Scatterplots

Topics

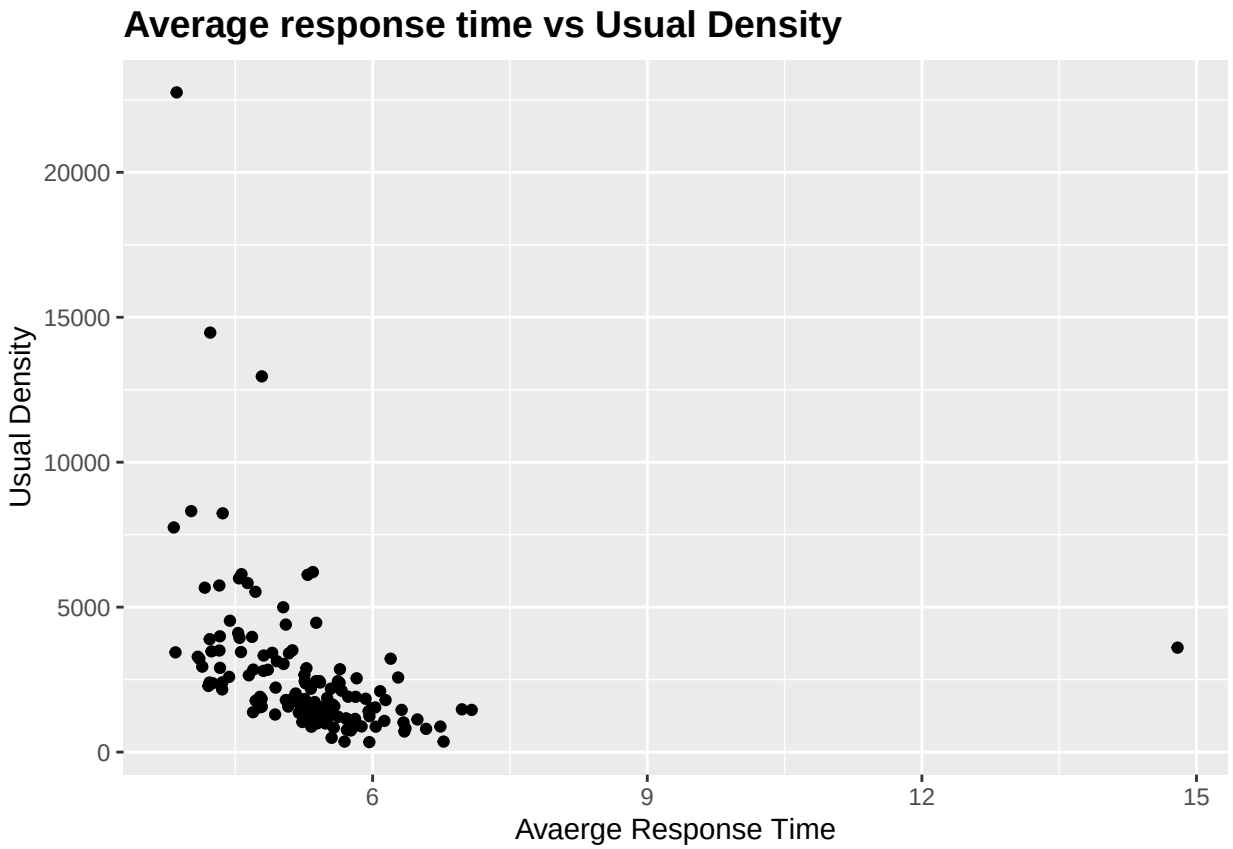
- Average response time for incidents in the neighborhood (if takes longer means more stations should be built? Table? plot?)
- Average response time vs neighborhood income (if poor take longer than something shou change)
- Fire size vs number of personnel (if no trend means city should take more action to prioritize urgency)
- High Casualty(3+,5+?) vs Income or high casualty vs dwelling density (means the area need more equipment if poor; or means area needs more inspection if more building gets more casualty)
- Avg financial loss in each origin? (loss more ones would get discount from insurance if purchase fire equipment?)
- Which neighborhoods have severe fires (large, extra large etc but least station)? Which has the most fire (but least station)?
- Does a certain premise type area have more fire (commercial neighborhood, apartment, condo, houses etc)

