Exploration of the Relationship Between Food Insecurity and Climate Change

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Data Selection and Exploration

- Explores the relationship between food insecurity and climate change
- Variables are the Global Hunger Index (GHI) and degree of environmental disaster by country
- Climatological disaster: long-term climatic disaster ie drought,
- We expect that regions that experience higher frequency of natural disasters, as well as higher degree of damage from natural disasters, are more likely to have overall worse rates of food insecurity on a national level
- The GHI dataset was taken from the public released, peer-reviewed data collected by a collaboration of Concern Worldwide, Welthungerhilfe, and the Institute for International Law of Peace and Armed Conflict
- Additionally, we analyzed a natural disaster dataset alongside water and waste statistics

ETL Pipeline Flowchart

Extraction of data from csv sources:

↓

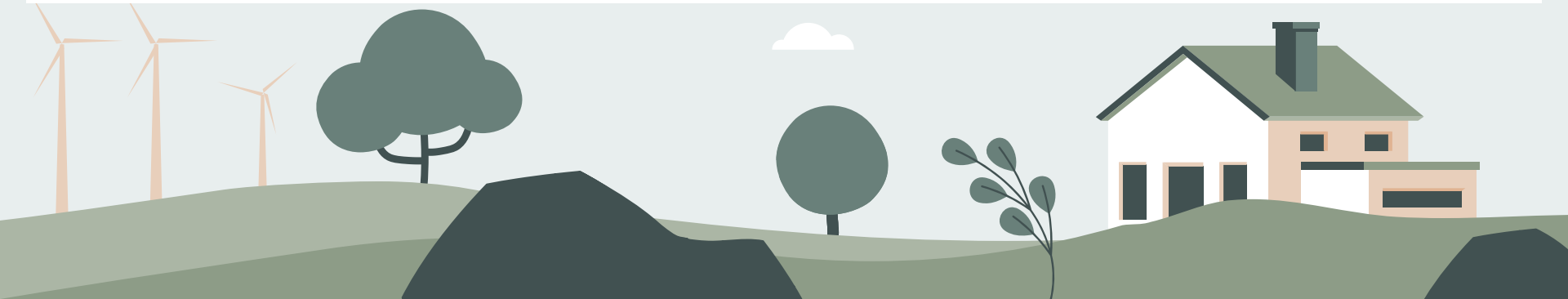
Transformation to a pandas dataframe,

data cleaning column names/empty rows/appropriate data type,

prompt user if they want to modify dataset to only values recorded after 2010

↓

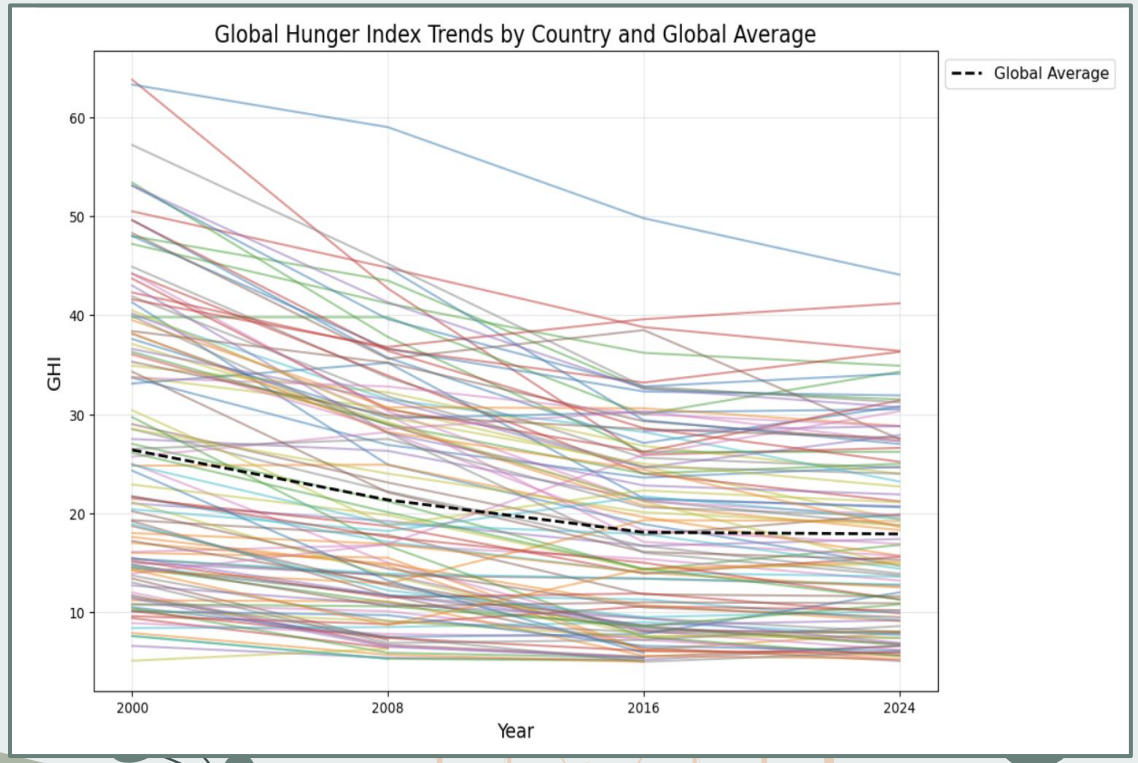
Loading updated data to mongoDB, ensure the most updated form is the one always being added to the database

