DATA 5310

Effects of Climate Change on Natural Disasters

Nitharsan Sivakanthan

Prateek Kakkar

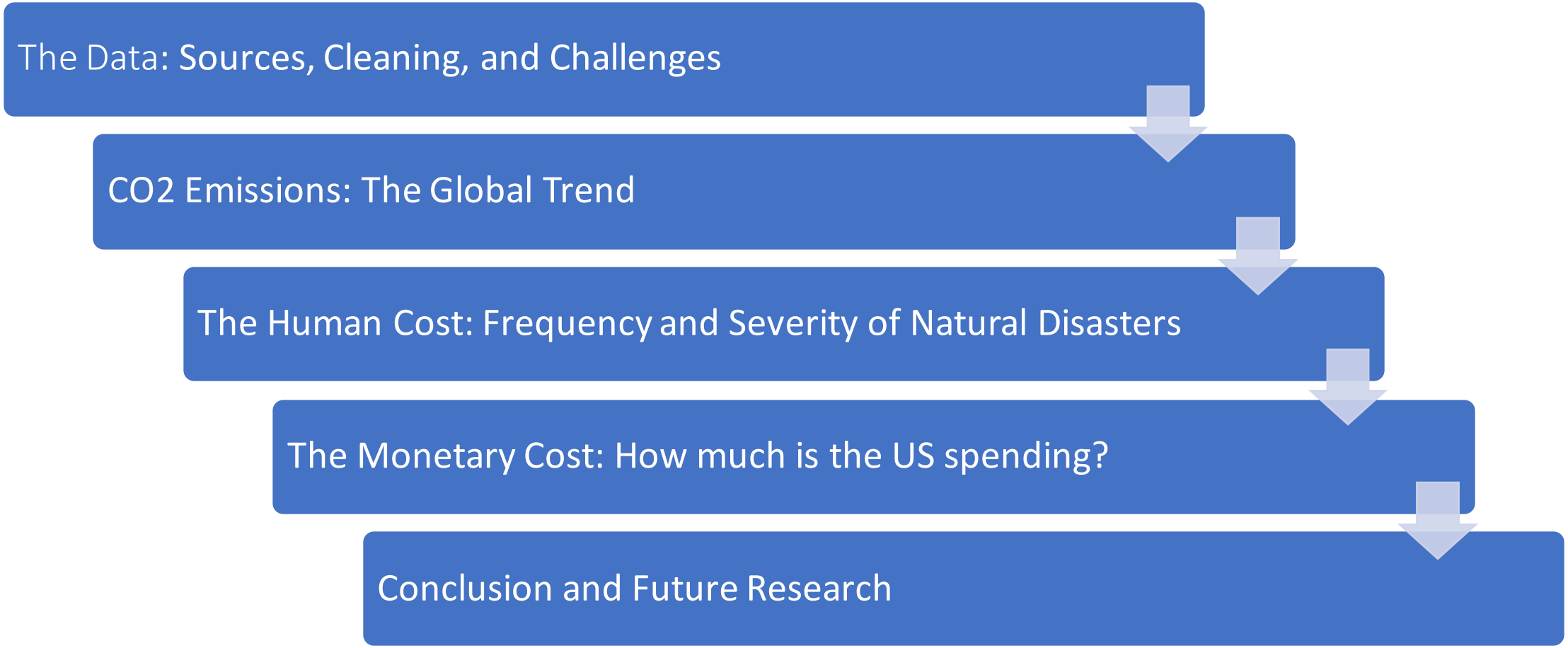
Ramgopal Reddy Putta

Introduction

Is climate change affecting the frequency and severity of natural disasters?

If so, can governments save human lives and money by reducing CO2 emissions?

Road Map


The Data: Sources, Cleaning, and Challenges
CO2 Emissions: The Global Trend
The Human Cost: Frequency and Severity of Natural Disasters
The Monetary Cost: How much is the US spending?
Conclusion and Future Research

The Data

USED DATA FROM KAGGLE, OUR WORLD IN DATA, AND DATAHUB

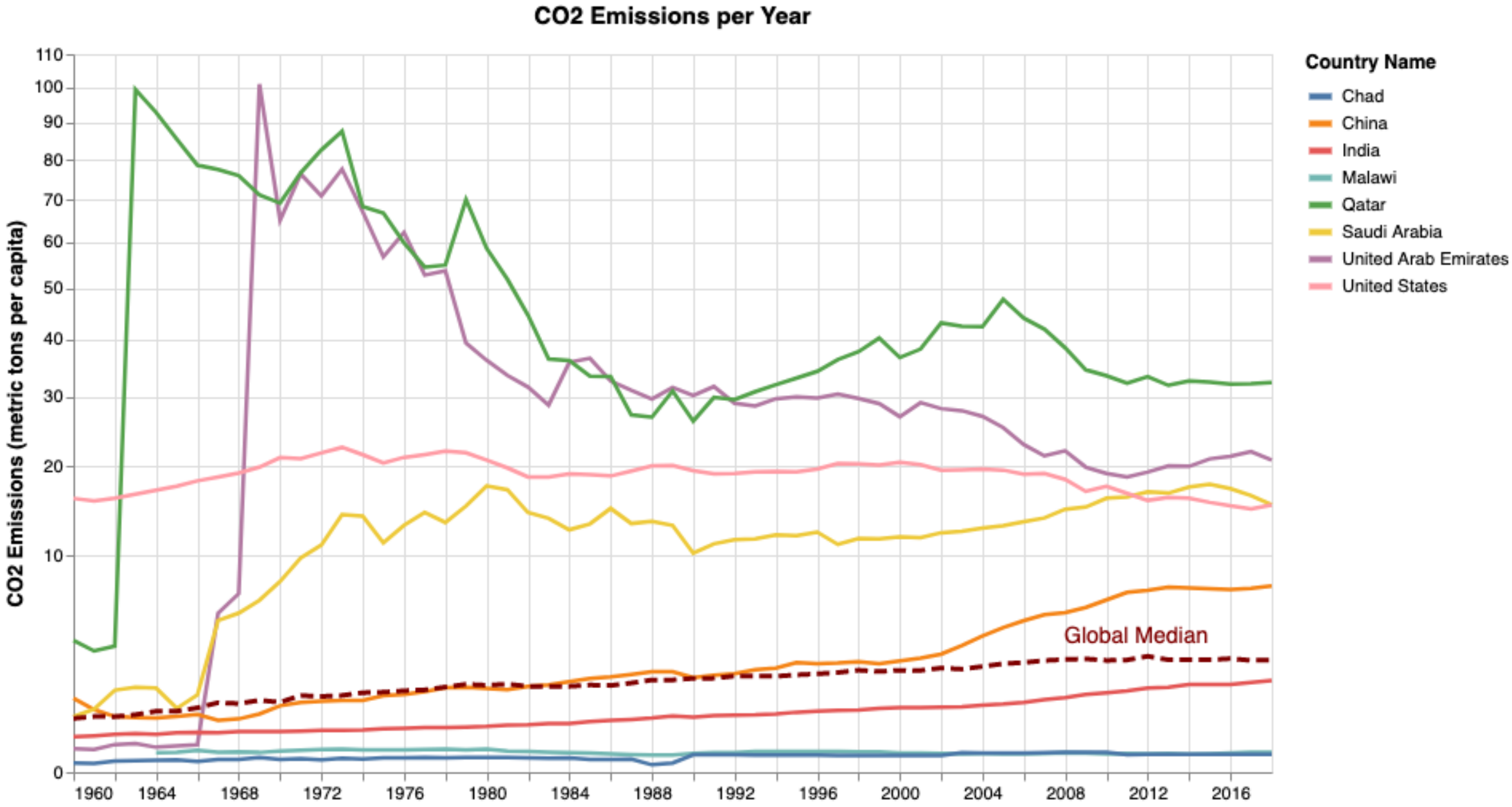
CLEANING/CHALLENGES: DEALING WITH CONFLICTING DATA SOURCES

