deprivation severity score** and average it to get the overall poverty index, e.g.:
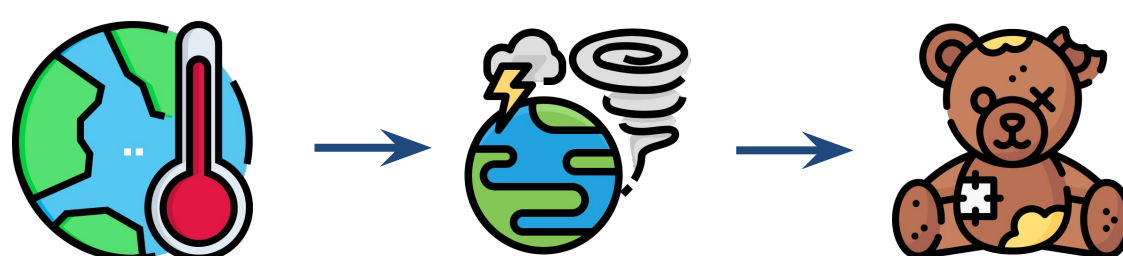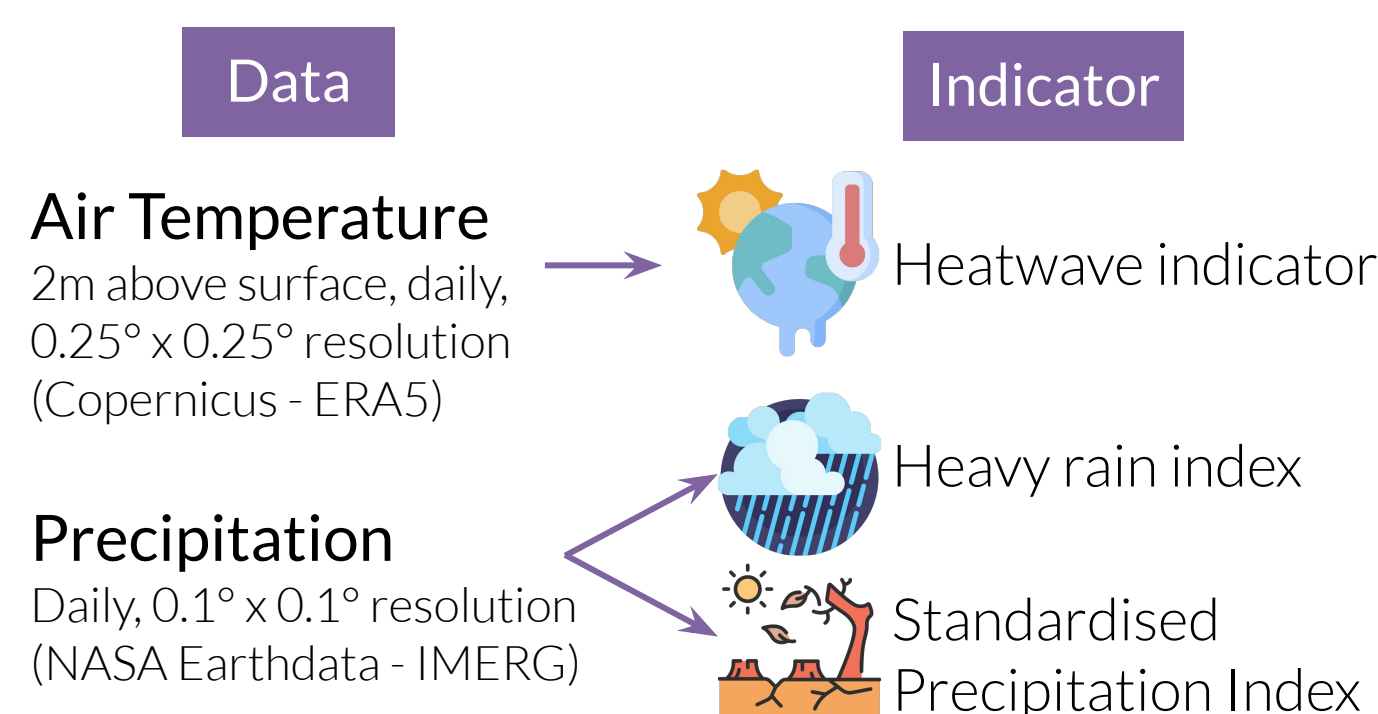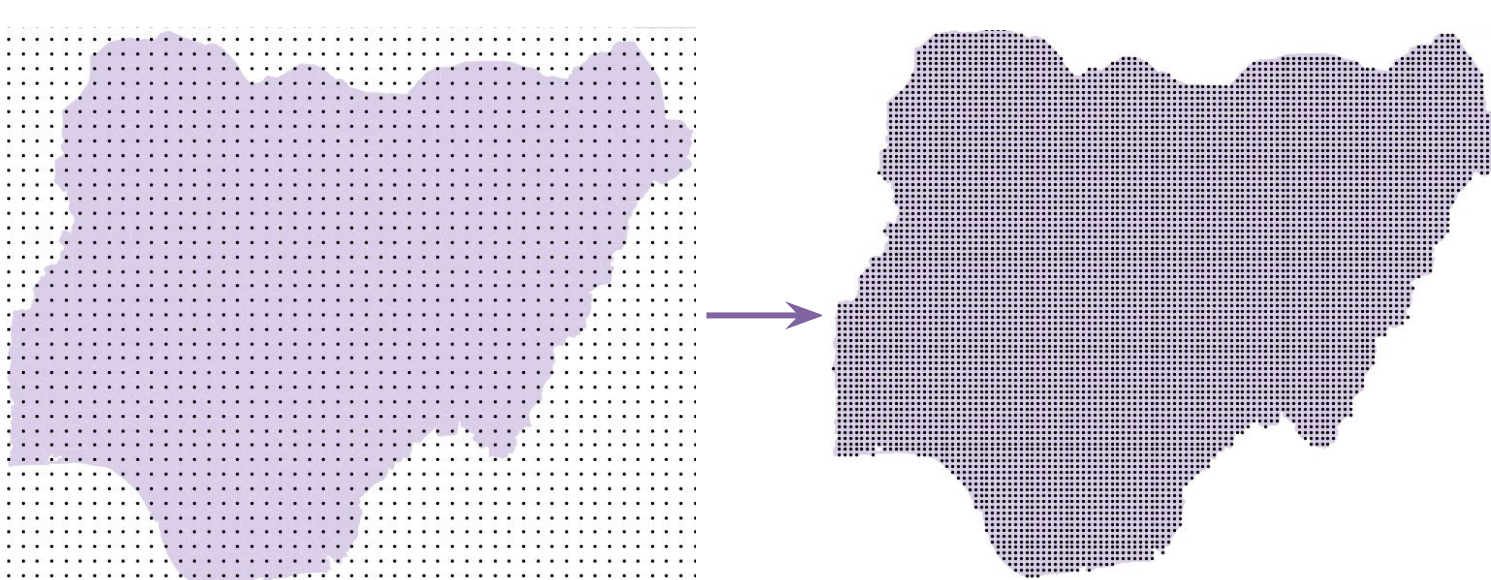
> example: **Sanitation**
> Not deprived: Have their **own** sanitation facility
> Moderately deprived: **Shared** sanitation facility
> Deprived: **No access** to sanitation facility

