

# Impacts of Storms and Other Severe Weather Events in Population Health and Economic Problems for Communities and Municipalities

## Synopsis

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 document involves exploring the U.S. National Oceanic and Atmospheric Administration's (NOAA) storm database between 1950 and 2011. In general, Tornado is most harmful event with respect to population health and economic problems for communities and municipalities.

## Data Processing

The document need the R libraries: Plyr and ggplot2.

```
library(plyr)
library(ggplot2)
```

We use the data file 'repdata\_data\_StormData.csv.bz2' that downloaded from this link: <https://d396qusza40orc.cloudfront.net/repdata%2Fdata%2FStormData.csv.bz2>

```
data <- read.csv("repdata_data_StormData.csv.bz2")
```

There are many units of measurement (K, B, H, ...) in the data. We init a mapping variable to convert them to real value.

```

mapping <- as.data.frame(cbind(key = c("", "-", "?", "+",
"0", "1", "2", "3",
"4", "5", "6", "7", "8", "H", "h", "K", "k", "M", "m",
"B", "b"), value = c(1,
0, 0, 0, 1, 10, 100, 1000, 10000, 1e+05, 1e+06, 1e+07,
1e+08, 100, 100,
1000, 1000, 1e+06, 1e+06, 1e+09, 1e+09)))

convert <- function(x) {
  x <- factor(x)
  levels(x) <- mapping[mapping$key %in% levels(x),
"value"]
  x <- as.numeric(paste(x))
  return(x)
}

```

## - Population Health

Calculate total injuries & fatalities by event Type.

```

injury <- aggregate(INJURIES ~ EVTYPE, data = data, FUN =
sum)
top_10_injury <- head(arrange(injury, desc(INJURIES)), n =
10)

fatalities <- aggregate(FATALITIES ~ EVTYPE, data = data,
FUN = sum)
top_10_fatality <- head(arrange(fatalities, desc
(FATALITIES)), n = 10)

data$SUM_INJURY_N_FATALITIES <- data$INJURIES +
data$FATALITIES
sum_injury_n_fatalities <- aggregate
(SUM_INJURY_N_FATALITIES ~ EVTYPE, data = data,
FUN = sum)
top_10_sum_injury_n_fatalities <- head(arrange
(sum_injury_n_fatalities, desc(SUM_INJURY_N_FATALITIES)),
n = 10)

```

## - Economic Problems for Communities and Municipalities

Next, we calculate property damage - PROPDMGEXP and CROPDMGEXP by event type.

```

data$CROPDMGEXP <- convert(data$CROPDMGEXP)
data$CROPDMG_real <- data$CROPDMGEXP * data$CROPDMG
cropdmg <- aggregate(CROPDMG_real ~ EVTYPE, data = data,
FUN = sum)
top_10_cropdmg <- head(arrange(cropdmg, desc
(CROPDMG_real)), n = 10)

data$PROPDMGEXP <- convert(data$PROPDMGEXP)
data$PROPDMG_real <- data$PROPDMGEXP * data$PROPDMG
propdmg <- aggregate(PROPDMG_real ~ EVTYPE, data = data,
FUN = sum)
top_10_propdmg <- head(arrange(propdmg, desc
(PROPDMG_real)), n = 10)

data$SUM_PROPDMG_N_CROPDMG <- data$PROPDMG_real +
data$CROPDMG_real
sum_propdmg_n_cropdmg <- aggregate(SUM_PROPDMG_N_CROPDMG ~
EVTYPE, data = data,
FUN = sum)
top_10_sum_propdmg_n_cropdmg <- head(arrange
(sum_propdmg_n_cropdmg, desc(SUM_PROPDMG_N_CROPDMG)),
n = 10)