CO_2 EMISSIONS

The Global Trend

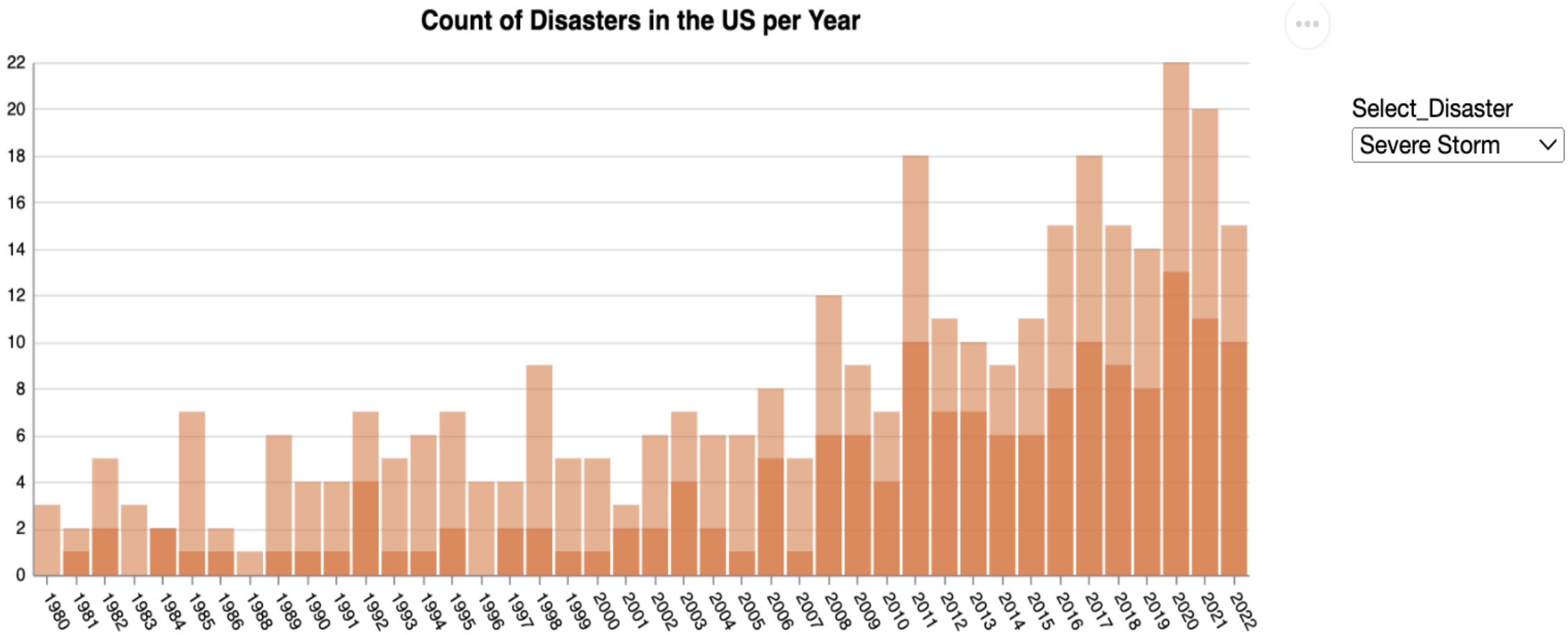
Top 15 CO_2 Emitting Countries in 2021

Country Name	CO_2 Emissions (Metric Tons per Capita) in 2021
Qatar	35.59
Bahrain	26.66
Kuwait	24.97
Trinidad and Tobago	23.68
Brunei	23.53
United Arab Emirates	21.79
New Caledonia	19.10
Saudi Arabia	18.70
Oman	17.92
Australia	15.09
Mongolia	15.03
United States	14.86
Sint Maarten (Dutch part)	14.70
Kazakhstan	14.41
Canada	14.30


CO2 Emissions per Year
CO2 Emissions (metric tons per capita)
110
100
90
80
70
60
50
40
30
20
10
0
1960
1964
1968
1972
1976
1980
1984
1988
1992
1996
2000
2004
2008
2012
2016
Global Median
Country Name
Chad
China
India
Malawi
Qatar
Saudi Arabia
United Arab Emirates
United States

