Vaccination Rates LA County

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Step 1: Importing and Fixing the Data

Variable name on R vs. Variable name on Excel:

X12..with.1..Dose = 12+ with 1+ Dose

Population..12.. = Population (12+)

X12..Pop..Vaccinated.... = 12+ Pop. Vaccinated (%)

```
la_c <- read.csv("LA-County-COVID-19-Vaccine-Dashboard-Community-2021-10-24.csv")
head(la_c) # Looks messy, for R standards
```

```
##            City.Community X12..with.1..Dose Population..12..
## 1 City of Agoura Hills             15,212          18,920
## 2     City of Alhambra             64,216          76,362
## 3      City of Arcadia             45,160          53,504
## 4      City of Artesia             12,420          15,043
## 5       City of Avalon                760           3,266
## 6        City of Azusa             30,563          43,954
##   X12..Pop..Vaccinated....
## 1                    80.4%
## 2                    84.1%
## 3                    84.4%
## 4                    82.6%
## 5                    23.3%
## 6                    69.5%
```

```
dim(la_c) # Dimeensions of our data frame
```

```
## [1] 345    4
```

```
la_c$City.Community <- as.character(la_c$City.Community)
# For the next 3 lines, we'll change the class of
# the last 3 variables to numeric to make things easier.
la_c$X12..with.1..Dose <- as.numeric(gsub("[\\,]", "", la_c$X12..with.1..Dose))
```

```
## Warning: NAs introduced by coercion
```

```r
la_c$Population..12.. <- as.numeric(gsub("[\\,]", "", la_c$Population..12..))
```

```
## Warning: NAs introduced by coercion
```

```r
la_c$X12..Pop..Vaccinated.... <- as.numeric(gsub("[\\%,]", "", la_c$X12..Pop..Vaccinated....))
```

```
## Warning: NAs introduced by coercion
```

```r
head(la_c) # Looks much better now
```

```
##           City.Community X12..with.1..Dose Population..12..
## 1 City of Agoura Hills             15212           18920
## 2     City of Alhambra             64216           76362
## 3      City of Arcadia             45160           53504
## 4      City of Artesia             12420           15043
## 5       City of Avalon               760            3266
## 6        City of Azusa             30563           43954
##   X12..Pop..Vaccinated....
## 1                     80.4
## 2                     84.1
## 3                     84.4
## 4                     82.6
## 5                     23.3
## 6                     69.5
```

Step 2: Cleaning the Data

```r
summary(la_c)
```

```
##  City.Community     X12..with.1..Dose Population..12.. X12..Pop..Vaccinated....
##  Length:345         Min.   :    10    Min.   :    11   Min.   :17.60
##  Class :character   1st Qu.:  2659    1st Qu.:  3233   1st Qu.:70.58
##  Mode  :character   Median : 12120    Median : 13422   Median :76.30
##                     Mean   : 20641    Mean   : 25965   Mean   :74.32
##                     3rd Qu.: 28727    3rd Qu.: 35430   3rd Qu.:81.40
##                     Max.   :300966    Max.   :404580   Max.   :99.50
##                     NA's   :21        NA's   :5        NA's   :21
```

```r
# Looks about right considering this is LA County,
# however, those NA's need to be taken care of.
nr <- which(is.na(la_c$X12..with.1..Dose) == TRUE) # Checks index of NA's
nr
```

```
##  [1]  36  82 100 115 152 175 177 219 227 238 241 250 265 268 298 308 314 325 330
## [20] 334 343
```

```
which(is.na(la_c$Population..12..) == TRUE)
```

```
## [1] 227 238 268 325 330
```

```
which(is.na(la_c$X12..Pop..Vaccinated....) == TRUE)
```

```
##  [1]  36  82 100 115 152 175 177 219 227 238 241 250 265 268 298 308 314 325 330
## [20] 334 343
```

```
# Appears that all our NA's happen on the same observations...
la_c2 <- la_c[-nr, ]
summary(la_c2) # No NA's; success
```

```
##  City.Community     X12..with.1..Dose Population..12.. X12..Pop..Vaccinated....
##  Length:324         Min.   :    10    Min.   :    20   Min.   :17.60
##  Class :character   1st Qu.:  2659    1st Qu.:  3649   1st Qu.:70.58
##  Mode  :character   Median :  12120   Median :  15070  Median :76.30
##                     Mean   :  20641   Mean   :  26944  Mean   :74.32
##                     3rd Qu.:  28727   3rd Qu.:  36333  3rd Qu.:81.40
##                     Max.   :300966    Max.   :404580   Max.   :99.50
```

```
# Now we check for duplicate observations
which(duplicated(la_c2) == TRUE) # No duplicates
```

```
## integer(0)
```

```
# We are done with cleaning the data
```

