

Class 17: COVID-19 Vaccination Rates

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11/23/2021

Getting Started

First, import and read the vaccination data.

```
vax <- read.csv("covid19vaccinesbyzipcode_test.csv")
head(vax)
```

```
## as_of_date zip_code tabulation_area local_health_jurisdiction county
## 1 2021-01-05 92804 Orange Orange
## 2 2021-01-05 92626 Orange Orange
## 3 2021-01-05 92250 Imperial Imperial
## 4 2021-01-05 92637 Orange Orange
## 5 2021-01-05 92155 San Diego San Diego
## 6 2021-01-05 92259 Imperial Imperial
## vaccine_equity_metric_quartile vem_source
## 1 2 Healthy Places Index Score
## 2 3 Healthy Places Index Score
## 3 1 Healthy Places Index Score
## 4 3 Healthy Places Index Score
## 5 NA No VEM Assigned
## 6 1 CDPH-Derived ZCTA Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 1 76455.9 84200 19
## 2 44238.8 47883 NA
## 3 7098.5 8026 NA
## 4 16027.4 16053 NA
## 5 456.0 456 NA
## 6 119.0 121 NA
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1 1282 0.000226
## 2 NA NA
## 3 NA NA
## 4 NA NA
## 5 NA NA
## 6 NA NA
## percent_of_population_partially_vaccinated
## 1 0.015226
## 2 NA
## 3 NA
## 4 NA
## 5 NA
## 6 NA
## percent_of_population_with_1_plus_dose
## 1 0.015452
## 2 NA
## 3 NA
## 4 NA
## 5 NA
## 6 NA
##
## redacted
## 1 No
## 2 Information redacted in accordance with CA state privacy requirements
## 3 Information redacted in accordance with CA state privacy requirements
## 4 Information redacted in accordance with CA state privacy requirements
## 5 Information redacted in accordance with CA state privacy requirements
## 6 Information redacted in accordance with CA state privacy requirements
```

Q1. What column details the total number of people fully vaccinated?

– persons_fully_vaccinated

Q2. What column details the Zip code tabulation area?

– zip_code_tabulation_area

Q3. What is the earliest date in this dataset?

```
head(vax$as_of_date, 1)
```

```
## [1] "2021-01-05"
```

Q4. What is the latest date in this dataset?

```
tail(vax$as_of_date, 1)
```

```
## [1] "2021-11-16"
```

Let's call the `skim()` function from the `skimr` package to get a quick overview of the dataset.

```
skimr::skim(vax)
```







Data summary

Name	vax
Number of rows	81144
Number of columns	14
Column type frequency:	
character	5
numeric	9
Group variables	
None	

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
as_of_date	0	1	10	10	0	46	0
local_health_jurisdiction	0	1	0	15	230	62	0
county	0	1	0	15	230	59	0
verm_source	0	1	15	26	0	3	0
redacted	0	1	2	69	0	2	0

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
zip_code_tabulation_area	0	1.00	93665.11	1817.39	90001	92257.75	93658.50	95380.50	97635.0	
vaccine_equity_metric_quartile	4002	0.95	2.44	1.11	1	1.00	2.00	3.00	4.0	
age12_plus_population	0	1.00	18895.04	18993.94	0	1346.95	13685.10	31756.12	88556.7	
age5_plus_population	0	1.00	20875.24	21106.05	0	1460.50	15364.00	34877.00	101902.0	
persons_fully_vaccinated	8256	0.90	9456.49	11498.25	11	506.00	4105.00	15859.00	71078.0	
persons_partially_vaccinated	8256	0.90	1900.61	2113.07	11	200.00	1271.00	2893.00	20185.0	

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
percent_of_population_fully_vaccinated	8256	0.90	0.42	0.27	0	0.19	0.44	0.62	1.0	
percent_of_population_partially_vaccinated	8256	0.90	0.10	0.10	0	0.06	0.07	0.11	1.0	
percent_of_population_with_1_plus_dose	8256	0.90	0.50	0.26	0	0.30	0.53	0.70	1.0	

Q5. How many numeric columns are in this dataset?