The Human Cost

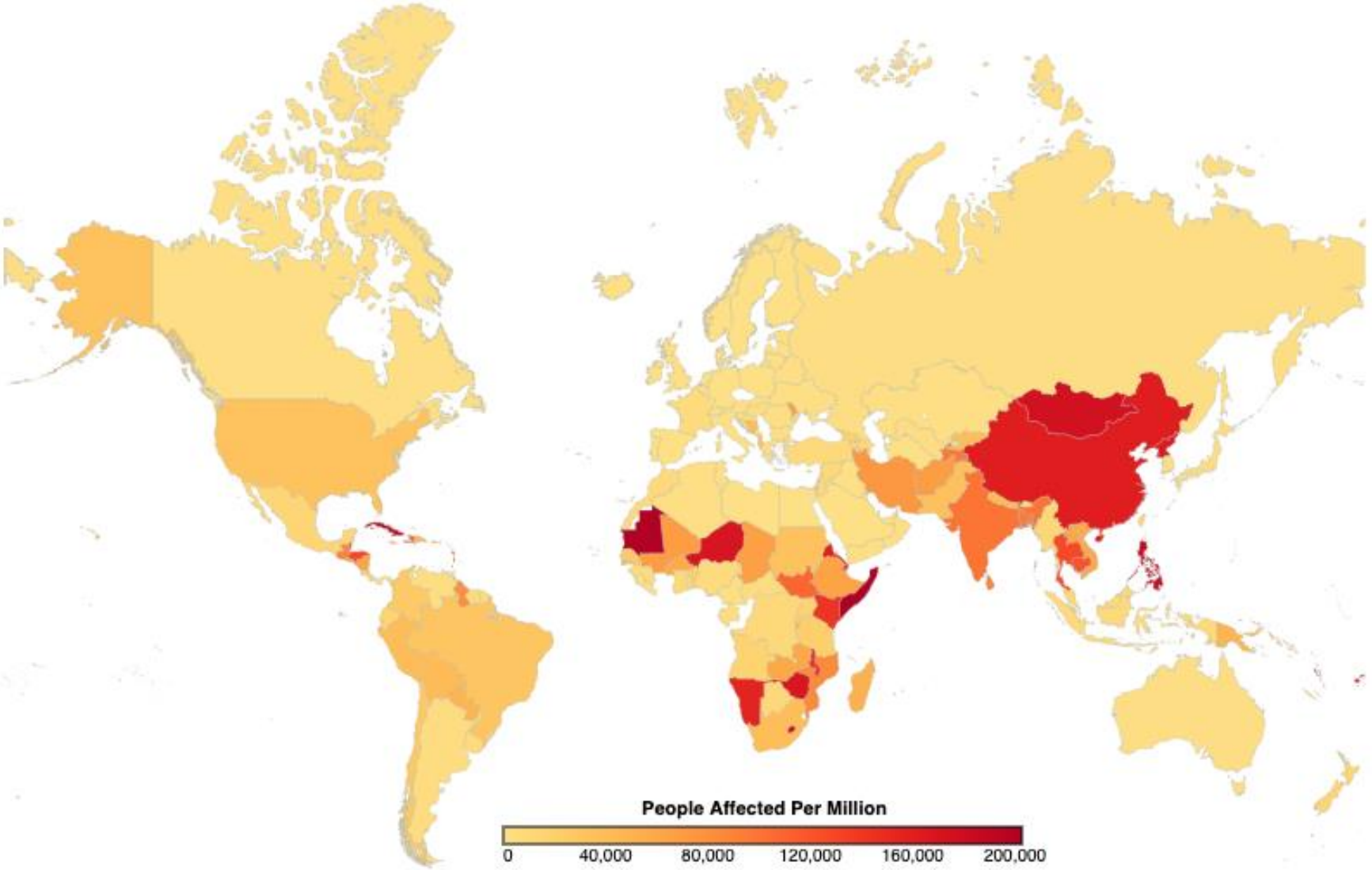
Frequency and Severity of Natural Disasters

