# GTECH78520_23S_week10_ac12980

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## Download libraries:

```
library(sf)
```

```
## Warning: package 'sf' was built under R version 4.2.3
```

```
## Linking to GEOS 3.9.3, GDAL 3.5.2, PROJ 8.2.1; sf_use_s2() is TRUE
```

```
library(tidyverse)
```

```
## Warning: package 'tibble' was built under R version 4.2.3
```

```
## Warning: package 'dplyr' was built under R version 4.2.3
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
## ✔ dplyr     1.1.1     ✔ readr     2.1.4
## ✔ forcats   1.0.0     ✔ stringr   1.5.0
## ✔ ggplot2   3.4.2     ✔ tibble    3.2.1
## ✔ lubridate 1.9.2     ✔ tidyr     1.3.0
## ✔ purrr     1.0.1
```

```
## ── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ──
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(janitor)
```

```
## 
## Attaching package: 'janitor'
## 
## The following objects are masked from 'package:stats':
## 
##     chisq.test, fisher.test
```

```
library(stringr)
library(mapview)
```

```
## Warning: package 'mapview' was built under R version 4.2.3
```

# Step 2.

## Read the NYC postal areas in Shapefiles into sf objects. As NYC DOH publishes COVID-19 data by zip code, we will utilize the postal area data later.

```
# Set working directory
wd <- dirname(rstudioapi::getActiveDocumentContext()$path)
setwd(wd)
```

```
# add NYC zip code shapefile
zipcode <- st_read("Data/HW_Data/ZIP_CODE_040114.shp")
```

```
## Reading layer `ZIP_CODE_040114' from data source 
##   `C:\Users\amyca\OneDrive\Documents\GTECH7852_R\R-spatial\GTECH7852_HW\Data\HW_Data\ZIP_CODE_040114.shp'
##   using driver `ESRI Shapefile'
## Simple feature collection with 263 features and 12 fields
## Geometry type: POLYGON
## Dimension:     XY
## Bounding box:  xmin: 913129 ymin: 120020.9 xmax: 1067494 ymax: 272710.9
## Projected CRS: NAD83 / New York Long Island (ftUS)
```

# Step 3

## Read and process the NYS health facilities spreadsheet data. Create sf objects from geographic coordinates.

```
# Add NYC health facilties data (points)
HealthFacilties_data <- read.csv("Data/HW_Data/NYS_Health_Facility.csv")

# Clean data
HealthFacilties_data <- clean_names(HealthFacilties_data)
```

```
# Turning health facilties csv into sf.

# Process the location column using stringr
leftPos <- stringr::str_locate(HealthFacilties_data$facility_location, "\\(")[,1]
rghtPos <- stringr::str_locate(HealthFacilties_data$facility_location, "\\)")[,1]

# Get the coordinates text
HealthFacilties_data$facility_location %>% stringr::str_sub(leftPos+1, rghtPos -1) -> HealthFacilties_data$coords
cmmaPos <- stringr::str_locate(HealthFacilties_data$coords, ", ")

#Get the numeric coordinates
HealthFacilties_data$Y <- stringr::str_sub(HealthFacilties_data$coords, 1, cmmaPos[,1]-1) %>% as.numeric()
HealthFacilties_data$X <- stringr::str_sub(HealthFacilties_data$coords, cmmaPos[,2]+1) %>% as.numeric()

# Take out the rows without coordinates and make a sf object
st_as_sf(HealthFacilties_data %>% tidyr::drop_na(X, Y), coords = c('X', 'Y')) -> HealthFacilties_SF

# Assign coordinate system
st_crs(HealthFacilties_SF) <- 4326

view(HealthFacilties_SF)
```

```
#Create sf objects from geographic coordinates for NYC

NYC_HealthFacilties_SF <- HealthFacilties_SF %>%
  filter(facility_county %in% c("Bronx", "Kings","Queens", "New York","Richmond"))

view(NYC_HealthFacilties_SF)
```

# Step 4.

## Read and process the NYS retail food stores data. Create sf objects from geographic coordinates for NYC.

```
# Add NYC food retails store data (points)
food_retails_xy <- read.csv("Data/HW_Data/nys_retail_food_store_xy.csv", fileEncoding = "Latin1", check.names = F)

# Clean data
food_retails_xy <- clean_names(food_retails_xy)

food_retails_NY <- food_retails_xy %>%
  filter(zip_code > 7000) %>%
  filter(i_county %in% c("Bronx", "Kings","Queens", "New York","Richmond")) %>%
  filter(!is.na(x)) %>%
  filter(!is.na(y))
```

