Storms and their Consequences in the United States

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##introduction

Storms and other severe weather events can cause both public health and economic problems for communities and municipalities. Many severe events can result in fatalities, injuries, and property damage, and preventing such outcomes to the extent possible is a key concern.

This project involves exploring the U.S. National Oceanic and Atmospheric Administration's (NOAA) storm database. This database tracks characteristics of major storms and weather events in the United States, including when and where they occur, as well as estimates of any fatalities, injuries, and property damage.

Research questions

1. Across the United States, which types of events (as indicated in the EVTYPE are most harmful with respect to population health?
2. Across the United States, which types of events have the greatest economic consequences?

Synopsis

In this data analysis, I sought to investigate weather events that cause the most damag to the U.S in terms of fatalities and injuries of population as well as the economic damages including properties damage and crop damages.

Data Processing

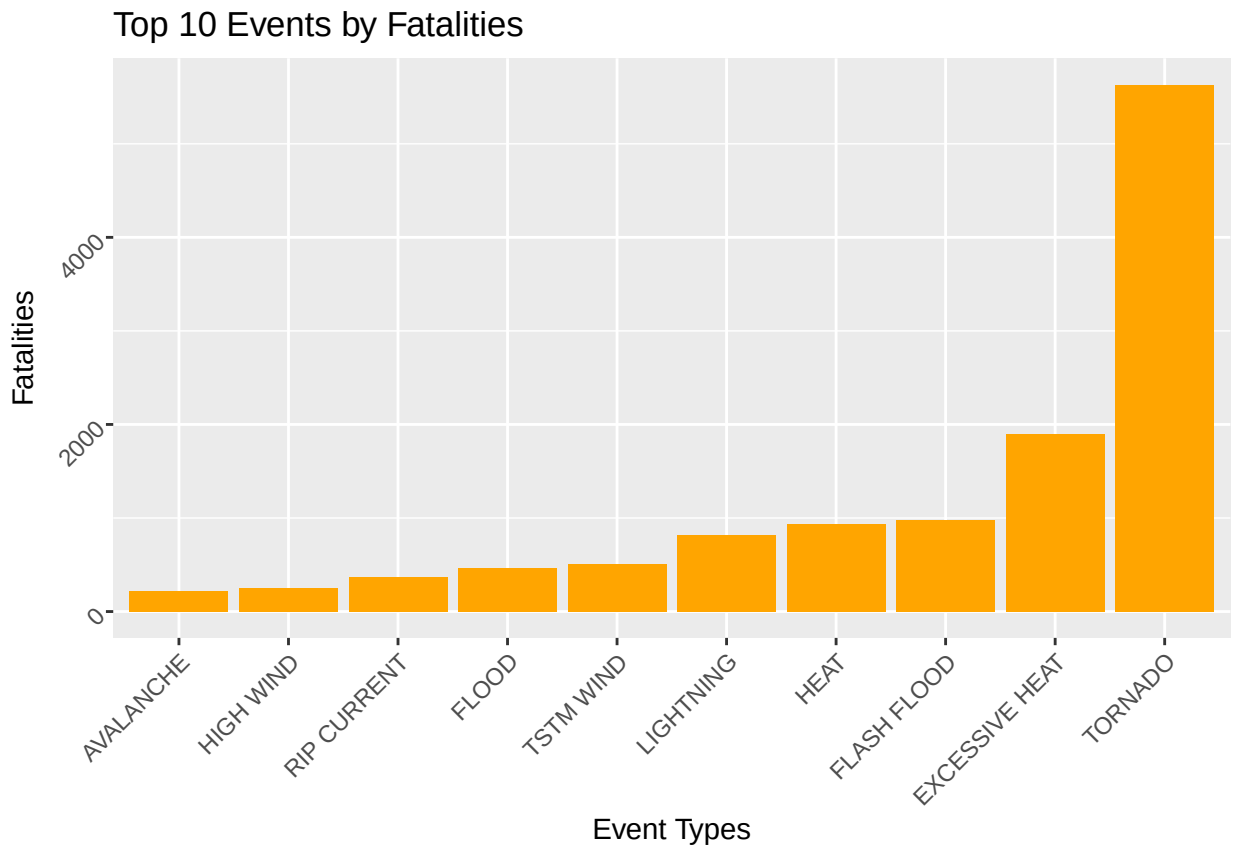
Answer the two research questions ### Events are most harmful to population health?

```
data <- read.csv("repdata_data_StormData.csv", header = TRUE)
# Fatalities
fatatility <- aggregate(FATALITIES ~ EVTYPE, data= data, FUN = sum)
dim(fatatility)
```

```
## [1] 985   2
```

```
## top 10 weather events with most fatality
topfata <- fatatility[order(-fatatility$FATALITIES),][1:10,]
library(ggplot2)
g1 <- ggplot(topfata, aes(x = reorder (EVTYPE, FATALITIES), y =FATALITIES)) +
    geom_bar(stat = "identity", fill = "orange") +
    ggtitle("Top 10 Events by Fatalities") +
```