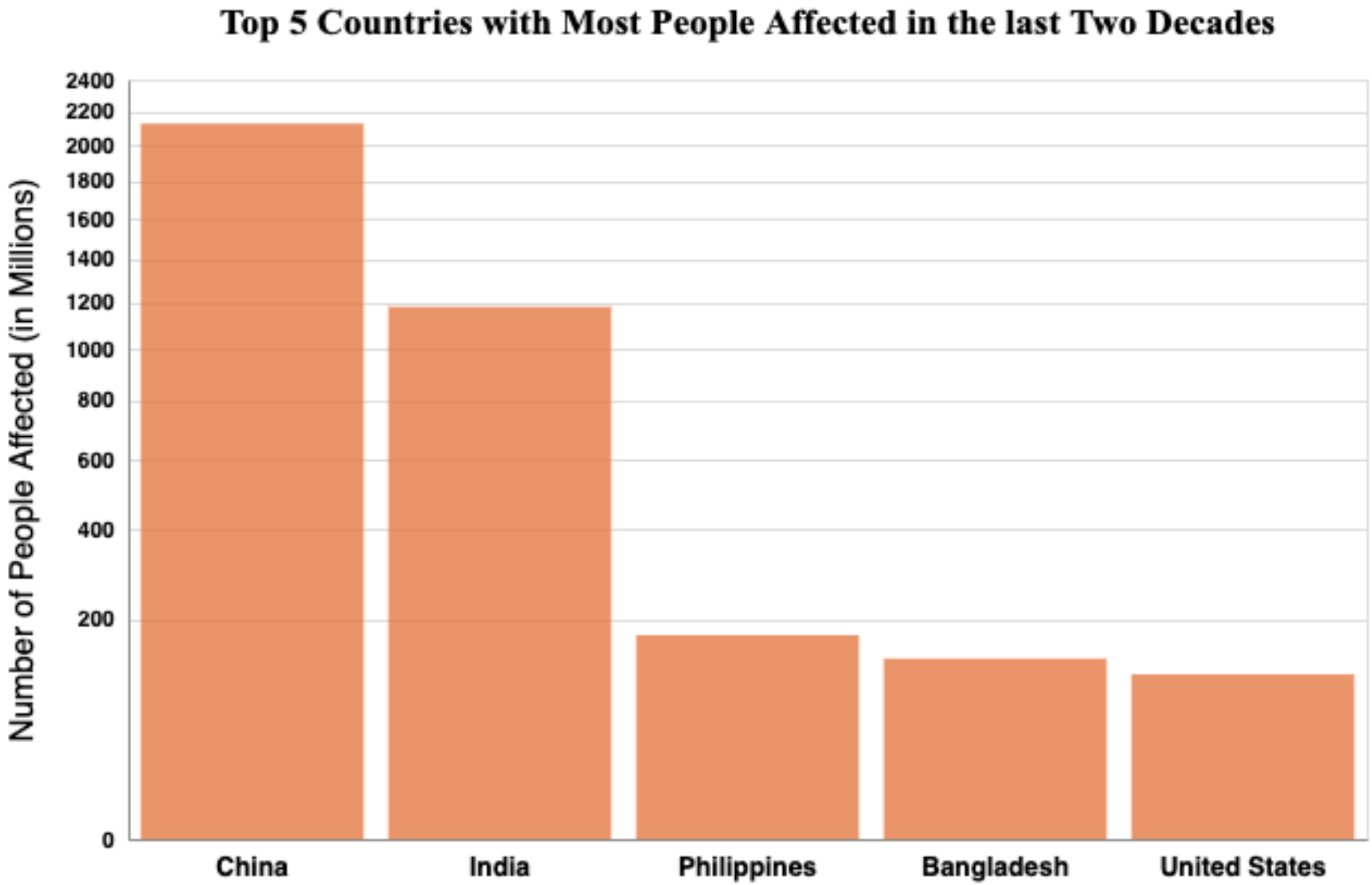


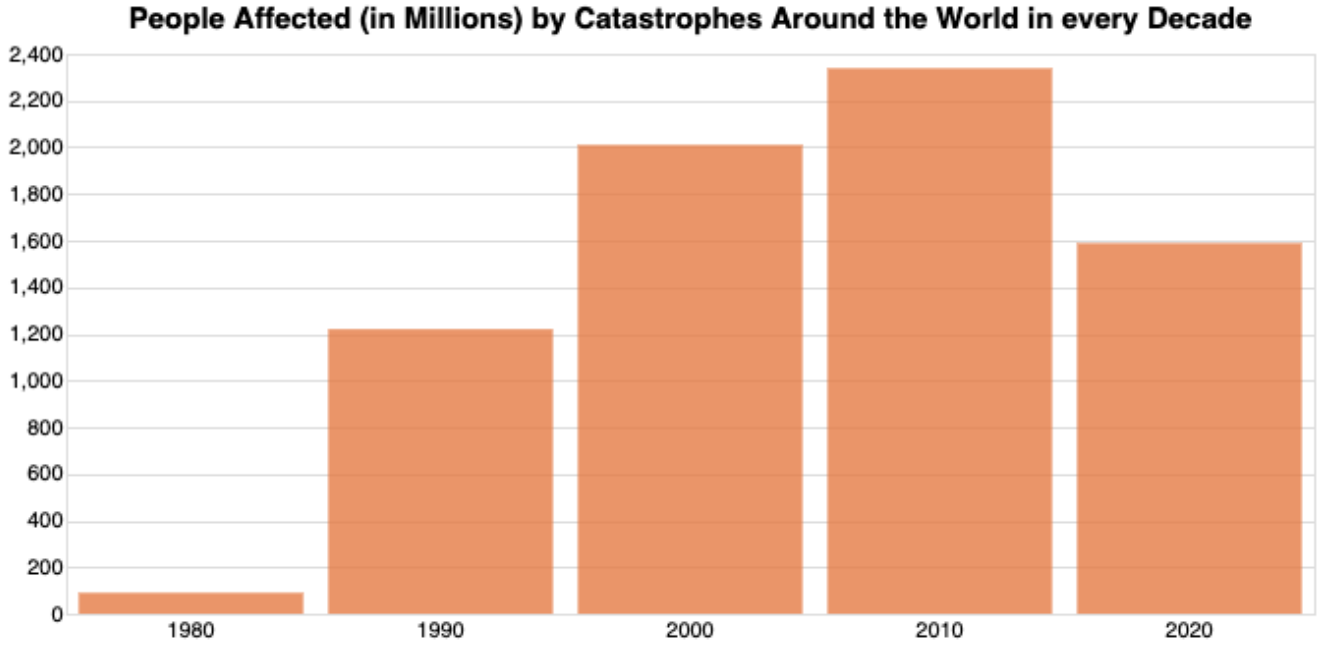
Select_Disaster

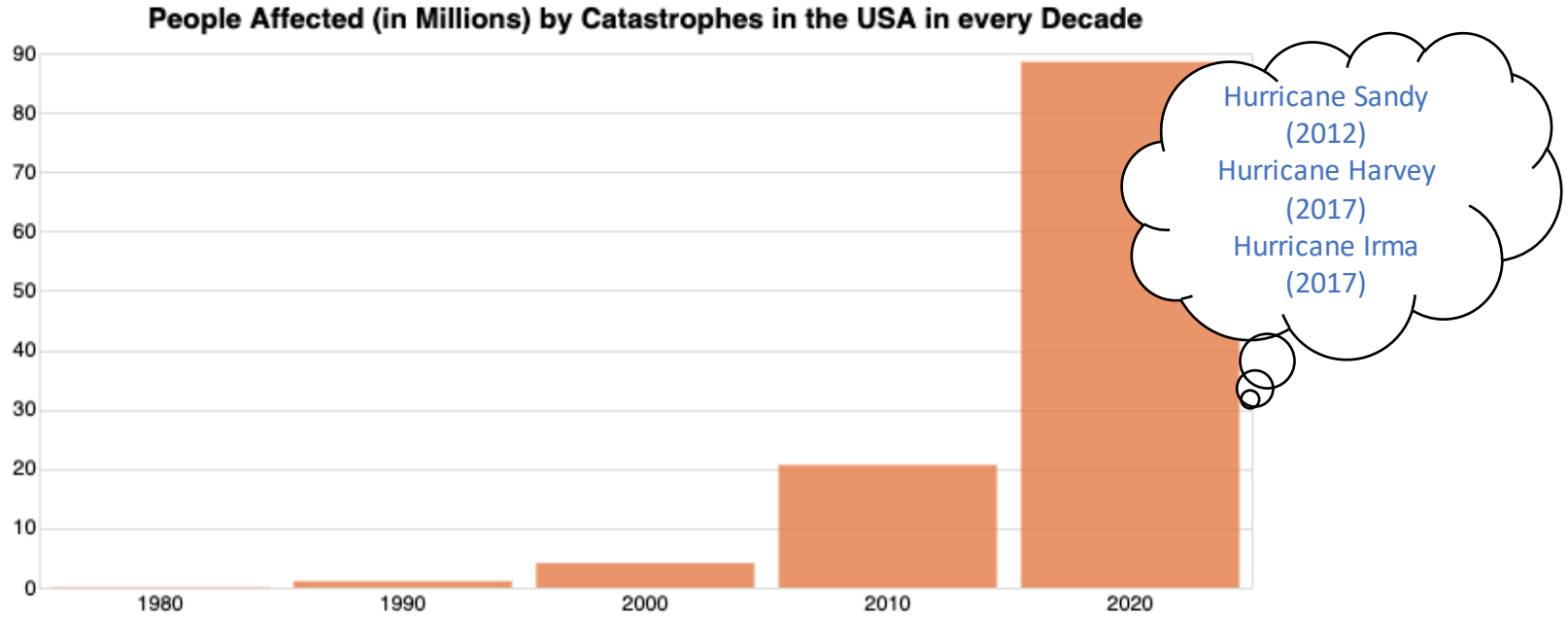
Severe Storm

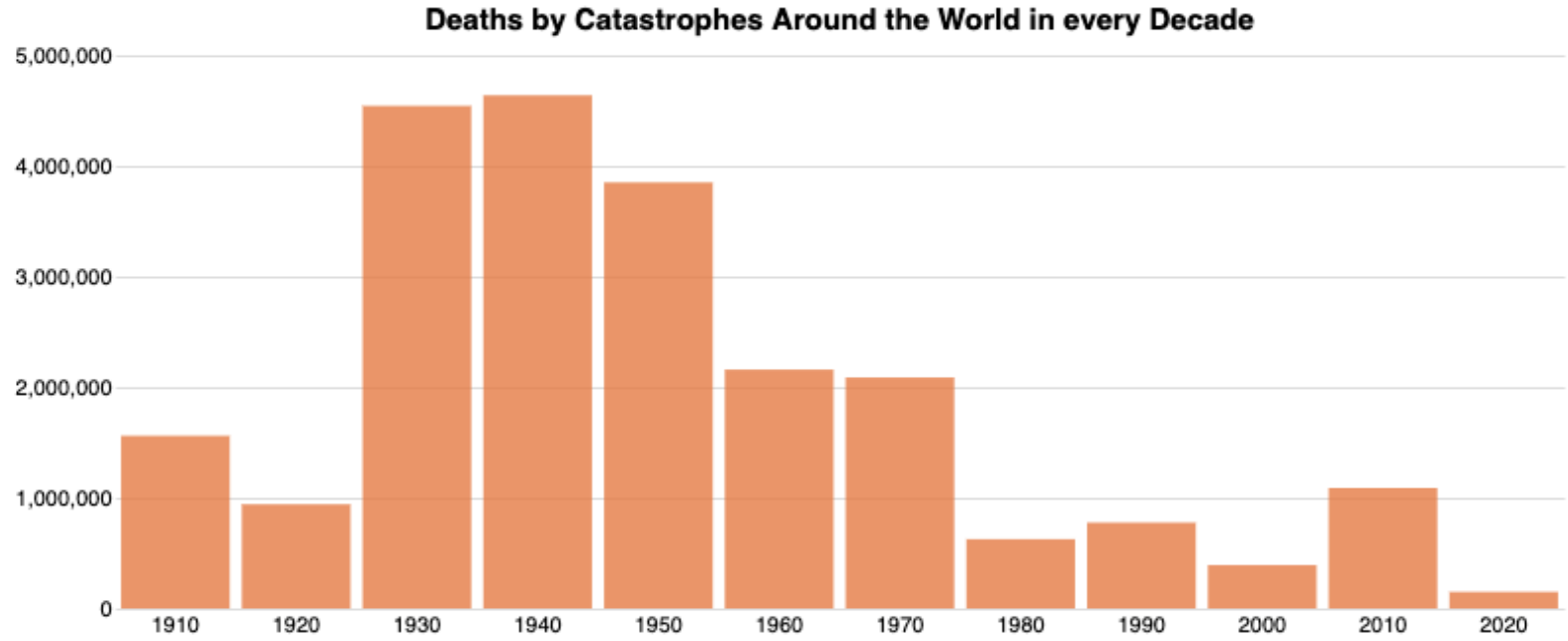
People Affected By Disasters Globally Per Million

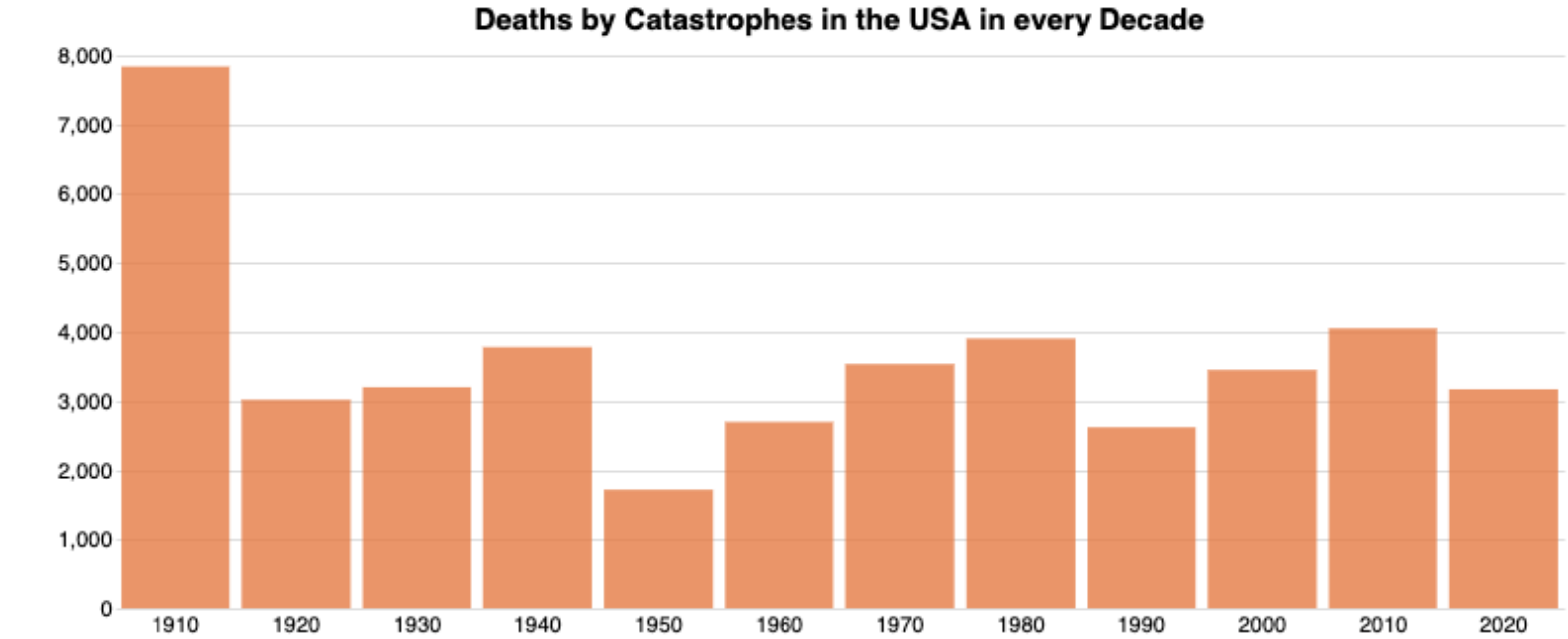



Top 5 Countries with Most People Affected in the last Two Decades