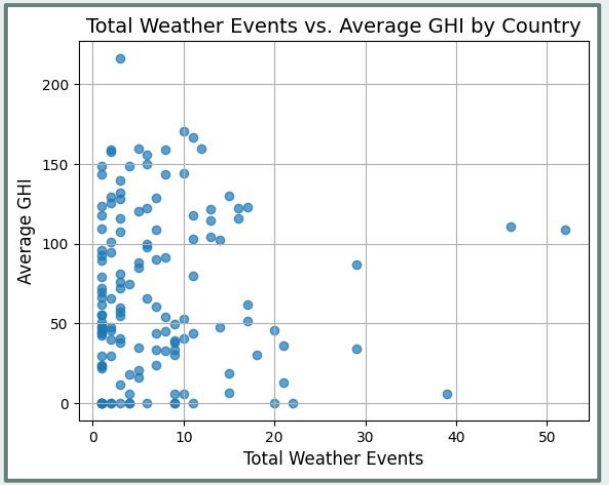


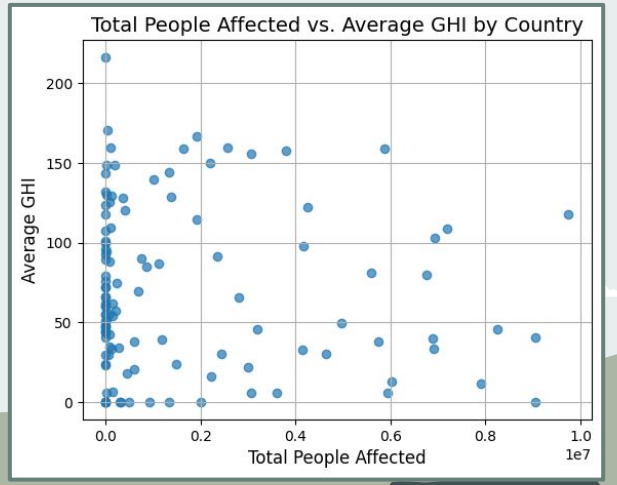
Cloud Storage

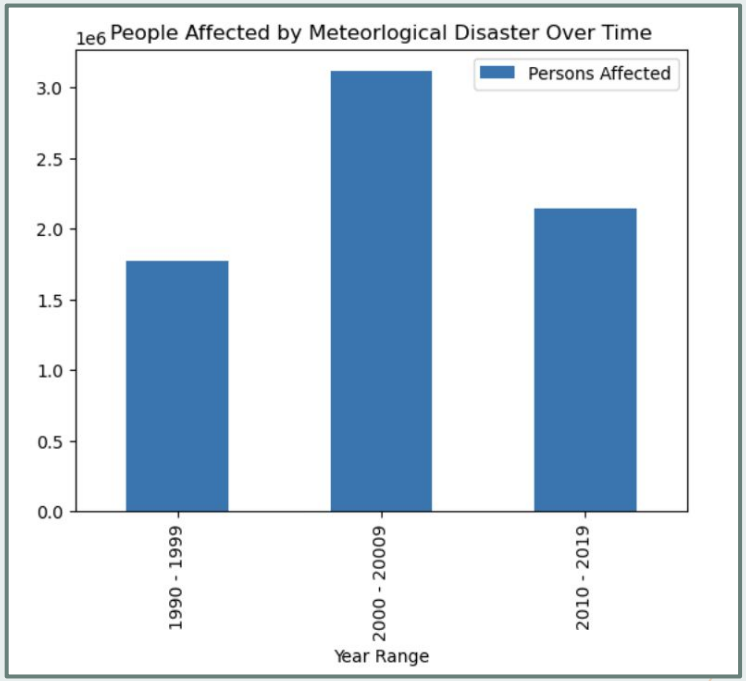
- Save csv files into Google Cloud bucket
- Made public for easy access