```

## Result

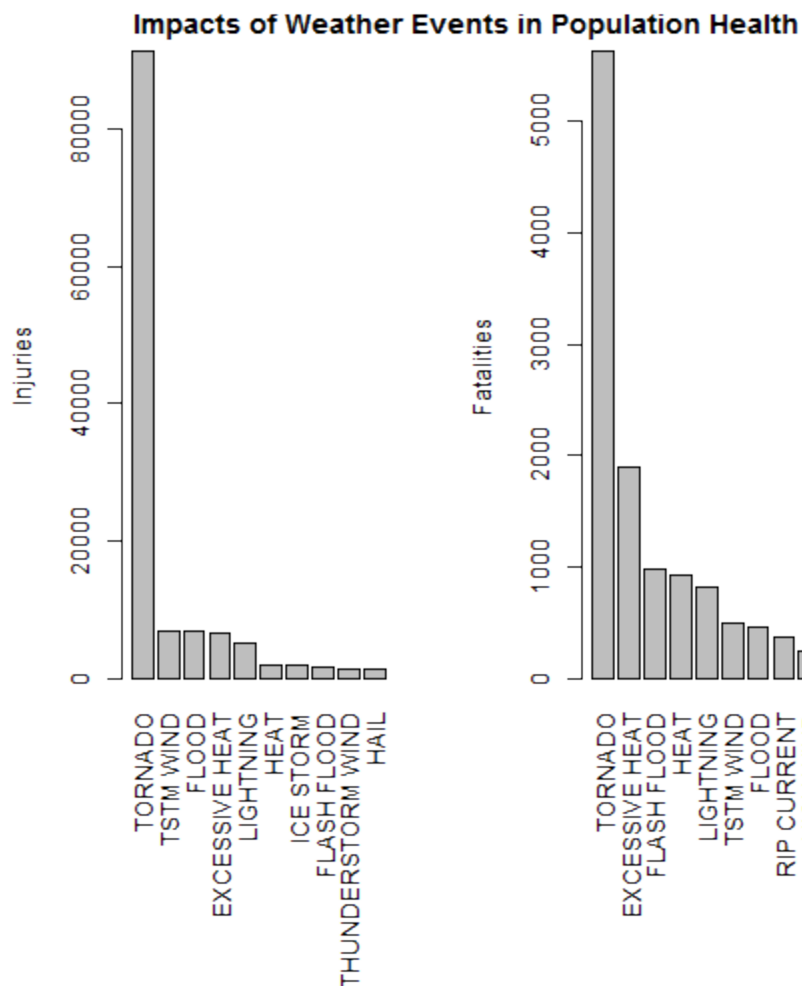
### - Population Health

```

par(mfrow = c(1, 2), mar = c(10, 4, 0.5, 2.5), oma = c(1.5,
2, 1, 1))
barplot(top_10_injury$INJURIES, names.arg =
top_10_injury$EVTYPE, ylab = "Injuries",
las = 3)
barplot(top_10_fatality$FATALITIES, names.arg =
top_10_fatality$EVTYPE, ylab = "Fatalities",
las = 3)

title(main = "Impacts of Weather Events in Population
Health", outer = TRUE)

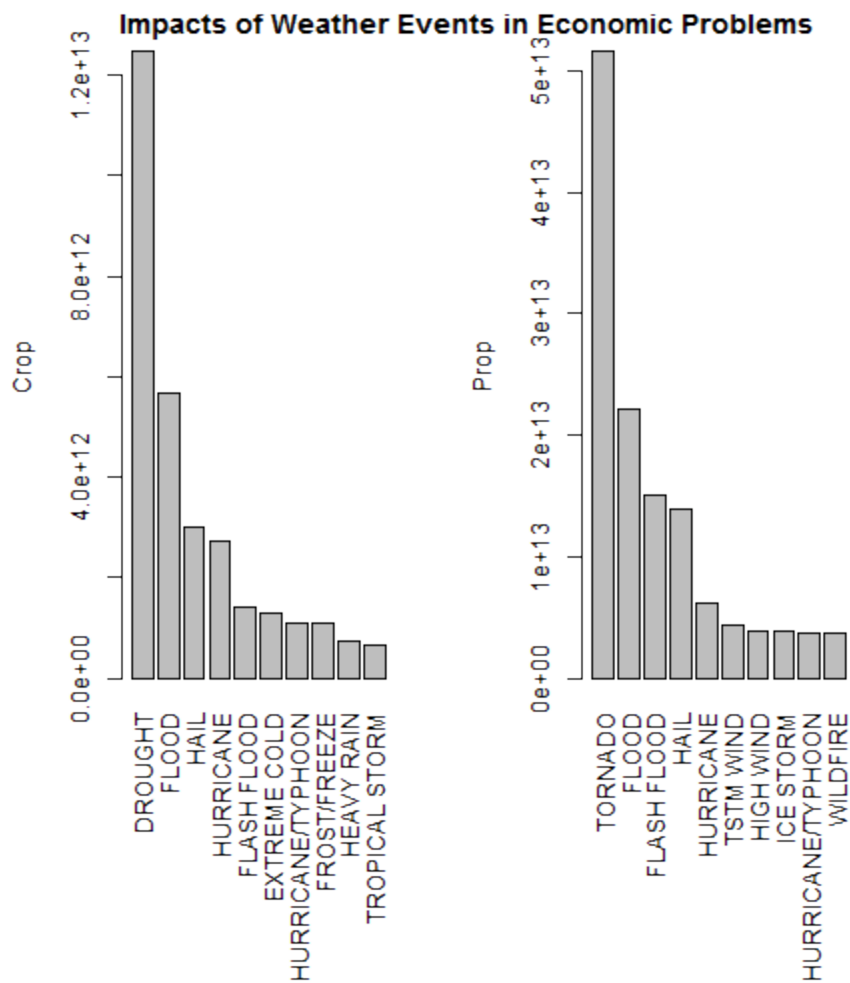
```



### - Economic Problems for Communities and Municipalities

```
par(mfrow = c(1, 2), mar = c(10, 4, 0.5, 2.5), oma = c(1.5,
2, 1, 1))
barplot(top_10_cropdmg$CROPDMG_real, names.arg =
top_10_cropdmg$EVTYPE, ylab = "Crop",
las = 3)
barplot(top_10_propdmg$PROPDMG_real, names.arg =
top_10_propdmg$EVTYPE, ylab = "Prop",
las = 3)

title(main = "Impacts of Weather Events in Economic
Problems", outer = TRUE)
```



- We have 2 charts that show sum of injuries and fatalities, and sum of crop and prop

```
par(mfrow = c(1, 2), mar = c(10, 4, 0.5, 2.5), oma = c(1.5,
2, 1, 1))
barplot
(top_10_sum_injury_n_fatalities$SUM_INJURY_N_FATALITIES,
names.arg = top_10_sum_injury_n_fatalities$EVTYPE,
ylab = "Injuries and Fatalities", las = 3)

barplot(top_10_sum_propdmg_n_cropdmg$SUM_PROPDMG_N_CROPDMG,
names.arg = top_10_sum_propdmg_n_cropdmg$EVTYPE,
ylab = "Crop and Prop", las = 3)

title(main = "Impacts of weather Events", outer = TRUE)
```

Impacts of Weather Events