Top options

Average response time

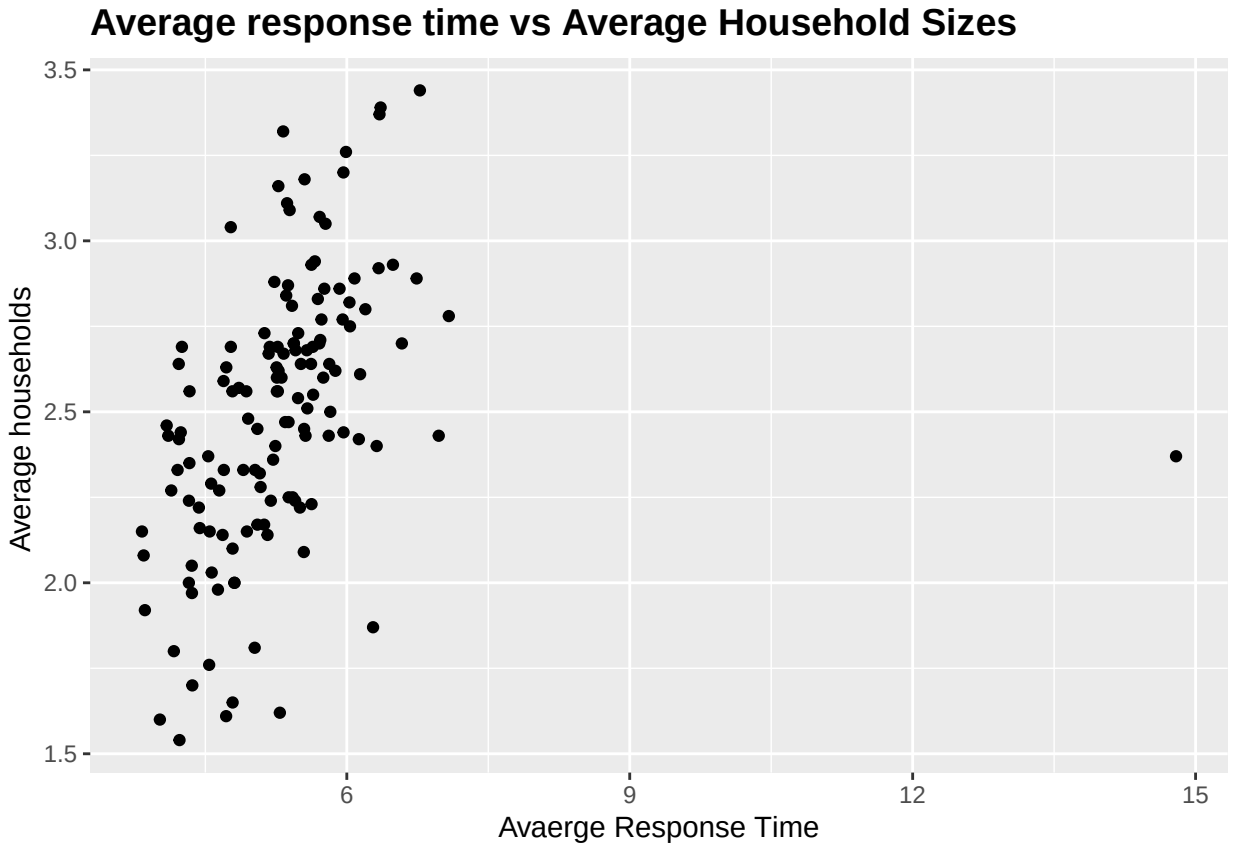
```
################################

# Group by date
fire_Incidents_Filtered <- fire_Incidents %>%
  group_by(Neighborhood) %>%
  summarise(Avaerge_Response_Time = mean(TFS_Response_Time), .groups = 'drop') %>%
  na.omit()

fire_Incidents_Filtered <- merge(fire_Incidents_Filtered, neighbourhood_Shape, by.y = "AREA_NAME", by.x=

# Plot the scatter plot
plot_title <- "Average response time vs Usual Density"

ggplot(fire_Incidents_Filtered, aes(x=DWELLINGS_OCCUPIED_BY_USUAL_RESIDENTS/LAND_AREA_IN_SQKM, y=Avaerg
  geom_point()+ ggtitle(plot_title)+ coord_flip()+
  xlab("Usual Density")+ ylab("Avaerge Response Time")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

```
## Don't know how to automatically pick scale for object of type difftime. Defaulting to continuous.
```



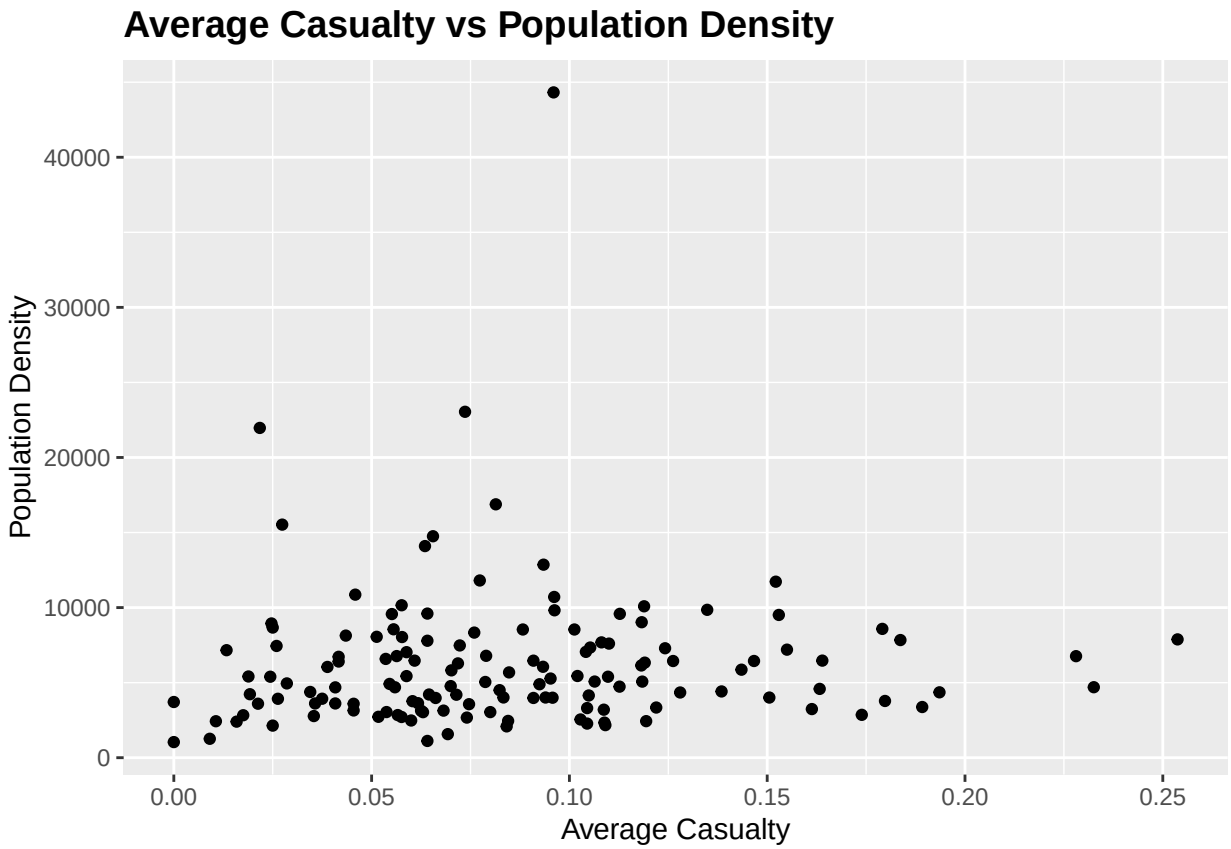

```
plot_title <- "Average response time vs Average Household Sizes"

ggplot(fire_Incidents_Filtered, aes(x=AVERAGE_HOUSRHOD_SIZE, y=Avaerge_Response_Time)) +
  geom_point()+ ggtitle(plot_title)+ coord_flip()+
  xlab("Average households ")+ ylab("Avaerge Response Time")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

```
## Don't know how to automatically pick scale for object of type difftime. Defaulting to continuous.
```