– 9

Q6. Note that there are “missing values” in the dataset. How many NA values there in the persons_fully_vaccinated column?

```
sum( is.na(vax$persons_fully_vaccinated) )
```

```
## [1] 8256
```

Q7. What percent of persons_fully_vaccinated values are missing (to 2 significant figures)?

```
round( sum( is.na(vax$persons_fully_vaccinated) ) / nrow(vax) * 100, 2 )
```

```
## [1] 10.17
```

Q8. [Optional]: Why might this data be missing?

– Some zip codes include areas that with federal agencies, whose data is not included in the CDC’s vaccination rate file.

We will use the **lubridate** package to make life a lot easier when dealing with dates and times.

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##   date, intersect, setdiff, union
```

Here, we make our `as_of_date` column lubridate format.

```
# Specify that we are using the Year-month-day format
vax$as_of_date <- ymd(vax$as_of_date)
```

Now I can do useful math with dates more easily:

```
today() - vax$as_of_date[1]
```

```
## Time difference of 322 days
```

Q9. How many days have passed since the last update of the dataset?

```
today() - vax$as_of_date[ nrow(vax) ]
```

```
## Time difference of 7 days
```

Q. How many days between the first and the last entry in the dataset?

```
vax$as_of_date[nrow(vax)] - vax$as_of_date[1]
```

```
## Time difference of 315 days
```

Q10. How many unique dates are in the dataset (i.e. how many different dates are detailed)?

```
length( unique(vax$as_of_date) )
```

```
## [1] 46
```

This sounds good

```
46*7
```

```
## [1] 322
```

Working with Zip Codes

In R we can use the zipcodeR package to make working with these codes easier.

```
library(zipcodeR)
```

```
reverse_zipcode(c('92037', "92109") )
```

```
## # A tibble: 2 × 24
##   zipcode zipcode_type major_city post_office_city common_city_list county state
##   <chr>    <chr>        <chr>      <chr>                <blob> <chr>  <chr>
## 1 92037    Standard      La Jolla   La Jolla, CA          <raw 20 B> San D... CA
## 2 92109    Standard      San Diego  San Diego, CA          <raw 21 B> San D... CA
## # ... with 17 more variables: lat <dbl>, lng <dbl>, timezone <chr>,
## #   radius_in_miles <dbl>, area_code_list <blob>, population <int>,
## #   population_density <dbl>, land_area_in_sqmi <dbl>,
## #   water_area_in_sqmi <dbl>, housing_units <int>,
## #   occupied_housing_units <int>, median_home_value <int>,
## #   median_household_income <int>, bounds_west <dbl>, bounds_east <dbl>,
## #   bounds_north <dbl>, bounds_south <dbl>
```

Focus on the San Diego County

```
table(vax$county)
```

```
##
##           Alameda           Alpine           Amador           Butte
##           230           2254           46           552           828
## Calaveras Colusa Contra Costa Del Norte El Dorado
##           828           322           1978           184           1012
##           Fresno           Glenn           Humboldt           Imperial           Inyo
##           2530           276           1610           690           460
##           Kern           Kings           Lake           Lassen           Los Angeles
##           2254           322           644           598           13340
##           Madera           Marin           Mariposa           Mendocino           Merced
##           552           1288           368           1196           874
##           Modoc           Mono           Monterey           Napa           Nevada
##           506           322           1288           460           552
##           Orange           Placer           Plumas           Riverside           Sacramento
##           4048           1334           736           3220           2484
##           San Benito San Bernardino San Diego San Francisco San Joaquin
##           184           4094           4922           1242           1472
## San Luis Obispo San Mateo Santa Barbara Santa Clara Santa Cruz
##           1012           1334           1058           2668           782
##           Shasta           Sierra           Siskiyou           Solano           Sonoma
##           1196           322           966           690           1656
##           Stanislaus Sutter Tehama Trinity Tulare
##           1104           414           598           598           1518
##           Tuolumne           Ventura           Yolo           Yuba
##           598           1242           782           506
```

We will subset with base R.