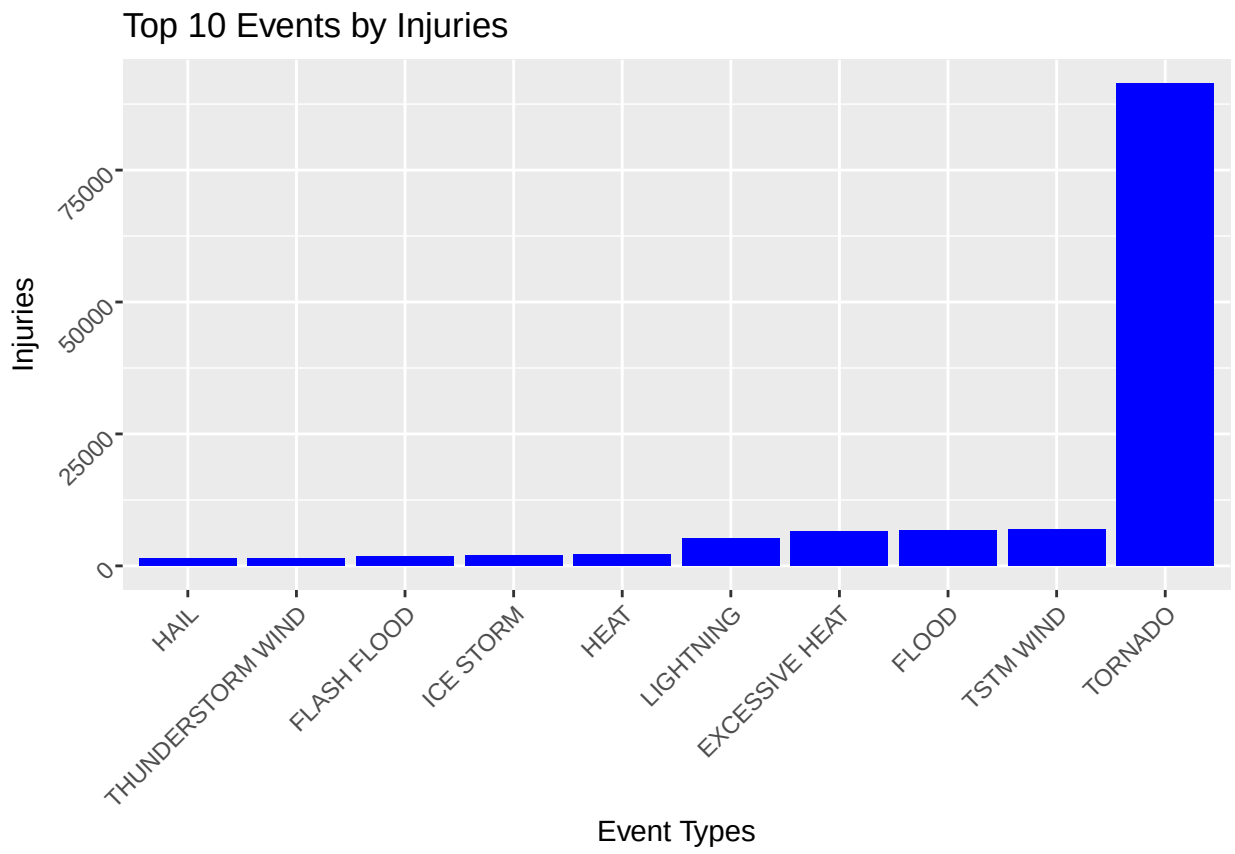
```
    labs(x="Event Types", y="Fatalities") +
    theme(axis.text = element_text(angle = 45,hjust = 1))
g1
```




```
## Based on this result, tornados are the most harmful events that cuase the highest fatality in the U..

# Injuries
injuries <- aggregate(INJURIES ~ EVTYPE, data= data, FUN = sum)
dim(injuries)
```

```
## [1] 985   2
```

```
topinju <- injuries[order(-injuries$INJURIES),][1:10,]
g2 <- ggplot(topinju, aes(x = reorder (EVTYPE, INJURIES), y =INJURIES)) +
    geom_bar(stat = "identity", fill = "blue") +
    ggtitle("Top 10 Events by Injuries") +
    labs(x="Event Types", y="Injuries") +
    theme(axis.text = element_text(angle = 45,hjust = 1))
    g2
```




```
## Based on this result, tornados are the most harmful events that cuase the highest injuries in the U.
```