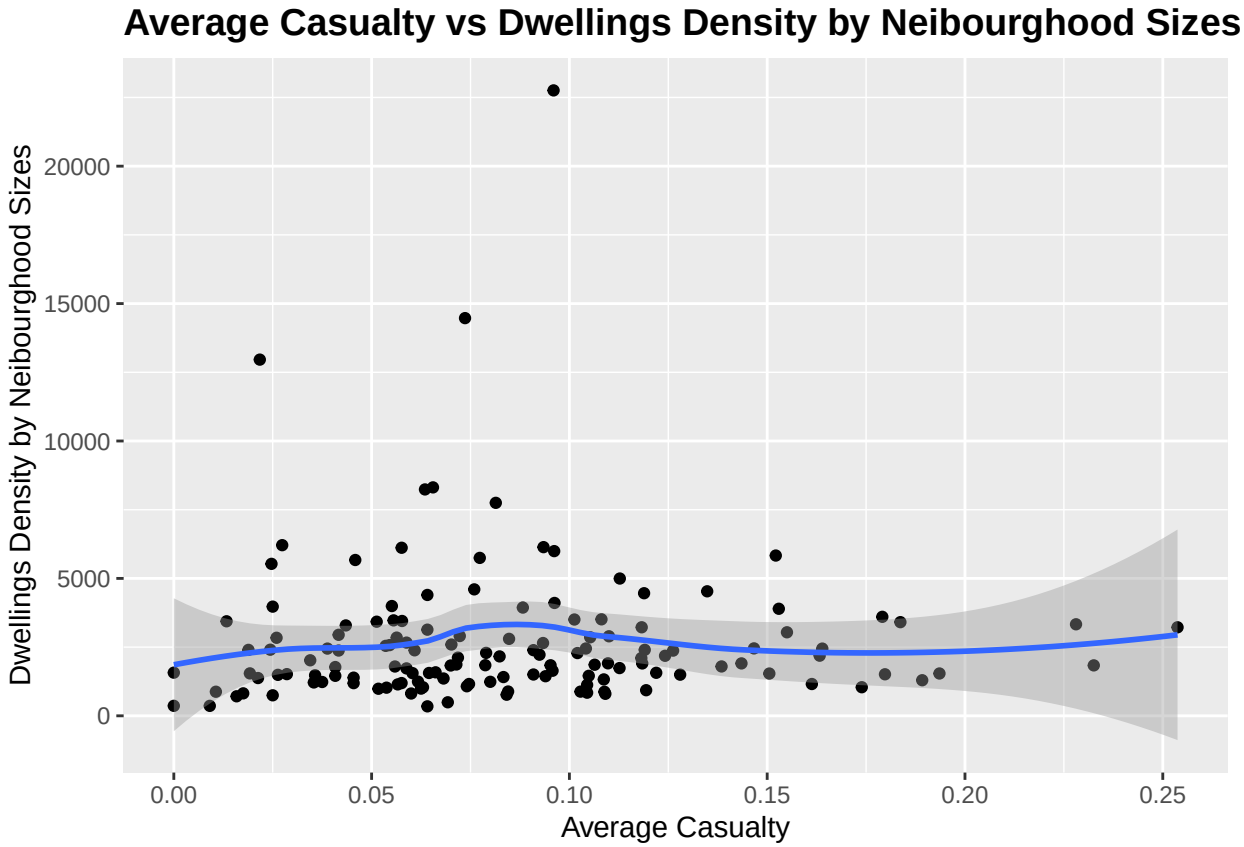


Casualty

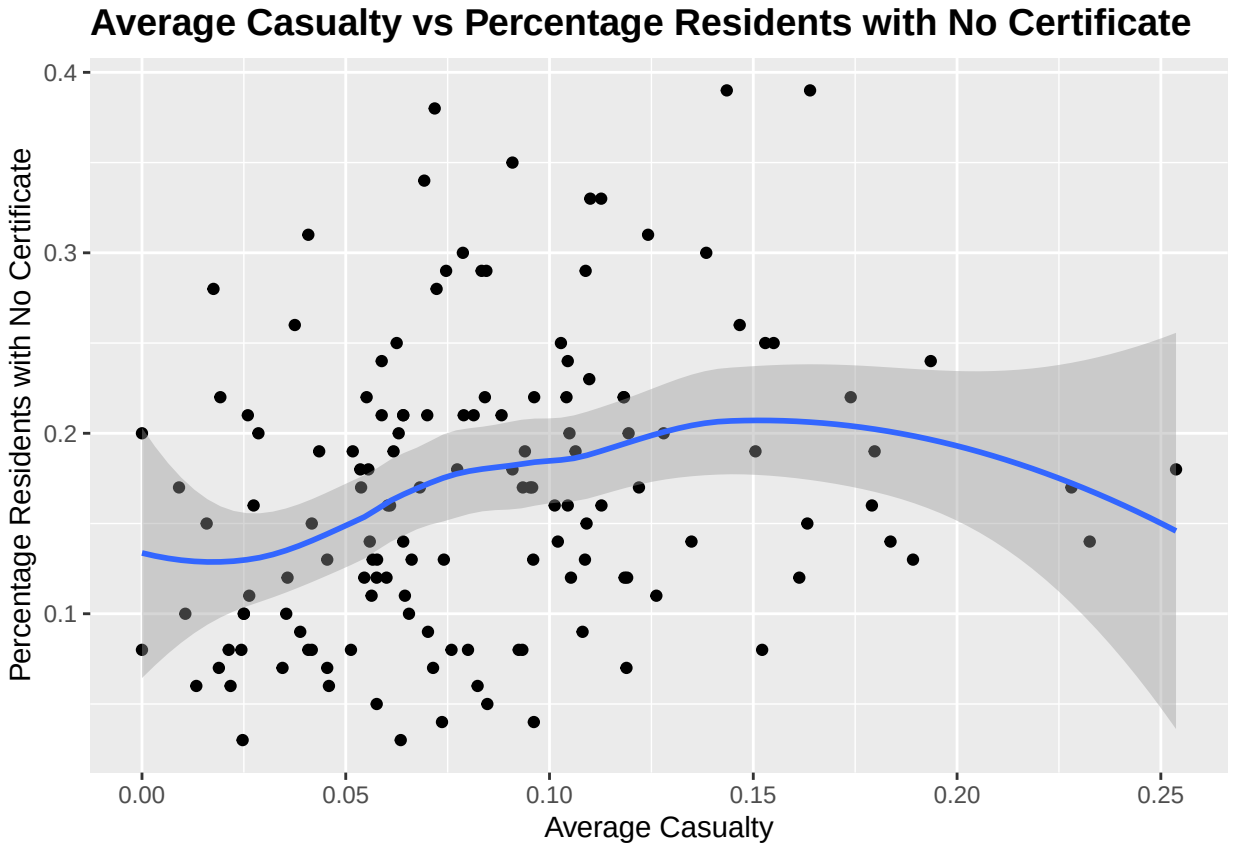
```
# Group by date
fire_Incidents_Filtered <- fire_Incidents %>%
  group_by(Neighborhood) %>%
  summarise(Avaerge_Casualty = mean(Civilian_Casualties), .groups = 'drop') %>%
  na.omit()

fire_Incidents_Filtered <- merge(fire_Incidents_Filtered, neighbourhood_Shape, by.y = "AREA_NAME", by.x=

# Plot the scatter plot
plot_title <- "Average Casualty vs Population Density"

ggplot(fire_Incidents_Filtered, aes(x=Avaerge_Casualty, y=POPULATION_DENSITY_PER_SQKM)) +
  geom_point()+ ggtitle(plot_title)+
  xlab("Average Casualty")+ ylab("Population Density")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```