Step 3: Visualizations and Analysis

```
la_c3 <- la_c2
# Let's compare the population to the percent of that
# population that vaccinated.
plot(la_c3$X12..Pop..Vaccinated.... ~ la_c3$Population..12..,
     xlab = "Population (12+)",
     ylab = "Percent Vaccinated (12+)",
     main = "Total Population vs Percent Vaccinated (Age 12+)") # Doesn't show a pattern...
```
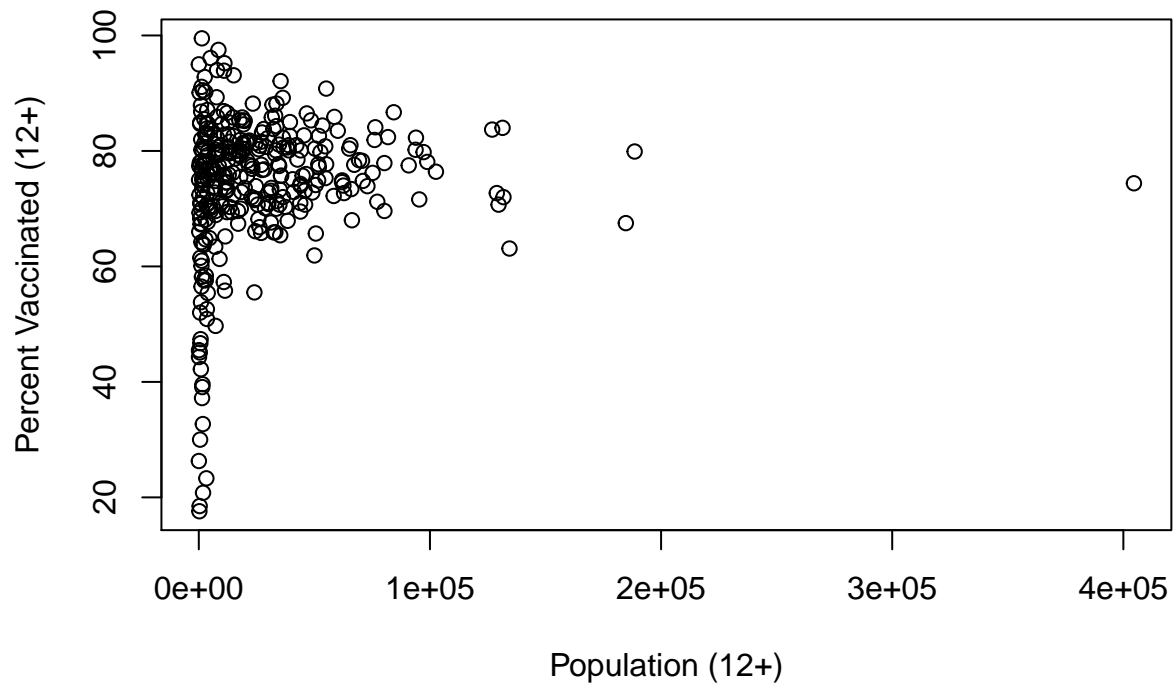
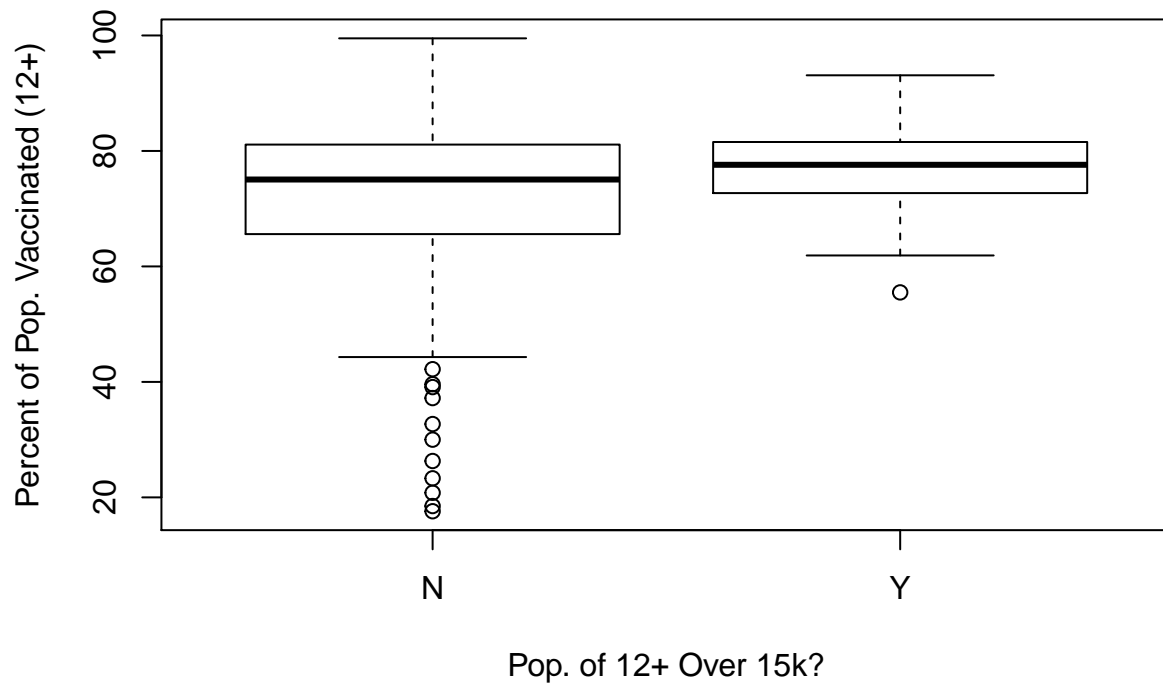# Total Population vs Percent Vaccinated (Age 12+)


```
# Let's see if the more populated areas of
# LA County have a higher vaccination rate.
# We'll use a population of 15k as our arbitrary cutoff point
# between sparsely populated and highly populated.
tp <- which(la_c3$Population..12.. >= 15000)
over10k <- rep("N", 324)
over10k[tp] <- "Y"
la_c3 <- cbind(la_c3, over10k)
table(la_c3$over10k) # Amount of areas over/under pop. of 15k
```

```
##
##   N   Y
## 160 164
```

```
plot(la_c3$over10k, la_c3$X12..Pop..Vaccinated....,
     xlab = "Pop. of 12+ Over 15k?",
     ylab = "Percent of Pop. Vaccinated (12+)",
     main = "Higher Population vs Lower Population Vax Rates")
```