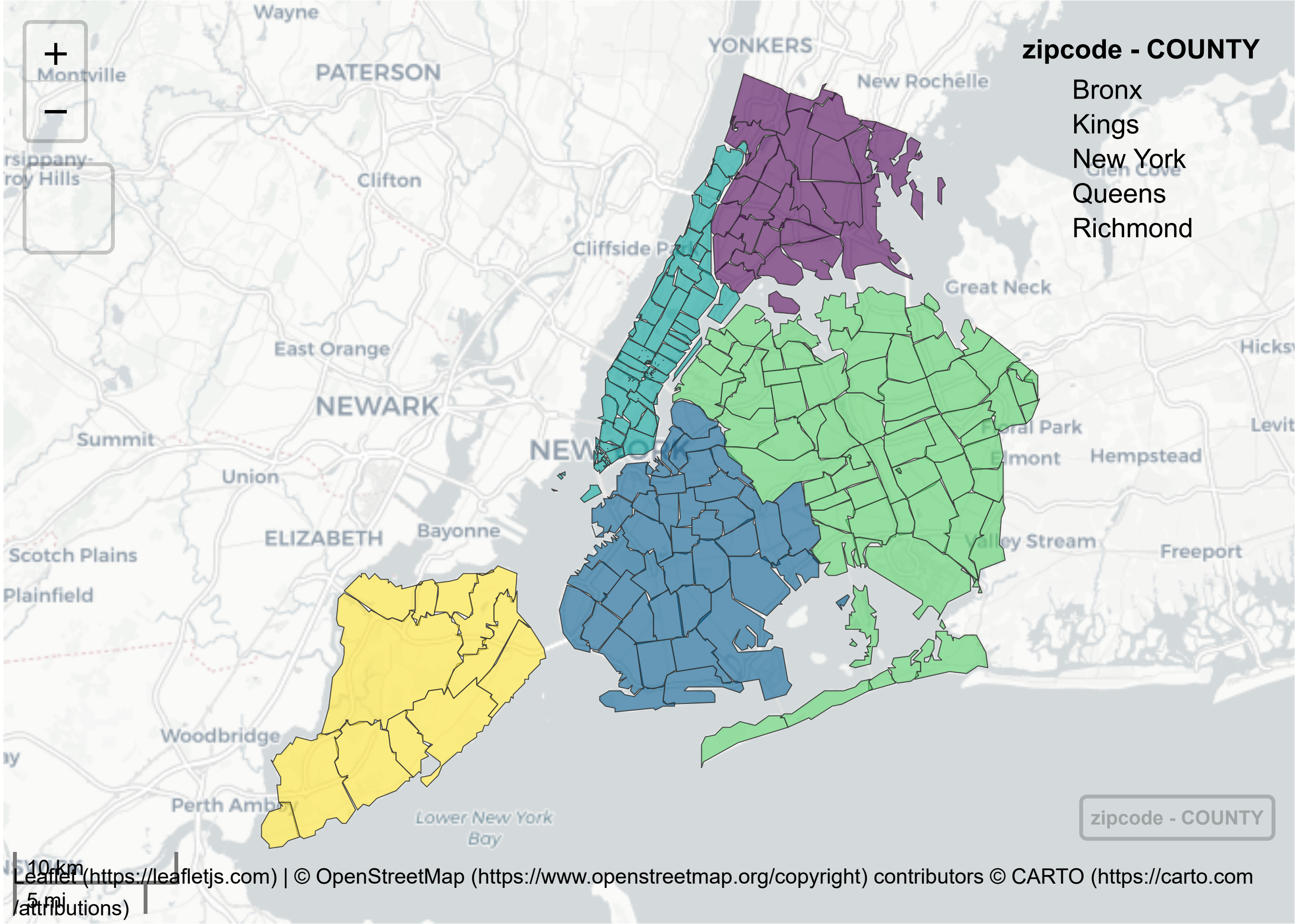
```
# Turning csv into sf. Process the location column using stringr
st_as_sf(food_retails_NY %>% tidyr::drop_na(x, y), coords = c('x', 'y')) -> food_retailsNY_SF

# Assign coordinate system
st_crs(food_retailsNY_SF) <- 4326
```