OUR THANKS

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(EXTREME) WEATHER INDICATORS

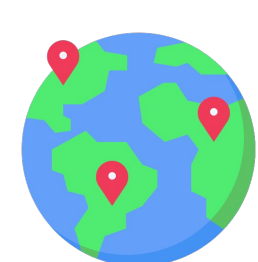We use **extreme weather** events (drought, extreme heat, etc.) as a proxy for measuring **climate change**.

Climate change → increases intensifies → Extreme weather events
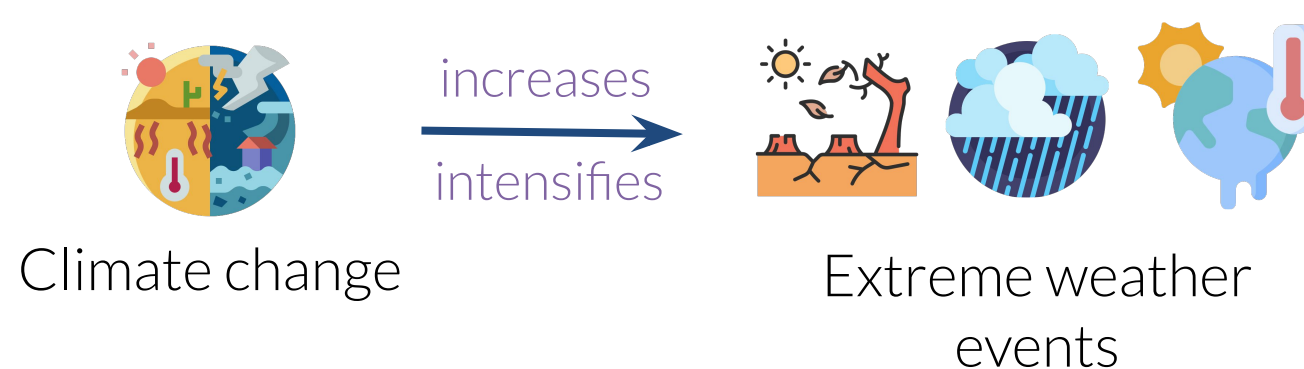
We choose indicators that have been shown to have a **higher effect of climate change**:

Data		Indicator
Air Temperature 2m above surface, daily, 0.25° × 0.25° resolution (Copernicus - ERA5)	→	Heatwave indicator
Precipitation Daily, 0.1° x 0.1° resolution (NASA Earthdata - IMERG)	→	Heavy rain index
	→	Standardised Precipitation Index

