

Car Jacking MPLS

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Spatial Data

```
#MPLS neighborhoods
mpls_neighb <- st_read("Car Jacking/Minneapolis_Neighborhoods") %>%
  st_transform(crs = st_crs("NAD83")) #DONT HAVE POP DENOM YET

## Reading layer 'Minneapolis_Neighborhoods' from data source
##   'C:\Users\DELL\Documents\UMN\UMN Projects\Chris RA\Gun Violence MN\Car Jacking\Minneapolis_Neighborhoods'
##   using driver 'ESRI Shapefile'
## Simple feature collection with 87 features and 10 fields
## Geometry type: POLYGON
## Dimension:      XY
## Bounding box:   xmin: -93.32911 ymin: 44.89059 xmax: -93.19433 ymax: 45.05125
## Geodetic CRS:   WGS 84

#Minneapolis Shapefile
mpls <- st_read("Data/mpls_city-shp/16cdbbfa-ad10-493c-afaf-52b61f2e76e42020329-1-180h9ap.whbo.shp") %>%
  st_transform(st_crs(mpls_neighb))

## Reading layer '16cdbbfa-ad10-493c-afaf-52b61f2e76e42020329-1-180h9ap.whbo' from data source 'C:\Users\DELL\Documents\UMN\UMN Projects\Chris RA\Gun Violence MN\Car Jacking\Minneapolis_Neighborhoods'
##   using driver 'ESRI Shapefile'
## Simple feature collection with 1 feature and 4 fields
## Geometry type: POLYGON
## Dimension:      XY
## Bounding box:   xmin: -93.32911 ymin: 44.89059 xmax: -93.19433 ymax: 45.05125
## Geodetic CRS:   WGS 84
```

Open Minneapolis Carjacking Data

```
#open minneapolis crime data 2019-4/7 (date of download)
cj_spatial <- read_csv("Car Jacking/crime_data.csv") %>%
  filter(Offense=="Carjacking - Subset of Robbery") %>% #filter carjackings
  mutate(date=ymd_hms(Occurred_Date),
         year=isoyear(date),
         week=isoweek(date)) %>%
  select(OBJECTID, year, week, Latitude, Longitude) %>%
```

```

st_as_sf(coords = c("Longitude", "Latitude"), crs = "NAD83", remove=F) %>%
st_join(mpls_neighb) %>% #spatial join ZCTA
st_drop_geometry() %>%
filter(!is.na(BDNAME)) %>%
group_by(year, week, BDNAME, .drop=F) %>%
tally(name = "car_jack") %>%
ungroup() %>%
complete(year, week, BDNAME=mpls_neighb$BDNAME, fill = list(car_jack = 0)) %>%
filter(!(year==2022 & week >= 14) & #removing unobserved/redundant completions
      !(year==2021 & week==53) & #removing unobserved/redundant completions
      !(year==2020 & week < 36)) %>% #removing weeks before Sept. 2020, isoweek 36
arrange(BDNAME, year, week) %>%
left_join(mpls_neighb, by = "BDNAME") %>%
#mutate(car_jack_rate = car_jack/B01001_001E*1000) %>%
st_as_sf()

```

MPLS Carjackings by Week

```

#aggregate to week over ZCTAs
cj_week <- cj_spatial %>%
  group_by(year, week) %>%
  summarize(car_jack = sum(car_jack, na.rm = T)) %>%
  mutate(begin_date = ISOweek2date(paste(year, paste0("W", sprintf("%02d", week)), 1, sep = "-")),
         end_date = begin_date+weeks(1)-days(1))