# Step 5.

## Use simple mapping method, either based on ggmap+ggplot or mapview, with a basemap to verify the above datasets in terms of their geometry locations

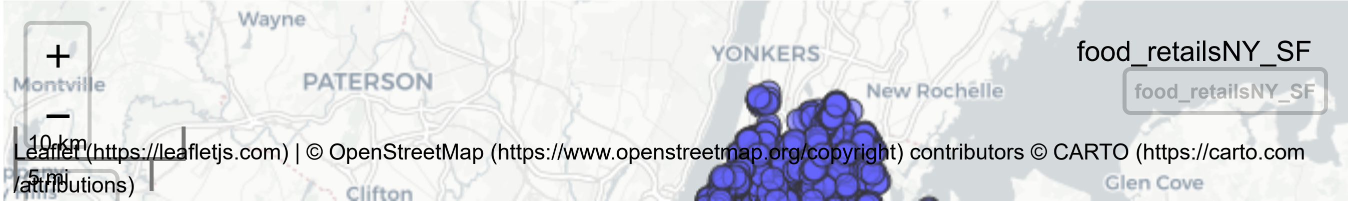
### Zip codes for NYC map

```
mapview(zipcode, zcol = "COUNTY")
```



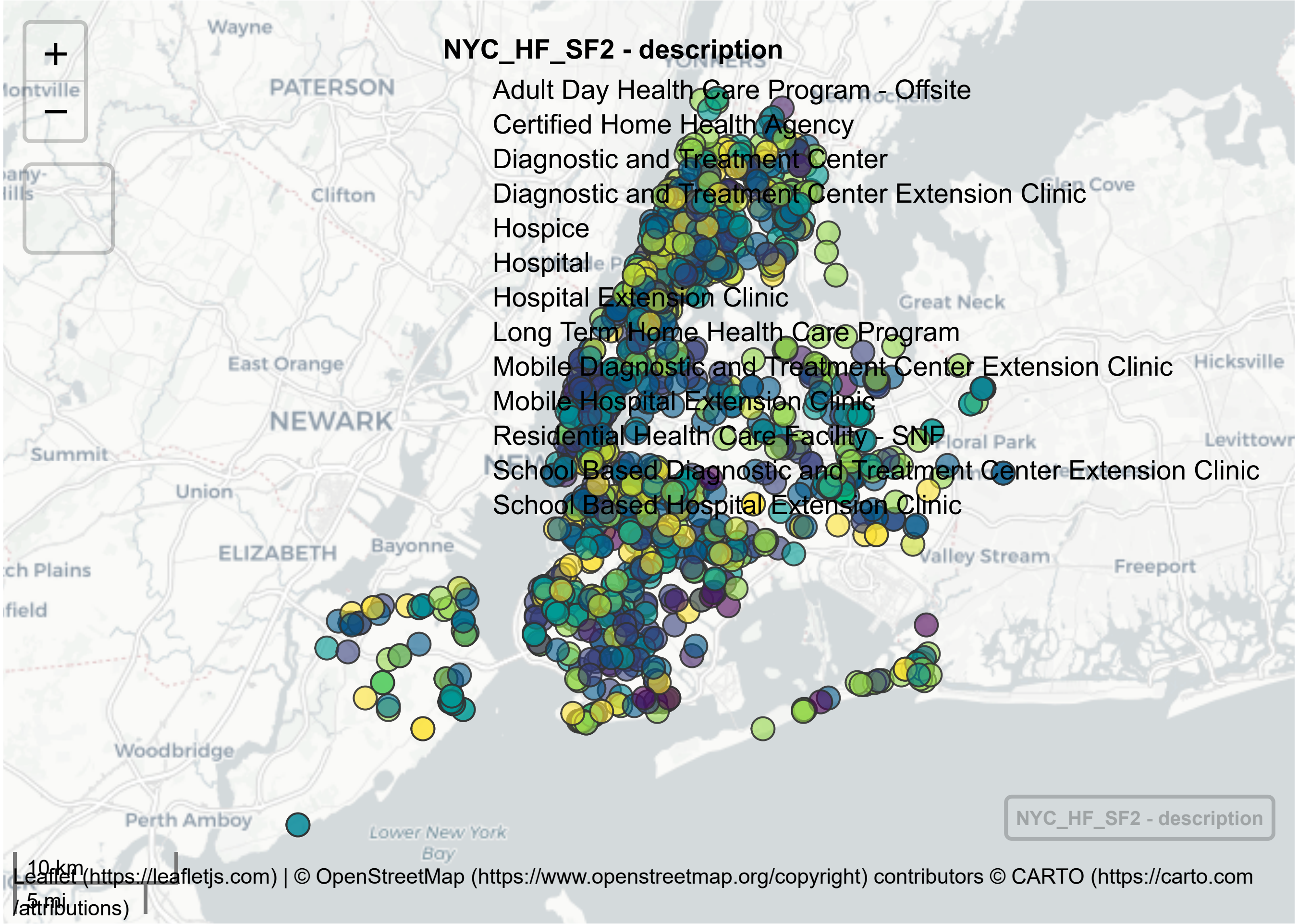
### Food Retail Map

```
mapview(food_retailsNY_SF)
```