```
# Plot the scatter plot
plot_title <- "Average Casualty vs Dwellings Density by Neibourghood Sizes"

ggplot(fire_Incidents_Filtered, aes(x=Avaerge_Casualty, y=DWELLINGS_OCCUPIED_BY_USUAL_RESIDENTS/LAND_ARE
  geom_point()+ ggtitle(plot_title)+geom_smooth(stat = 'smooth',method = 'loess', formula = y ~ x)+
  xlab("Average Casualty")+ ylab("Dwellings Density by Neibourghood Sizes")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

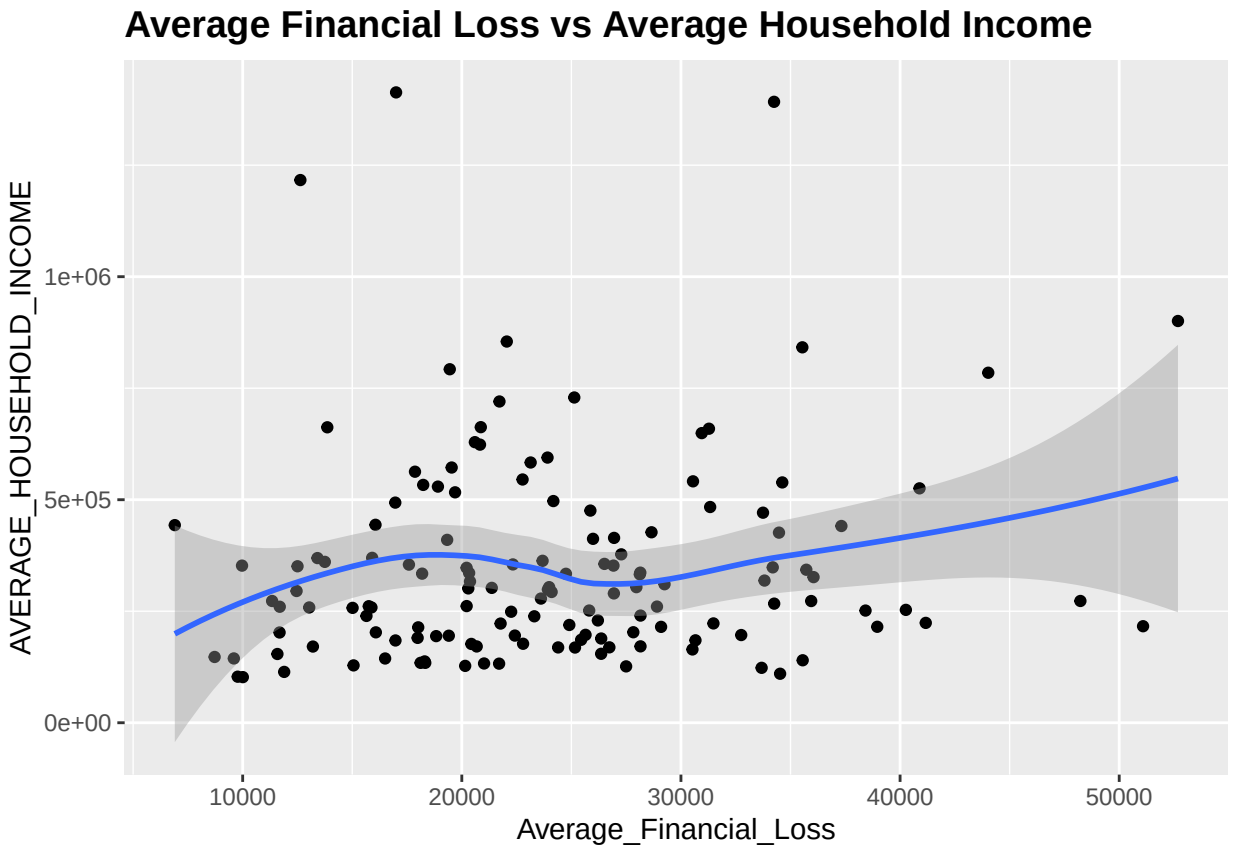



```
# Plot the scatter plot
plot_title <- "Average Casualty vs Percentage Residents with No Certificate"

ggplot(fire_Incidents_Filtered, aes(x=Avaerge_Casualty, y=PERCENTAGE_NO_CERTIFICATE_DIPLOMA)) +
  geom_point()+ ggtitle(plot_title)+geom_smooth(stat = 'smooth',method = 'loess', formula = y ~ x)+
  xlab("Average Casualty")+ ylab("Percentage Residents with No Certificate")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

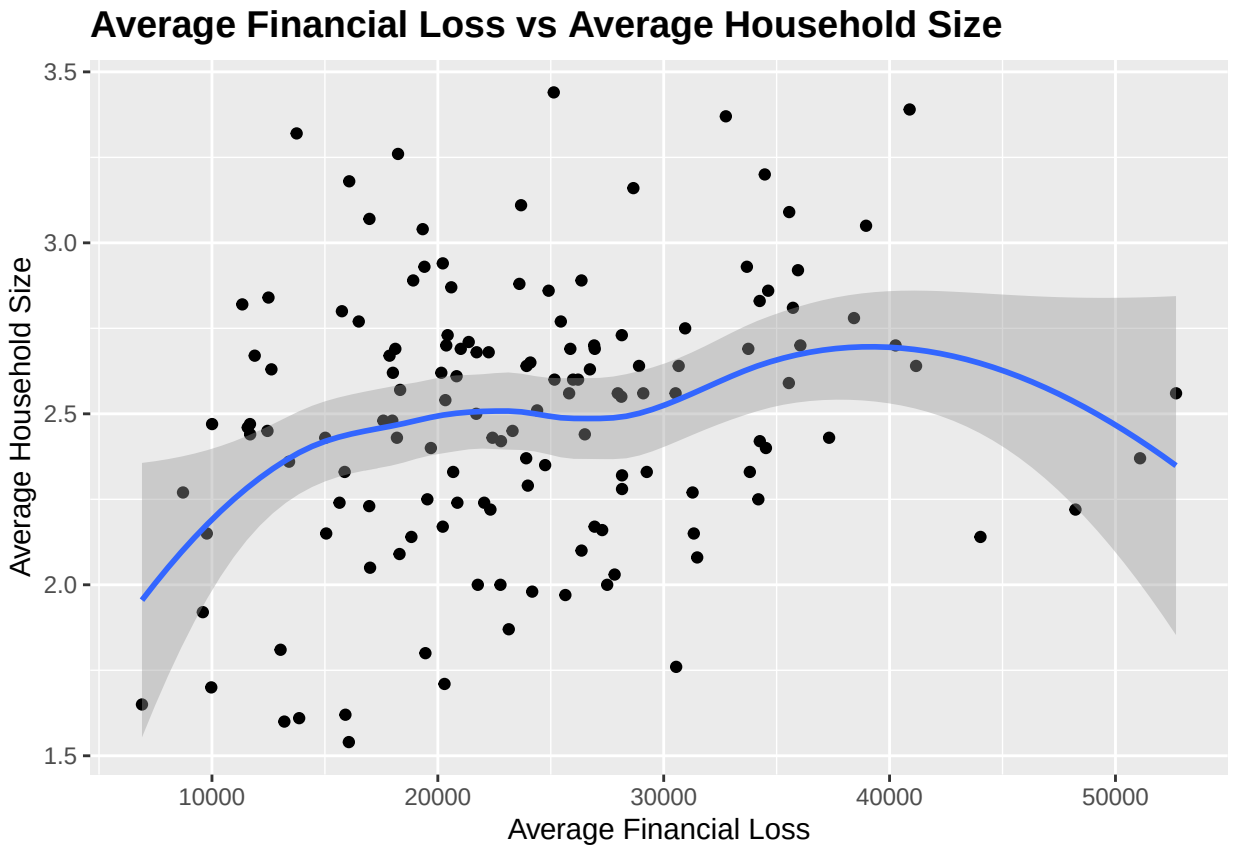


Avg financial loss