We **increase the resolution** of the grid points for temperature from 0.25 x 0.25 to 0.1 x 0.1 by using linear interpolation.
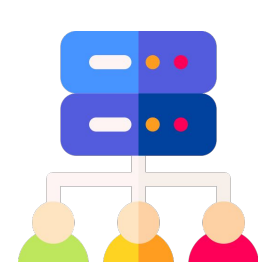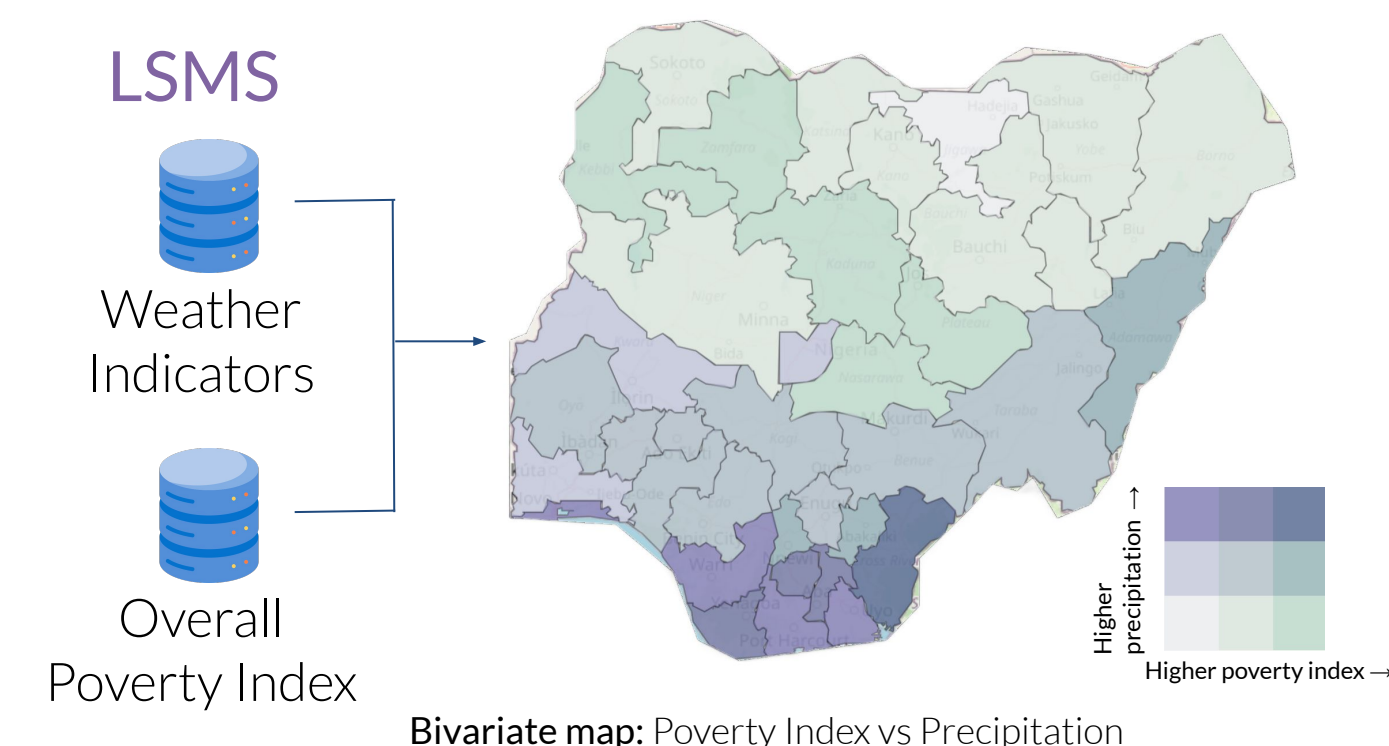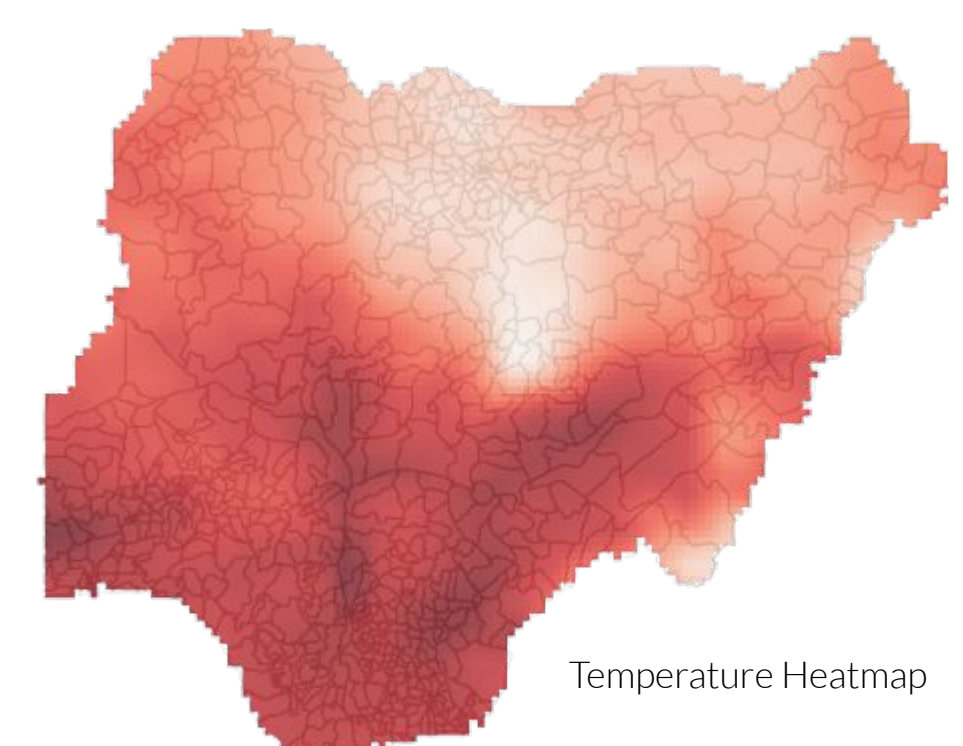