+
−
food_retailsNY_SF
food_retailsNY_SF
Wayne
YONKERS
PATERSON
Montville
New Rochelle
Clifton
Glen Cove
10 km
5 mi
Leaflet (https://leafletjs.com) | © OpenStreetMap (https://www.openstreetmap.org/copyright) contributors © CARTO (https://carto.com/attributions)

## Health Faciltìes Map

```
NYC_HF_SF2 <- NYC_HealthFaciltìes_SF %>%
  filter(facility_latitude > "0.00000")

mapview(NYC_HF_SF2, zcol = "description")
```


+
−
NYC_HF_SF2 - description
Adult Day Health Care Program - Offsite
Certified Home Health Agency
Diagnostic and Treatment Center
Diagnostic and Treatment Center Extension Clinic
Hospice
Hospital
Hospital Extension Clinic
Long Term Home Health Care Program
Mobile Diagnostic and Treatment Center Extension Clinic
Mobile Hospital Extension Clinic
Residential Health Care Facility - SNF
School Based Diagnostic and Treatment Center Extension Clinic
School Based Hospital Extension Clinic
Wayne
PATERSON
Clifton
Glen Cove
Great Neck
East Orange
Hicksville
NEWARK
Floral Park
Levittown
Summit
Union
ELIZABETH
Bayonne
Valley Stream
Freeport
ch Plains
field
Woodbridge
Perth Amboy
Lower New York Bay
NYC_HF_SF2 - description
10 km
5 mi
Leaflet (https://leafletjs.com) | © OpenStreetMap (https://www.openstreetmap.org/copyright) contributors © CARTO (https://carto.com/attributions)

# Step 6.

## Save the three sf objects in a RData file or in a single GeoPackage file/database.

```
#save as a RData file
saveRDS(NYC_HealthFacilties_SF, "HW10_Outputs/NYC_HealthFacilties_SF.rds")
saveRDS(food_retailsNY_SF, "HW10_Outputs/NYC_FoodRetail_SF.rds")
saveRDS(zipcode, "HW10_Outputs/NYC_Zipcode_SF.rds")
```

```
# Save as a GeoPackage file
st_write(NYC_HealthFacilties_SF, "HW10_Outputs/HW10.gpkg", "NYC_HealthFacilties_SF")
```

```
## Writing layer `NYC_HealthFacilties_SF' to data source
##   `HW10_Outputs/HW10.gpkg' using driver `GPKG'
## Writing 1295 features with 37 fields and geometry type Point.
```

```
st_write(food_retailsNY_SF, "HW10_Outputs/HW_Outputs.gpkg", "NYC_FoodRetail_SF")
```

```
## Writing layer `NYC_FoodRetail_SF' to data source
##   `HW10_Outputs/HW_Outputs.gpkg' using driver `GPKG'
## Writing 11300 features with 16 fields and geometry type Point.
```

```
st_write(zipcode, "HW10_Outputs/HW10.gpkg", "NYC_Zipcode_SF")
```

```
## Writing layer `NYC_Zipcode_SF' to data source
##   `HW10_Outputs/HW10.gpkg' using driver `GPKG'
## Writing 263 features with 12 fields and geometry type Polygon.
```