```
# Group by date
fire_Incidents_Filtered <- fire_Incidents %>%
  group_by(Neighborhood) %>%
  summarise(Average_Financial_Loss = mean(Estimated_Dollar_Loss), .groups = 'drop') %>%
  na.omit()

fire_Incidents_Filtered <- merge(fire_Incidents_Filtered, neighbourhood_Shape, by.y = "AREA_NAME", by.x=

# Plot the scatter plot
plot_title <- "Average Financial Loss vs Average Household Income"

ggplot(fire_Incidents_Filtered, aes(y=AVERAGE_HOUSEHOLD_INCOME, x=Average_Financial_Loss)) +
  geom_point()+ ggtitle(plot_title)+ geom_smooth(stat = 'smooth',method = 'loess', formula = y ~ x)+
  xlab("Average_Financial_Loss")+ ylab("AVERAGE_HOUSEHOLD_INCOME")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

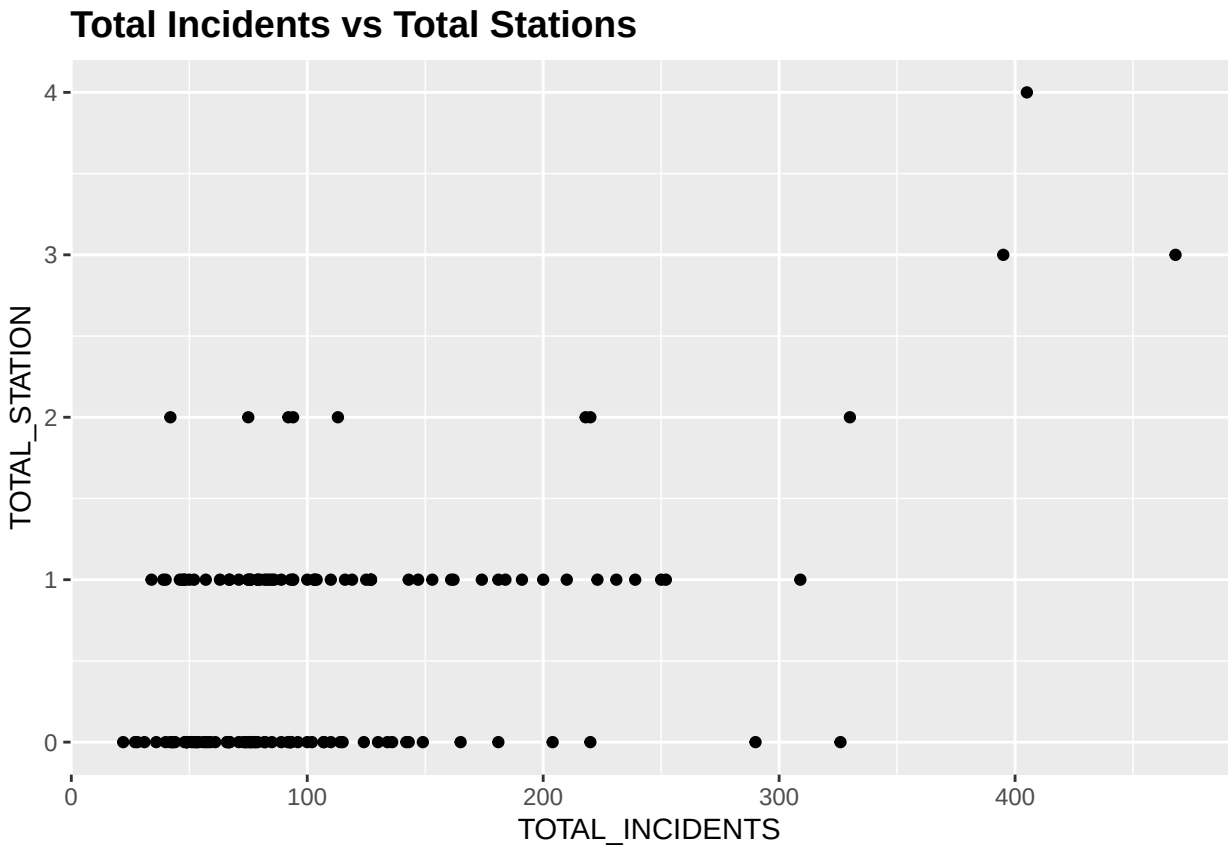