Number of People Affected (in Millions)
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
China
India
Philippines
Bangladesh
United States

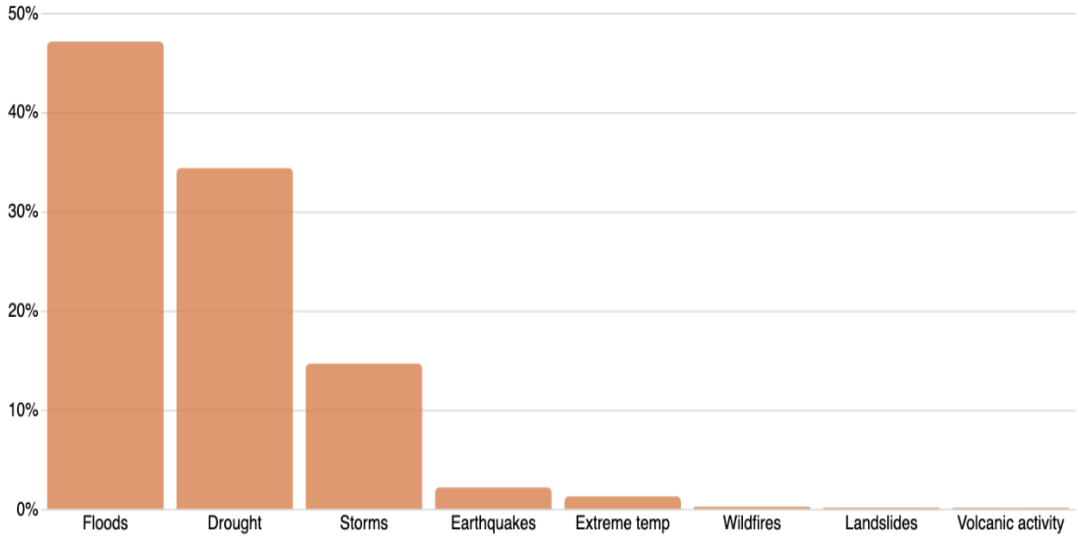

People Affected (in Millions) by Catastrophes Around the World in every Decade
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1980
1990
2000
2010
2020