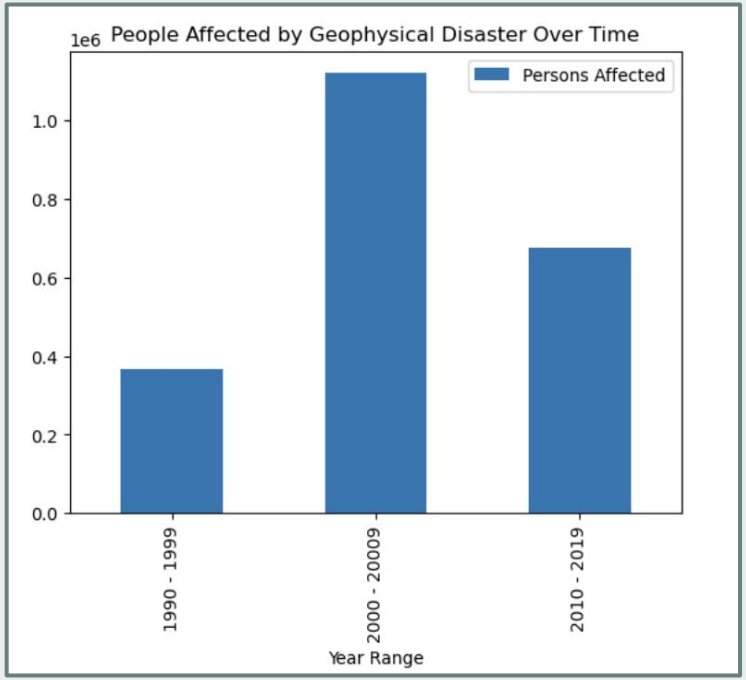
Data Analysis

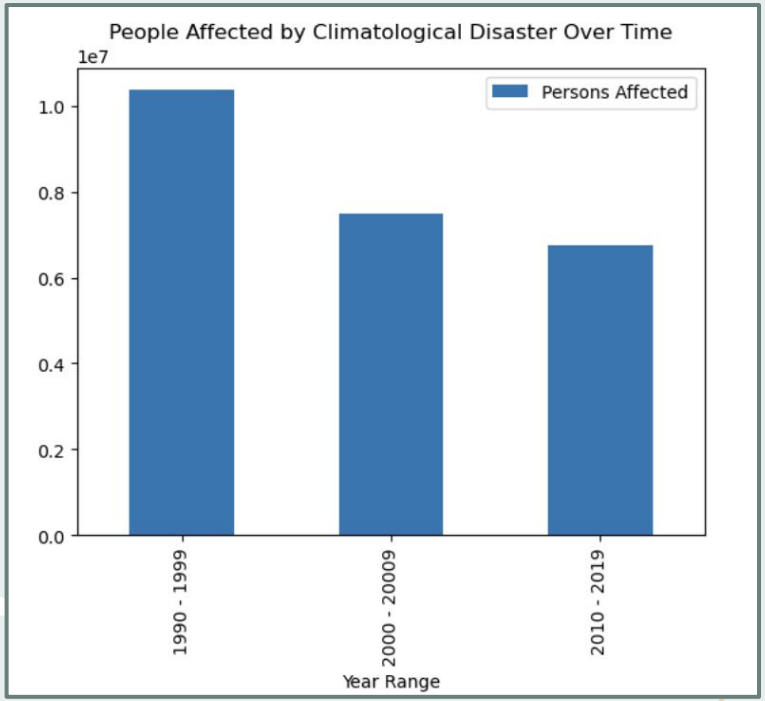


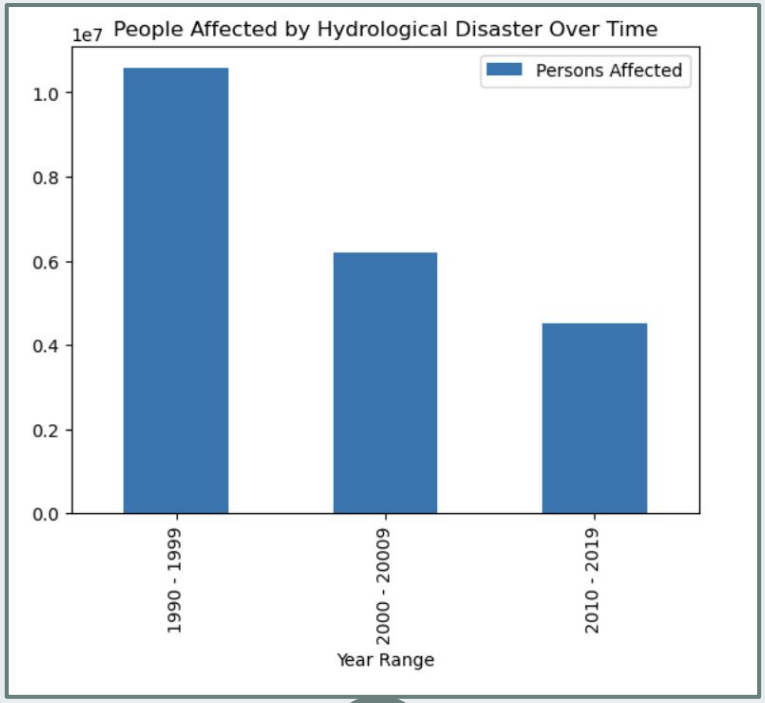


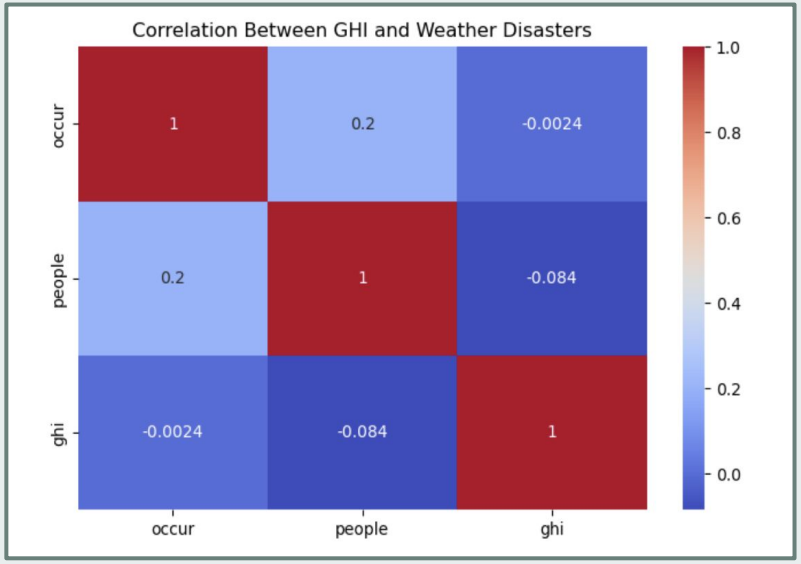


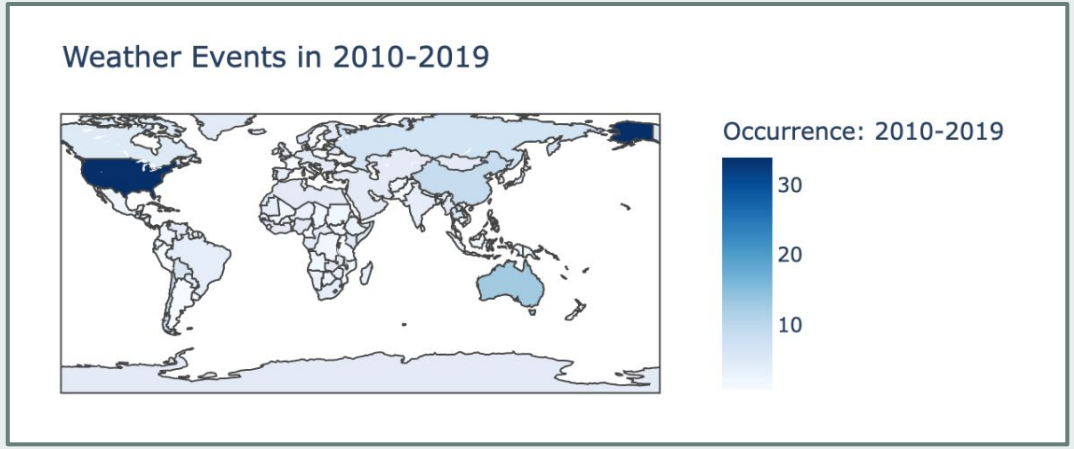

People Affected by Meteorlogical Disaster Over Time
1e6
Persons Affected
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1990 - 1999
2000 - 20009
2010 - 2019
Year Range


People Affected by Geophysical Disaster Over Time
1e6
Persons Affected
1.0
0.8
0.6
0.4
0.2
0.0
1990 - 1999
2000 - 20009
2010 - 2019
Year Range


People Affected by Climatological Disaster Over Time
1e7
Persons Affected
1.0
0.8
0.6
0.4
0.2
0.0
1990 - 1999
2000 - 20009
2010 - 2019
Year Range