```
# Plot the scatter plot
plot_title <- "Average Financial Loss vs Average Household Size"

ggplot(fire_Incidents_Filtered, aes(y=AVERAGE_HOUSRHOD_SIZE, x=Average_Financial_Loss)) +
  geom_point()+ ggtitle(plot_title)+ geom_smooth(stat = 'smooth',method = 'loess', formula = y ~ x)+
  xlab("Average Financial Loss")+ ylab("Average Household Size")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

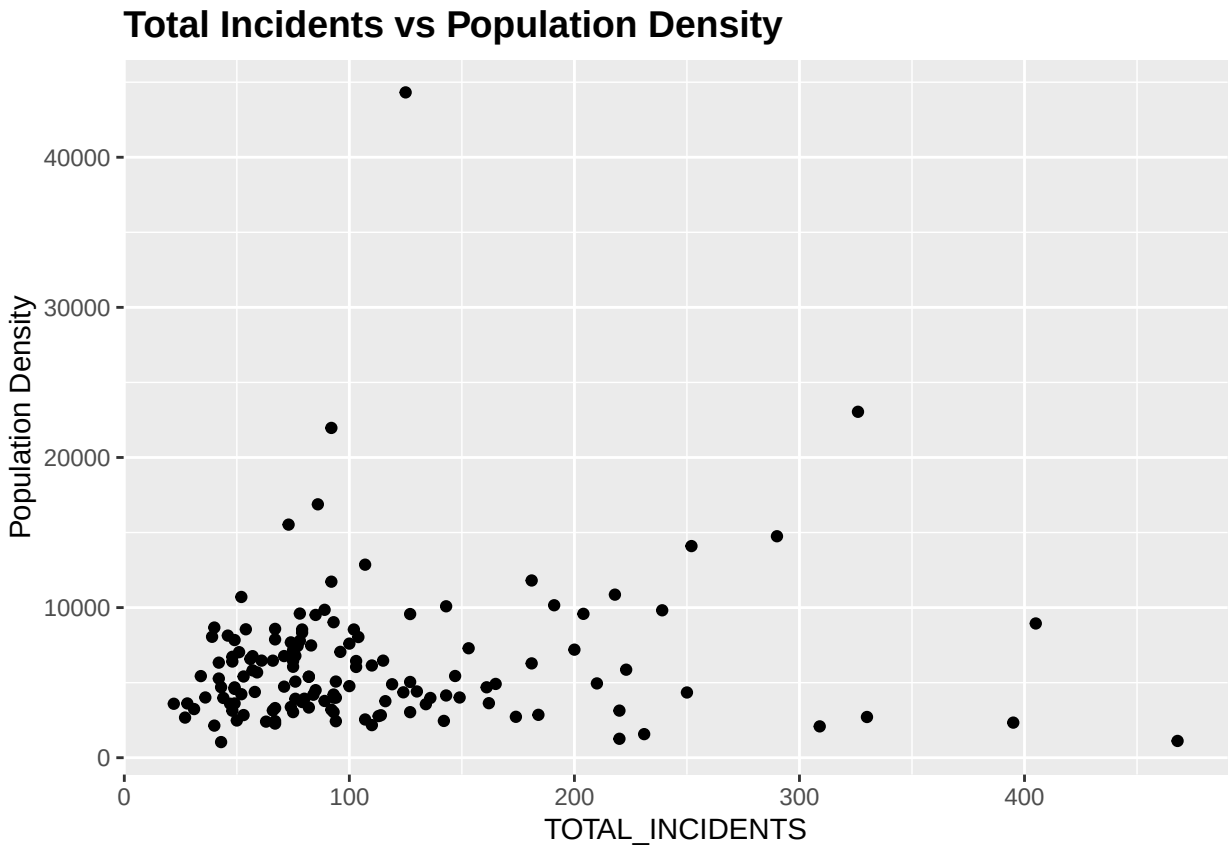


Total Incidents

```
plot_title <- "Total Incidents vs Total Stations"

ggplot(neighbourhood_Shape, aes(x=TOTAL_STATION, y=TOTAL_INCIDENTS)) +
  geom_point()+ ggtitle(plot_title)+ coord_flip()+
  xlab("TOTAL_STATION")+ ylab("TOTAL_INCIDENTS")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