People Affected (in Millions) by Catastrophes in the USA in every Decade
90
80
70
60
50
40
30
20
10
0
1980
1990
2000
2010
2020
Hurricane Sandy
(2012)
Hurricane Harvey
(2017)
Hurricane Irma
(2017)


Deaths by Catastrophes Around the World in every Decade
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020

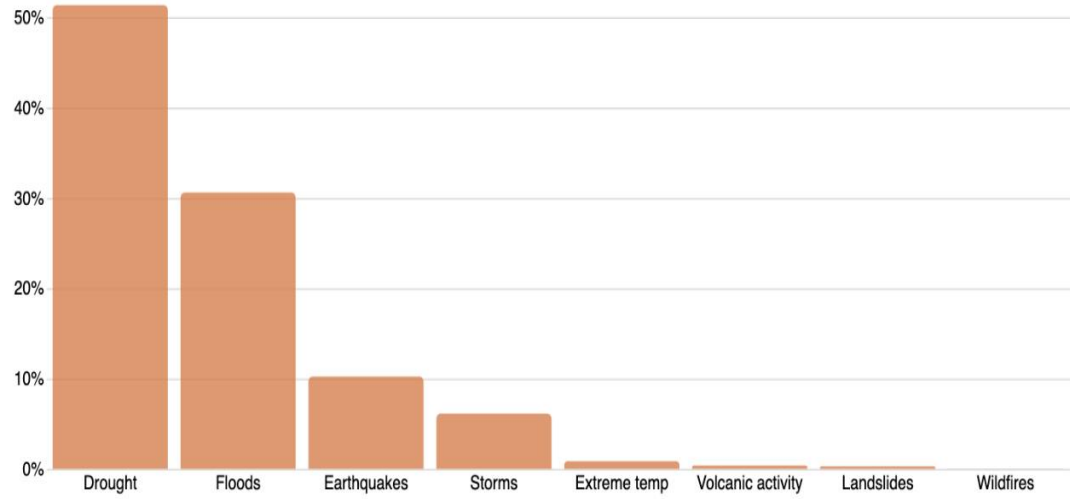

Deaths by Catastrophes in the USA in every Decade
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020