Higher Population vs Lower Population Vax Rates


```
par(mfrow = c(1, 2))
plot(la_c3$X12..Pop..Vaccinated....[tp] ~ la_c3$Population..12..[tp],
     ylim = c(0, 100), xlab = "Popuation <= 15k (12+)",
     ylab = "Percent Vaccinated (12+)", col = "green",
     main = "Pop. <= 15k vs % Vaccinated")
abline(h = mean(la_c3$X12..Pop..Vaccinated....[tp]), col = "purple")
plot(la_c3$X12..Pop..Vaccinated....[-tp] ~ la_c3$Population..12..[-tp],
     ylim = c(0, 100), xlab = "Popuation > 15k (12+)",
     ylab = "Percent Vaccinated (12+)", col = "red",
     main = "Pop. > 15k vs % Vaccinated")
abline(h = mean(la_c3$X12..Pop..Vaccinated....[-tp]), col = "purple")
legend("bottomright", legend = c("mean %"), col = c("purple"), lty = 1)
```

Pop. <= 15k vs % Vaccinated

Pop. > 15k vs % Vaccinated
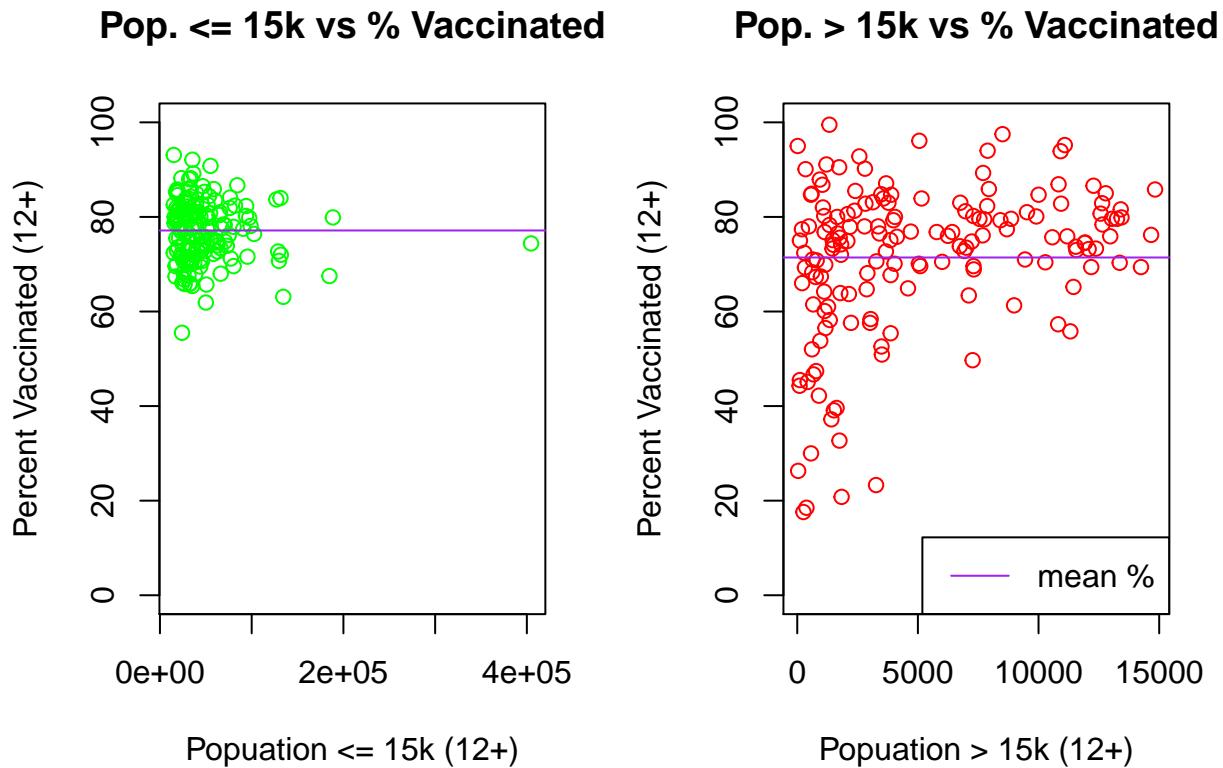
We do see that the more populated areas have a higher vaccination rate
on average as we can see from the scatterplot where the higher pop. areas
have a high concentration between 60% and 90%, whereas the lower pop.
areas seems to show a more varied spread of the percentage vaccinated
and a slightly lower average in general.

```r
# Now let's a try a linear regression model
la_m <- lm(la_c3$X12..Pop..Vaccinated.... ~ la_c3$Population..12..)
summary(la_m)
```

```
##
## Call:
## lm(formula = la_c3$X12..Pop..Vaccinated.... ~ la_c3$Population..12..)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -55.490  -3.839   2.033   7.132  26.360
##
## Coefficients:
```