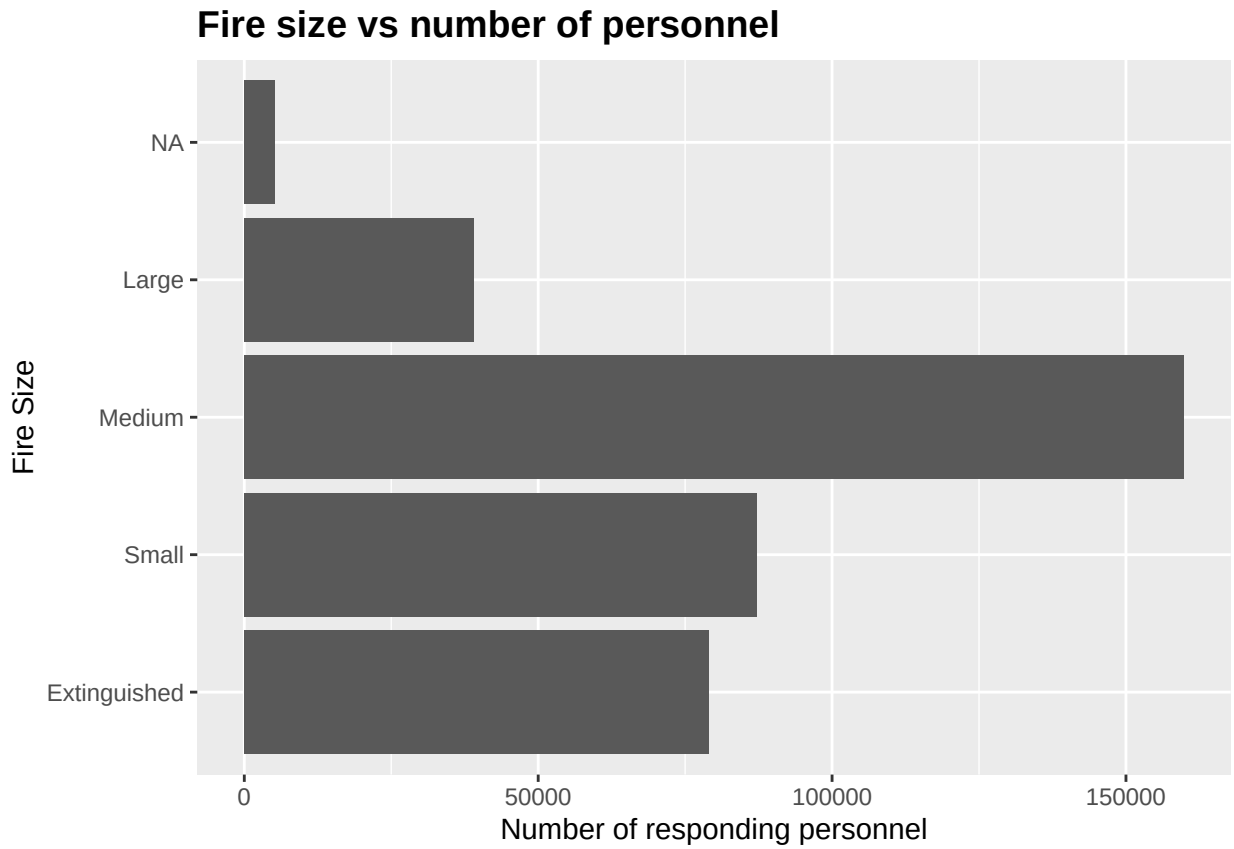



```
plot_title <- "Total Incidents vs Population Density"

ggplot(neighbourhood_Shape, aes(x=POPULATION_DENSITY_PER_SQKM, y=TOTAL_INCIDENTS)) +
  geom_point()+ ggtitle(plot_title)+ coord_flip()+
  xlab("Population Density")+ ylab("TOTAL_INCIDENTS")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```



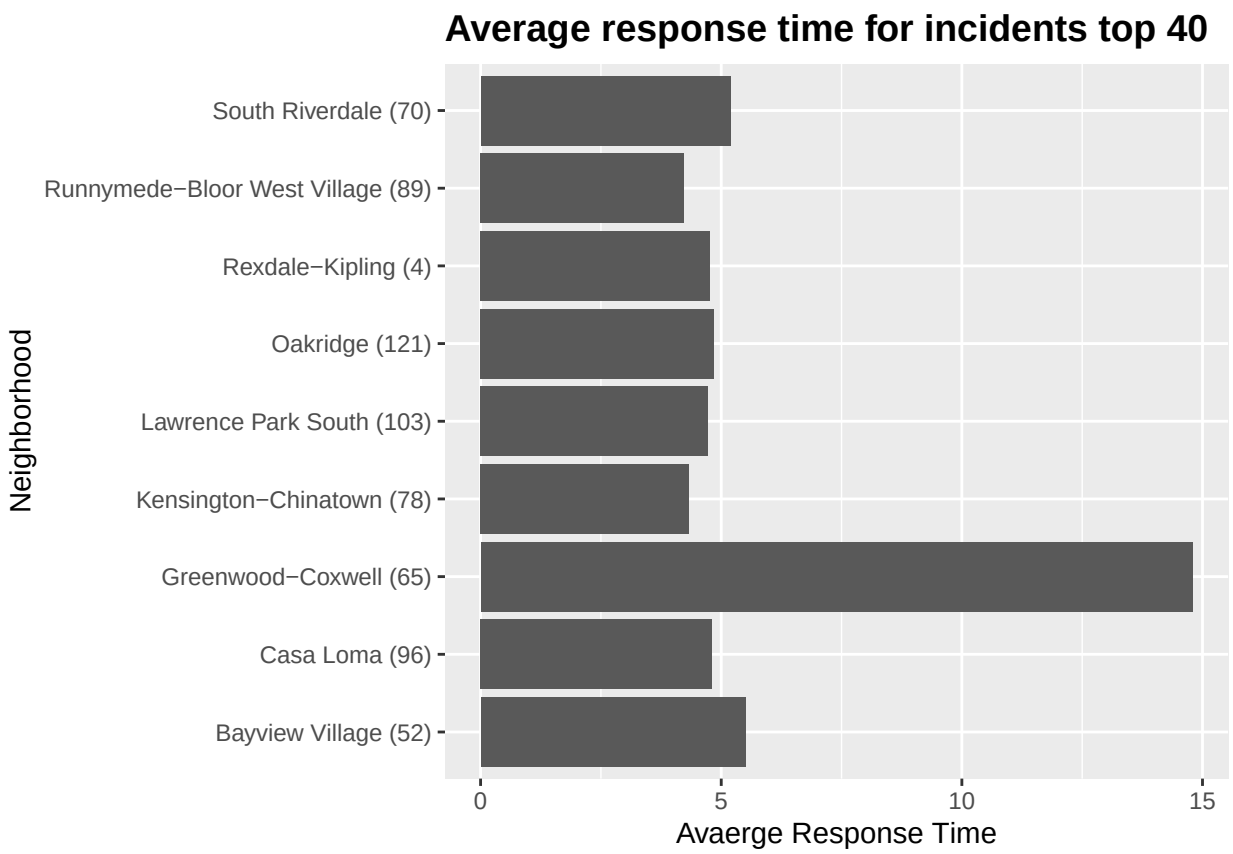
Other Options