IMPACT

Scalability
Our tool uses open data and can be scaled to other countries

Policy analysis
Enables data-driven policy making

Social Impact
Policy makers will have tools they need to take necessary steps towards resilience to the severe impact of climate change

TOOL

We created a **publicly accessible website** using Streamlit that will display our data and enable researchers to do pilot analysis.

LSMS

Weather Indicators

Overall Poverty Index

**Bivariate map:** Poverty Index vs Precipitation

On selecting certain weather events, either in combination with the overall poverty index or with another weather event, we get visualizations like **univariate, and bivariate choropleths, heatmaps, time series**, etc.

Temperature Heatmap

We use different methods like DBSCAN, dynamic time warping (DTW), and correlation analysis to **cluster households that experience similar conditions**.

Weather Enhancement

Survey Coordinates   Gridded Weather Data   k-nearest neighbours   Survey + weather data
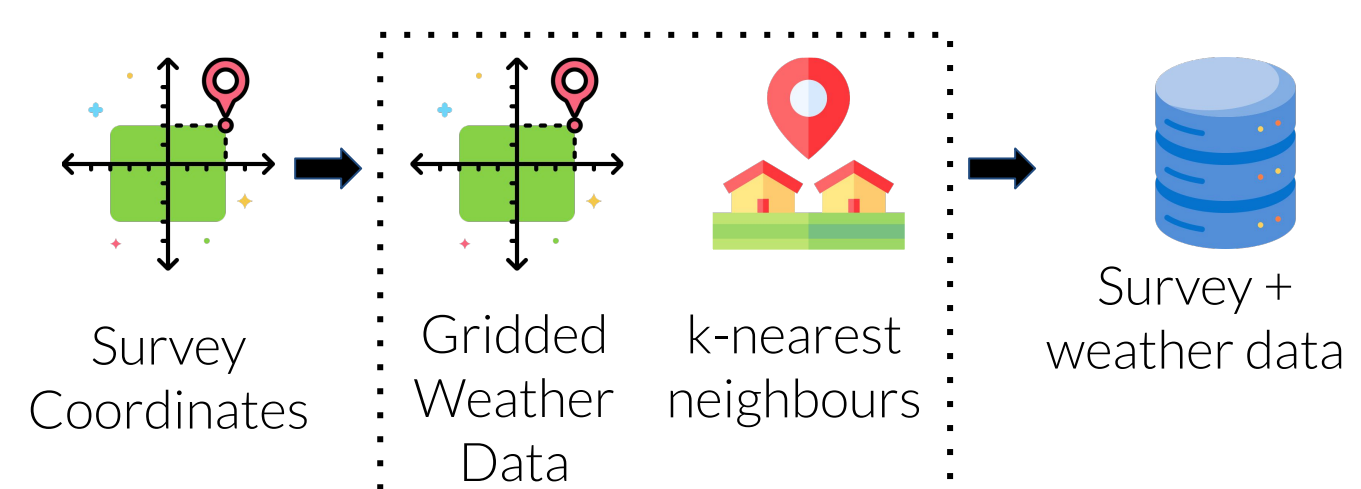
Given a file with latitude, longitude, and date, we use **knn** and **inverse distance weighting** to add weather-related features (temperature, precipitation, aggregated temperature and precipitation, SPI, heavy rain, heat wave).