```
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)            7.308e+01  8.511e-01  85.867   <2e-16 ***
## la_c3$Population..12.. 4.595e-05  1.870e-05   2.457   0.0146 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 12.35 on 322 degrees of freedom
## Multiple R-squared:  0.0184, Adjusted R-squared:  0.01535
## F-statistic: 6.035 on 1 and 322 DF,  p-value: 0.01455
```

```r
plot(la_c3$X12..Pop..Vaccinated.... ~ la_c3$Population..12..,
     xlab = "Population (12+)",
     ylab = "Percent Vaccinated (12+)",
     main = "Total Population vs Percent Vaccinated (Age 12+)")
abline(la_m, col = "red")
```
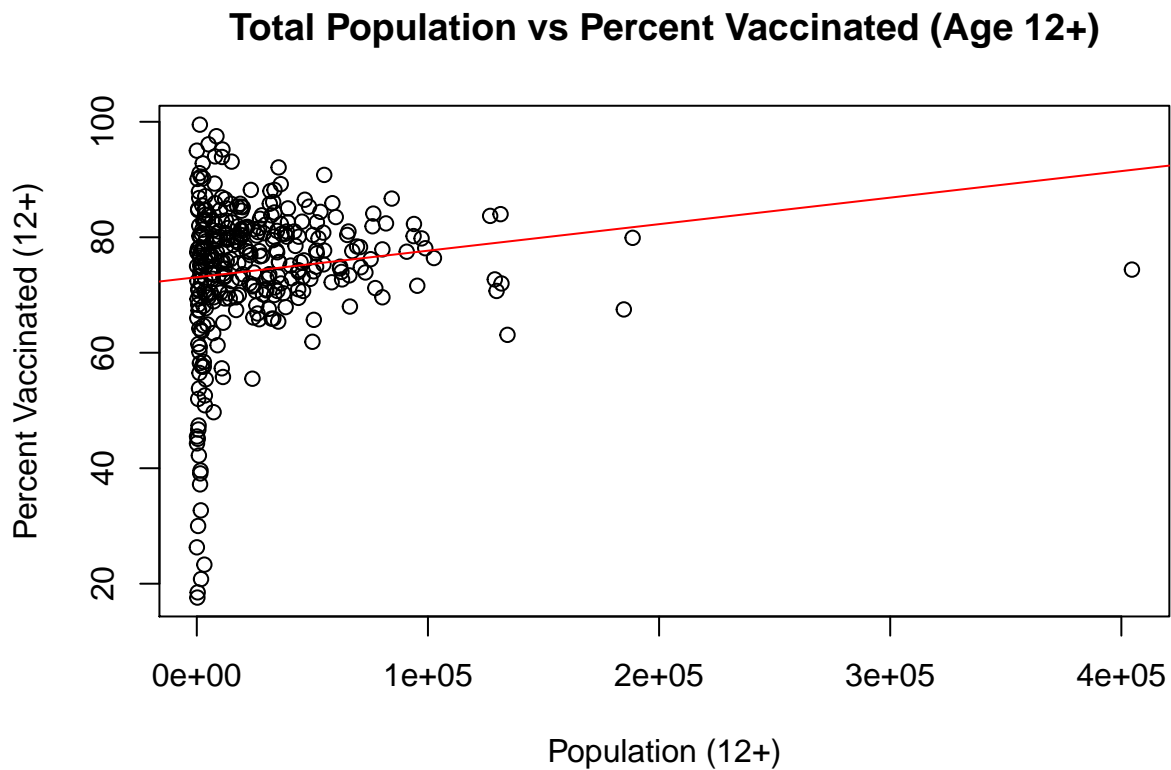
While the summary of the model seems to be promising with how it

shows a positive trend in vax rate as pop. increases, adding a

regression line to the first scatterplot doesn't really work,

although it could probably be useful to predict the vaccination rates

of other districts not listed here. Unfortunately, this data set

is fair;y barebones, so we can't really do much else.

I'd love to try and add political alignments for each districts, but

unfortunately, there is no current data set with such info

and if it does, it groups all unincorporated regions into one.

For now, we do see that higher population areas do make a difference in

vaccination rates, at least in the LA County.