Percentage of People Impacted by Catastrophes Around the World



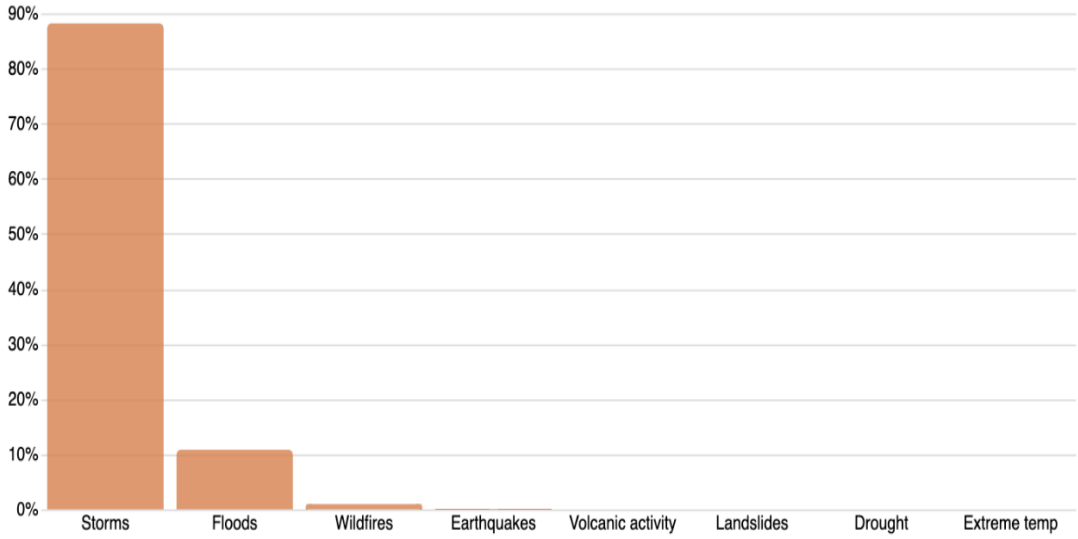
Select_the_Impact
Deaths
Affected

Percentage of People Impacted by Catastrophes Around the World



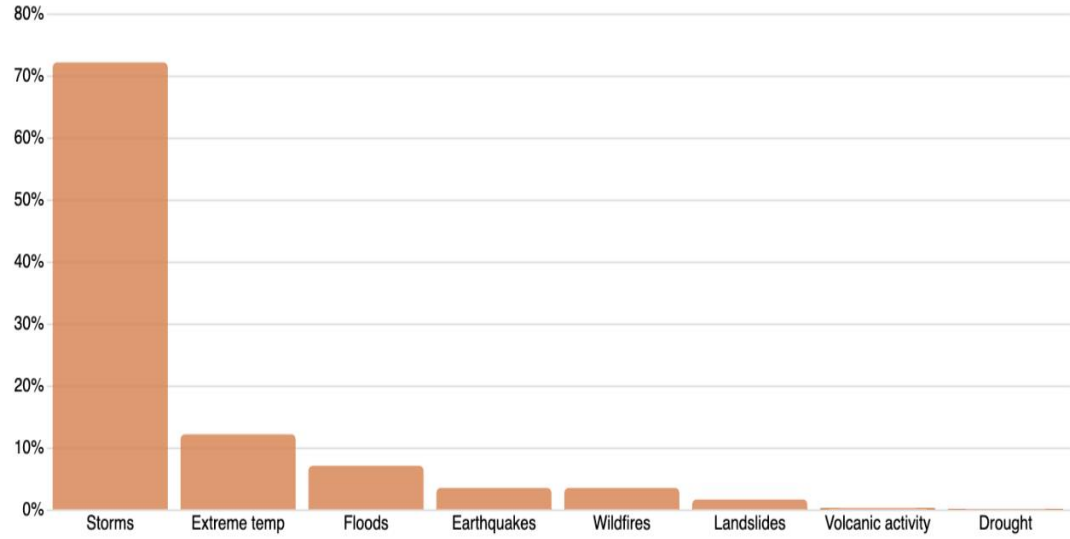
Select_the_Impact
Deaths
Affected

Percentage of People Impacted by Catastrophes in the USA

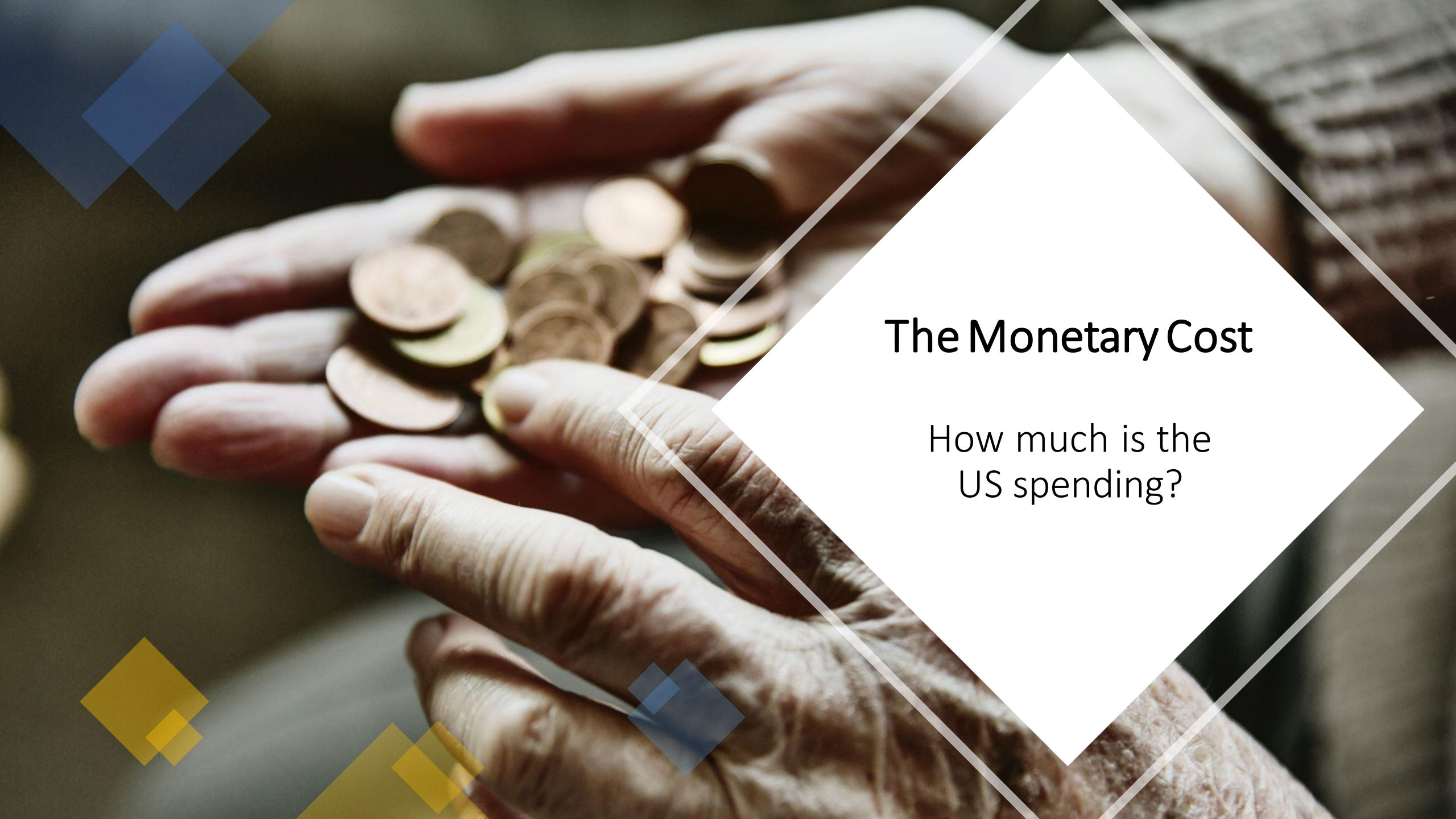


Percentages are based off the total count from the year 1980 to 2022

Percentage of People Impacted by Catastrophes in the USA



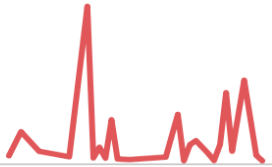
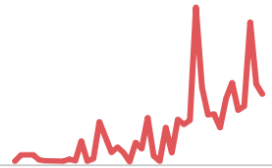
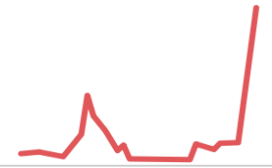
Percentages are based off the total count from the year 1980 to 2022