```

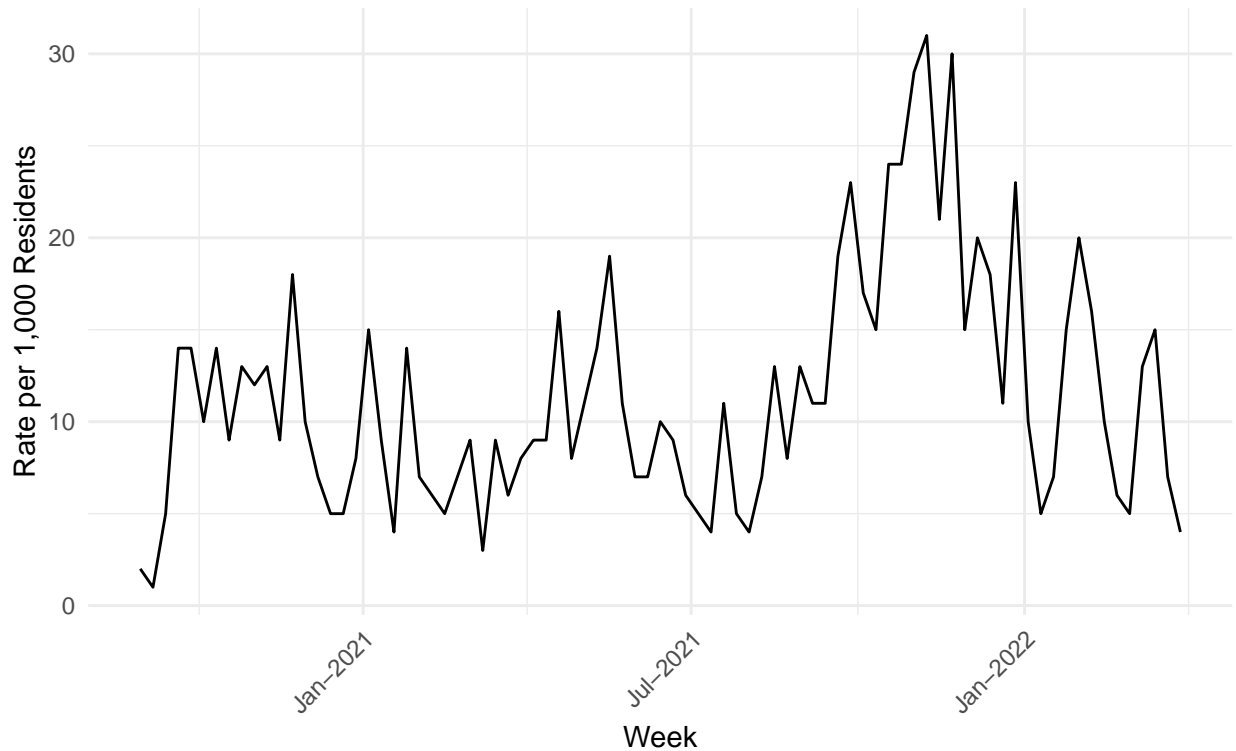
'summarise()' has grouped output by 'year'. You can override using the
'.groups' argument.

```

ggplot(cj_week)+
  geom_line(aes(x=begin_date, y=car_jack))+
  scale_x_date(date_labels = "%b-%Y",
              limits = c(min(cj_week$begin_date), max(cj_week$begin_date)))+
  labs(title = "Figure X: Weekly Minneapolis Carjackings, 8/31/2020-4/7/2022",
       subtitle = "openminneapolis Crime Data",
       x = "Week",
       y = "Rate per 1,000 Residents")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))

```

Figure X: Weekly Minneapolis Carjackings, 8/31/2020–4/7/2022
openminneapolis Crime Data



MPLS ZCTA Carjackings Map

```
#aggregate to ZCTA-Year level
cj_nb_year <- cj_spatial %>%
  group_by(BDNAME, year) %>%
  summarize(car_jack = sum(car_jack, na.rm = T),
            weeks = n(),
            car_jack_rate = car_jack/weeks)
```

```
## 'summarise()' has grouped output by 'BDNAME'. You can override using the
## '.groups' argument.
```

```
ggplot() +
  geom_sf(data = cj_nb_year, aes(geometry = geometry, fill = car_jack_rate)) +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0)+
  facet_wrap(~year)+
  scale_fill_distiller(palette = "Spectral")+
  labs(title = "Figure X: Minneapolis Carjacking Rates by Year",
       subtitle = "openminneapolis Crime Data",
       fill = "Weekly Rate")+
  theme_void()
```

Figure X: Minneapolis Carjacking Rates by Year

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