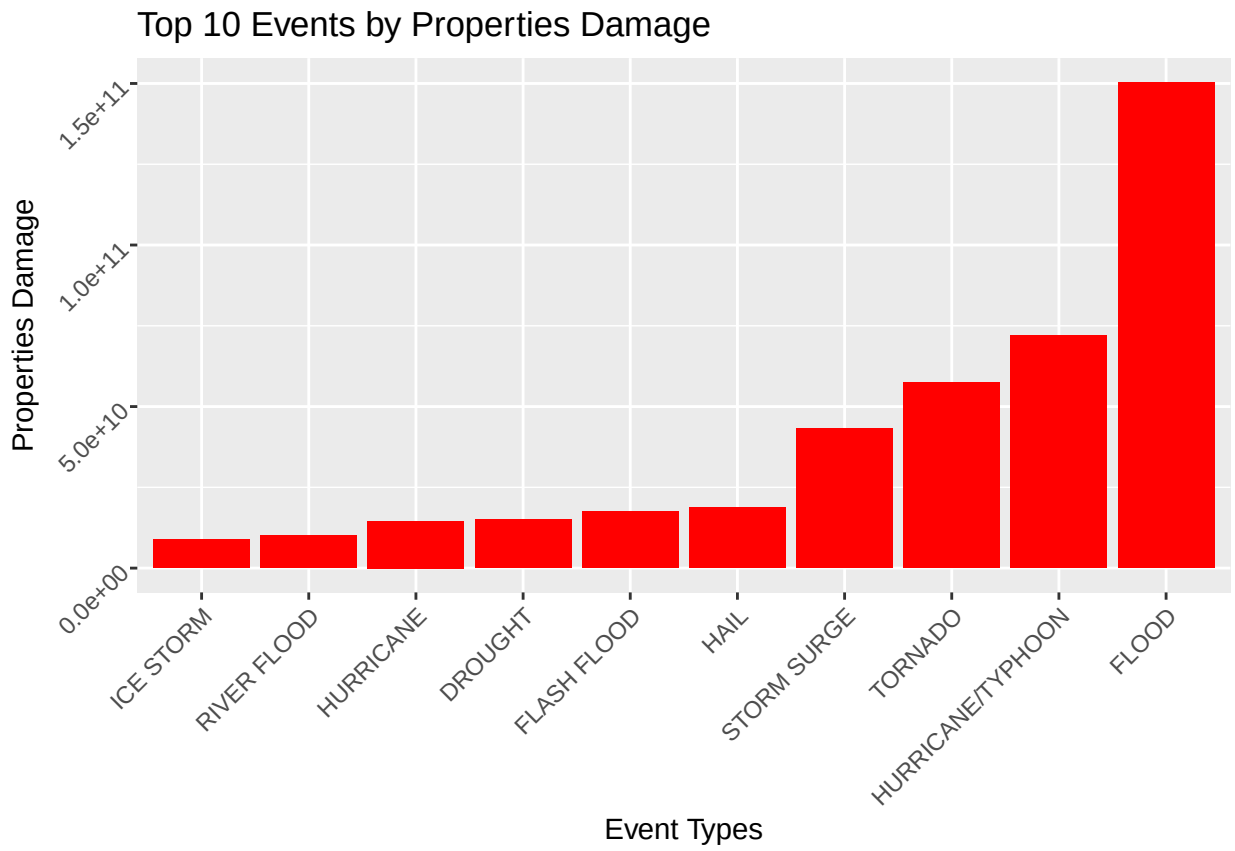
Events have the greatest economic consequences?

```
## processing
data$PROPDMGMult <- ifelse (data$PROPDMGEXP == "K", 1000, ifelse (data$PROPDMGEXP == "M", 1000000, ifels

data$PROPDMGAMT <- data$PROPDMG*data$PROPDMGMult

data$CROPDMGMult <- ifelse (data$CROPDMGEXP == "K", 1000, ifelse (data$CROPDMGEXP == "M", 1000000, ifels

data$CROPDMGAMT <- data$CROPDMG*data$CROPDMGMult

data$TOTALDMGAMT <- data$PROPDMGAMT+data$CROPDMGAMT
# properties damage
tdamage <- aggregate(TOTALDMGAMT ~ EVTYPE, data= data, FUN = sum)
dim(tdamage)
```

```
## [1] 985   2
```

```
toppdam <- tdamage[order(-tdamage$TOTALDMGAMT),][1:10,]
g3 <- ggplot(toppdam, aes(x = reorder (EVTYPE, TOTALDMGAMT), y =TOTALDMGAMT)) +
    geom_bar(stat = "identity", fill = "red") +
```

```
    ggtitle("Top 10 Events by Properties Damage") +
    labs(x="Event Types", y="Properties Damage") +
    theme(axis.text = element_text(angle = 45,hjust = 1))
    g3
```




```
## Based on this result, floods are the most harmful events that cuase the highest economic damage in t
```

Results and Conclusions

question 1

- As shown in the figure, Tornados causes the greatest number of Fatalities and Injuries.
- In particular, in terms of fatalities, after Tornados, EXCESSIVE HEAT, FLASH FLOOD and HEAT are the next ones.
- In particular, in terms of injuries, after tornados we have TSTM WIND, FLOOD and EXCESSIVE HEAT.

question 2

- Floods have the greatest economic consequences based on total dollars of property and crop damage, followed by Hurrucanes.

Conclusions

In our analysis of weather events that cause the most adverse effect in the U.S, we found that tornados cause the most damage in the population including fatalities and injuries, while floods cause the most damage to the ecoomy in the U.S.