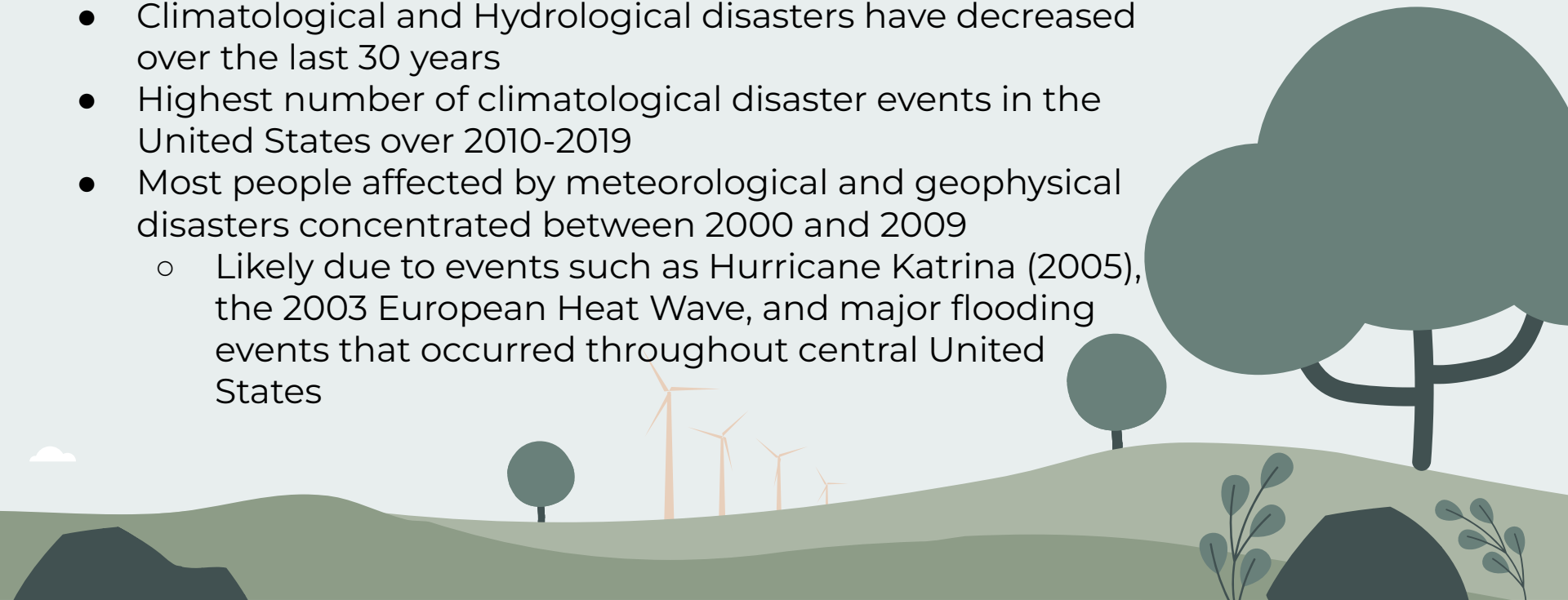

People Affected by Hydrological Disaster Over Time
1e7
Persons Affected
1.0
0.8
0.6
0.4
0.2
0.0
1990 - 1999
2000 - 20009
2010 - 2019
Year Range


Correlation Between GHI and Weather Disasters
occur
people
ghi
1
0.2
-0.0024
0.2
1
-0.084
-0.0024
-0.084
1
occur
people
ghi
1.0
0.8
0.6
0.4
0.2
0.0


Weather Events in 2010-2019
Occurrence: 2010-2019
30
20
10

Key Findings

- Weak correlation
- Over time Global Hunger Index across the world has decreased
- Climatological and Hydrological disasters have decreased over the last 30 years
- Highest number of climatological disaster events in the United States over 2010-2019
- Most people affected by meteorological and geophysical disasters concentrated between 2000 and 2009
    - Likely due to events such as Hurricane Katrina (2005), the 2003 European Heat Wave, and major flooding events that occurred throughout central United States



Challenges

- **Data cleaning was a very tedious process, consisting of:**
  - Fixing column headers
  - Removing empty rows
  - Converting observation from string to numeric; ensuring data types were float
- **Understanding google cloud storage and navigating its features**
  - Establishing authorization credentials to store the data.
  - Difficulty securely storing and sharing credentials, which led to unauthorized access or delays in collaboration.
  - Setting up permissions without risking possibility of data breaches.
- **Original weather data we wanted to use became unavailable during the project, which required us to pivot to a different dataset**
  - This dataset, however, offered insignificant results and timelines that didn't match with the hunger dataset
  - Weather was not normalized to per person/population, raw number counts
  - Time coherence: averaged data over time with GHI to match range of years collected from climatological disaster