```
# Plot the scatter plot
plot_title <- "Fire size vs number of personnel"

ggplot(fire_Incidents, aes(x=Fire_Size_Case, y=Number_of_responding_personnel)) +
  geom_bar(stat='identity')+ ggtitle(plot_title)+ coord_flip()+
  xlab("Fire Size")+ ylab("Number of responding personnel")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```




```
# Group by date
fire_Incidents_Filtered <- fire_Incidents %>%
  group_by(Neighborhood) %>%
  summarise(Avaerge_Response_Time = mean(TFS_Response_Time), .groups = 'drop') %>%
  na.omit()

fire_Incidents_Filtered <- fire_Incidents_Filtered[which(order(fire_Incidents_Filtered$Avaerge_Response_

# Plot the scatter plot
plot_title <- "Average response time for incidents top 40"

ggplot(fire_Incidents_Filtered, aes(x=Neighborhood, y=Avaerge_Response_Time)) +
  geom_bar(stat='identity')+ ggtitle(plot_title)+ coord_flip()+
  xlab("Neighborhood")+ ylab("Avaerge Response Time")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```

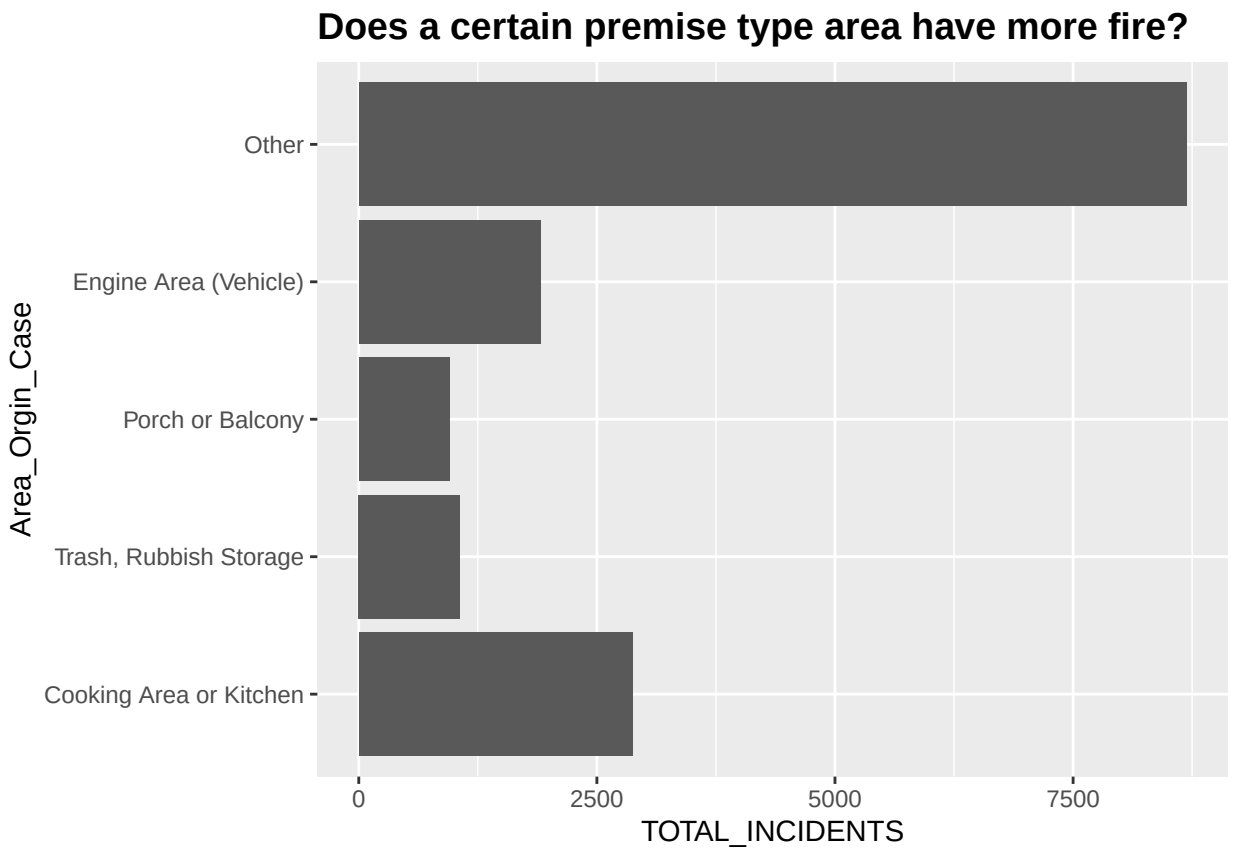
```
## Don't know how to automatically pick scale for object of type difftime. Defaulting to continuous.
```




```
fire_Incidents_Filtered
```

```
## # A tibble: 9 x 2
##   Neighborhood                       Avaerge_Response_Time
##   <chr>                              <drtn>
## 1 Bayview Village (52)                5.503175 mins
## 2 Casa Loma (96)                      4.807345 mins
## 3 Greenwood-Coxwell (65)             14.792786 mins
## 4 Kensington-Chinatown (78)           4.325322 mins
## 5 Lawrence Park South (103)           4.722449 mins
## 6 Oakridge (121)                      4.855628 mins
## 7 Rexdale-Kipling (4)                 4.770513 mins
## 8 Runnymede-Bloor West Village (89)   4.218254 mins
## 9 South Riverdale (70)                5.194470 mins
```

```
plot_title <- "Does a certain premise type area have more fire?"

ggplot(fire_Incidents, aes(x=Area_Orgin_Case)) +
  geom_bar()+ ggtitle(plot_title)+ coord_flip()+
  xlab("Area_Orgin_Case")+ ylab("TOTAL_INCIDENTS")+
  theme(plot.title = element_text(color="Black", size=14, face="bold"))
```


Does a certain premise type area have more fire?
Area_Orgin_Case
Other
Engine Area (Vehicle)
Porch or Balcony
Trash, Rubbish Storage
Cooking Area or Kitchen
0
2500
5000
7500
TOTAL_INCIDENTS