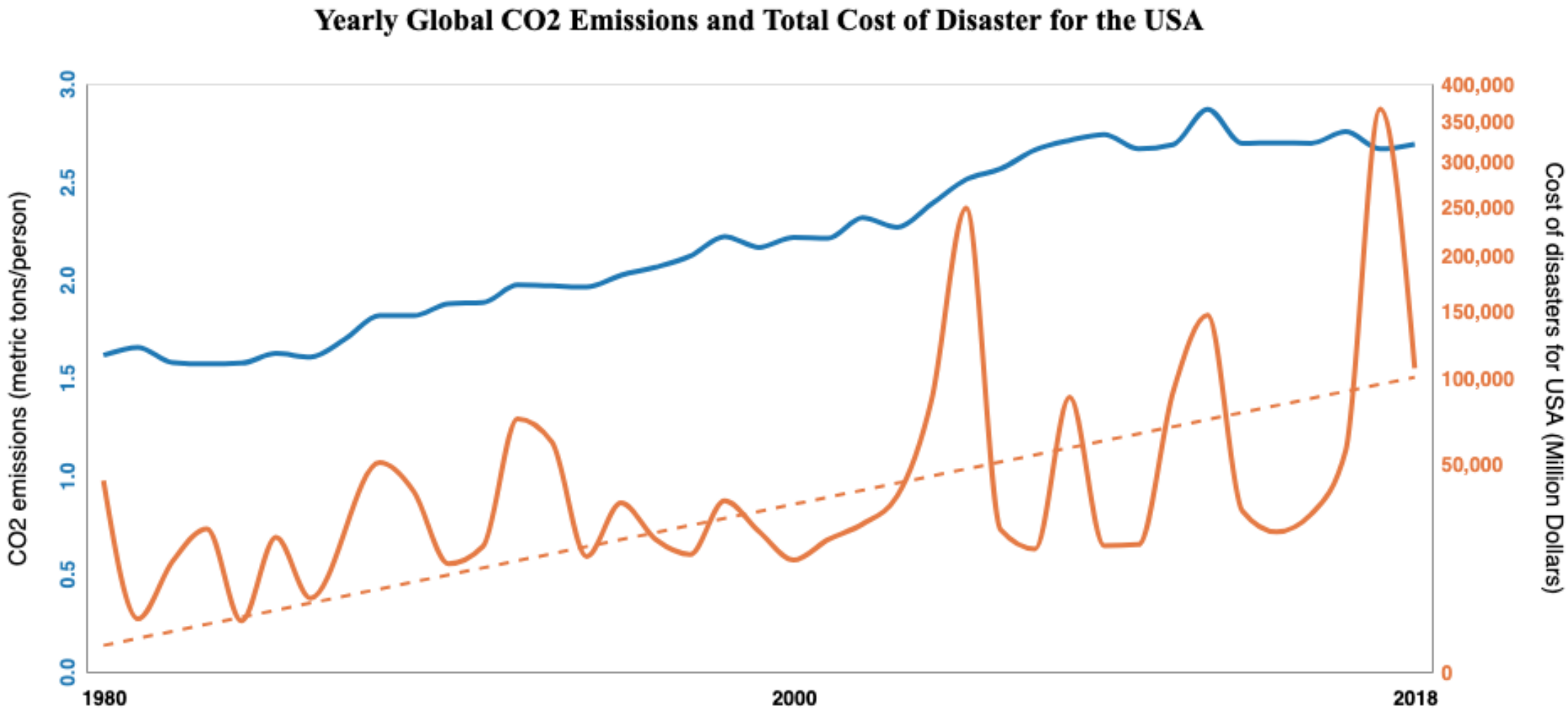


The Monetary Cost

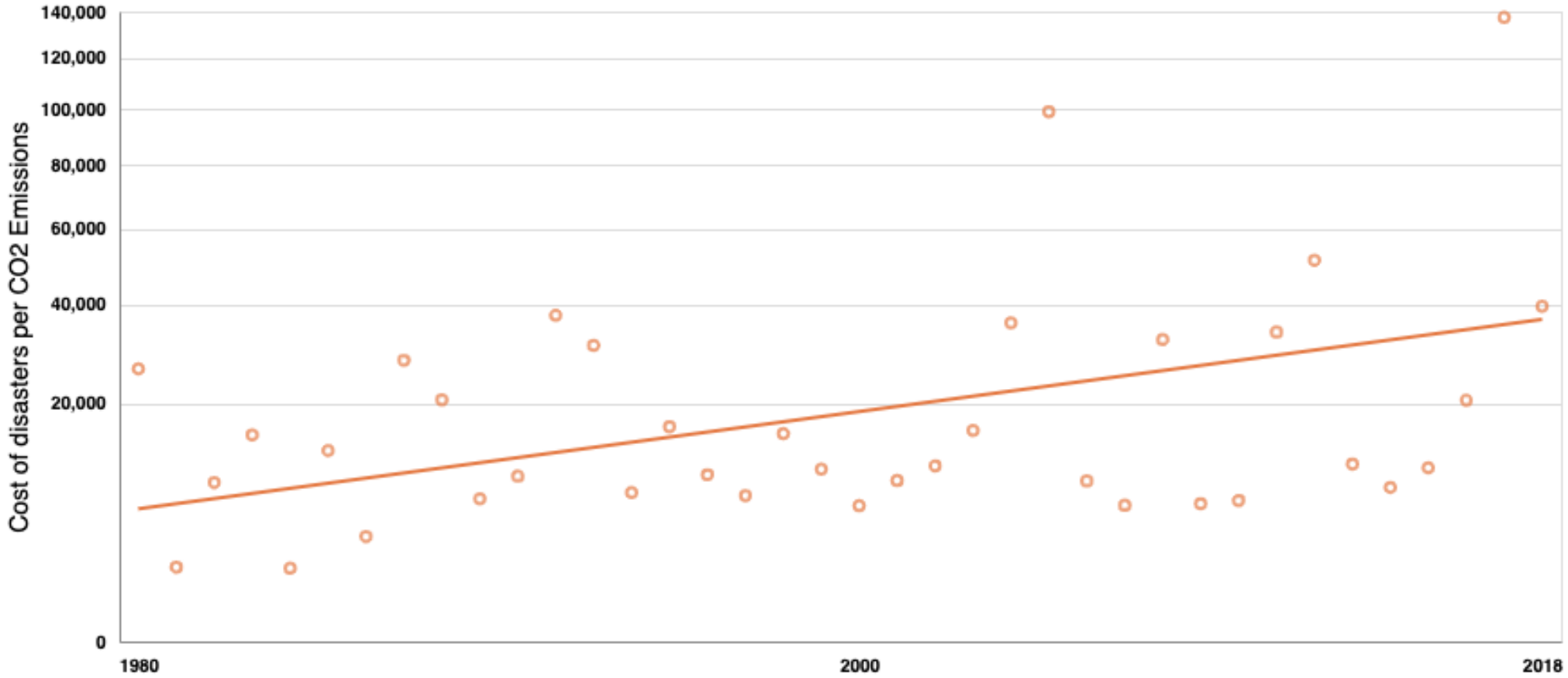
How much is the
US spending?

Trend of the Amount (In Million Dollars) spent by the US government on Catastrophes

Disasters	Min Cost	1980 : 2022	Max Cost
Drought	$1,880		$50,610
Flooding	$1,192		$42,970
Freeze	$1,200		$7,786
Severe Storm	$1,070		$13,288
Tropical Cyclone	$1,087		$186,294
Wildfire	$1,376		$27,840
Winter Storm	$1,103		$25,182


Yearly Global CO2 Emissions and Total Cost of Disaster for the USA
CO2 emissions (metric tons/person)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Cost of disasters for USA (Million Dollars)
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
1980
2000
2018

Yearly Economic Costs per CO2 Emission for the USA



Cost of Disasters per CO2 emissions is calulated as Cost (in Millions US Dollars) per CO2 emissions (Metric Tons per Capita)

Conclusions

Increasing trends in CO2 emissions, counts of natural disasters, number of people affected by disasters, and monetary cost

Potential to save lives, improve lives, and save billions of $ by reducing C02 emissions

Future research: establish causal relationships, how disaster relief is used, data collection issues to address

Questions?

References

1. NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2022). https://www.ncei.noaa.gov/access/billions/, DOI: 10.25921/stkw-7w73

2. Centre for research on the epidemiology of disasters: Centre for research on the epidemiology of disasters (no date) *Centre for Research on the Epidemiology of Disasters | Centre for Research on the Epidemiology of Disasters*. Available at: https://www.cred.be/publications

3. Paper, D.A. (2020) *How climate change contributed to the Australian bushfires, Double A Paper Supplier*. Available at: https://us.doubleapaper.com/home/climate-change-australian-bushfires/

Data Sources

CO2 Emissions:

- https://www.kaggle.com/datasets/kkhandekar/co2-emissions-1960-2018

US Billion Dollar Disasters:

- https://www.kaggle.com/datasets/michaelbryantds/billiondollar-disasters

Our World In Data Natural Disasters and CO2 Emissions:

- https://ourworldindata.org/natural-disasters

CO2 Emissions 2021

- https://ourworldindata.org/grapher/co-emissions-per-capita

World map GeoJSON files:

- Country Polygons as GeoJSON - Dataset - DataHub - Frictionless Data