```
sd <- vax$county == "San Diego"
head(vax[sd,])
```

```
## as_of_date zip_code_tabulation_area local_health_jurisdiction county
## 5 2021-01-05 92155 San Diego San Diego
## 14 2021-01-05 92147 San Diego San Diego
## 16 2021-01-05 92124 San Diego San Diego
## 24 2021-01-05 92145 San Diego San Diego
## 34 2021-01-05 91935 San Diego San Diego
## 36 2021-01-05 92102 San Diego San Diego
## vaccine_equity_metric_quartile vem_source
## 5 NA No VEM Assigned
## 14 NA No VEM Assigned
## 16 3 Healthy Places Index Score
## 24 NA No VEM Assigned
## 34 3 Healthy Places Index Score
## 36 1 Healthy Places Index Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 5 456.0 456 NA
## 14 518.0 518 NA
## 16 25422.4 29040 29
## 24 1603.5 1821 NA
## 34 7390.0 8101 NA
## 36 37042.3 41033 29
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 5 NA NA
## 14 NA NA
## 16 573 0.000999
## 24 NA NA
## 34 NA NA
## 36 1495 0.000707
## percent_of_population_partially_vaccinated
## 5 NA
## 14 NA
## 16 0.019731
## 24 NA
## 34 NA
## 36 0.036434
## percent_of_population_with_1_plus_dose
## 5 NA
## 14 NA
## 16 0.020730
## 24 NA
## 34 NA
## 36 0.037141
## redacted
## 5 Information redacted in accordance with CA state privacy requirements
## 14 Information redacted in accordance with CA state privacy requirements
## 16 No
## 24 Information redacted in accordance with CA state privacy requirements
## 34 Information redacted in accordance with CA state privacy requirements
## 36 No
```

But let's use the **dplyr** package and it's **filter()** function:

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
## filter, lag
```

```
## The following objects are masked from 'package:base':
##
## intersect, setdiff, setequal, union
```

```
sd <- filter(vax, county == "San Diego")
head(sd)
```

```
## as_of_date zip_code_tabulation_area local_health_jurisdiction county
## 1 2021-01-05 92155 San Diego San Diego
## 2 2021-01-05 92147 San Diego San Diego
## 3 2021-01-05 92124 San Diego San Diego
## 4 2021-01-05 92145 San Diego San Diego
## 5 2021-01-05 91935 San Diego San Diego
## 6 2021-01-05 92102 San Diego San Diego
## vaccine_equity_metric_quartile vem_source
## 1 NA No VEM Assigned
## 2 NA No VEM Assigned
## 3 3 Healthy Places Index Score
## 4 NA No VEM Assigned
## 5 3 Healthy Places Index Score
## 6 1 Healthy Places Index Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 1 456.0 456 NA
## 2 518.0 518 NA
## 3 25422.4 29040 29
## 4 1603.5 1821 NA
## 5 7390.0 8101 NA
## 6 37042.3 41033 29
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1 NA NA
## 2 NA NA
## 3 573 0.000999
## 4 NA NA
## 5 NA NA
## 6 1495 0.000707
## percent_of_population_partially_vaccinated
## 1 NA
## 2 NA
## 3 0.019731
## 4 NA
## 5 NA
## 6 0.036434
## percent_of_population_with_1_plus_dose
## 1 NA
## 2 NA
## 3 0.020730
## 4 NA
## 5 NA
## 6 0.037141
## redacted
## 1 Information redacted in accordance with CA state privacy requirements
## 2 Information redacted in accordance with CA state privacy requirements
## 3 No
## 4 Information redacted in accordance with CA state privacy requirements
## 5 Information redacted in accordance with CA state privacy requirements
## 6 No
```

Q. How many entries are there for San Diego county?

```
nrow(sd)
```

```
## [1] 4922
```

Q11. How many distinct zip codes are listed for San Diego County?

```
length( unique(sd$zip_code_tabulation_area) )
```

```
## [1] 107
```

Using dplyr is often more convenient when we are subsetting across multiple criteria - for example all San Diego county areas with a population of over 10,000.

```
sd.10 <- filter(vax, county == "San Diego" &
                age5_plus_population > 10000)
head(sd.10)
```

```
##   as_of_date zip_code_tabulation_area local_health_jurisdiction   county
## 1 2021-01-05                92124                San Diego San Diego
## 2 2021-01-05                92102                San Diego San Diego
## 3 2021-01-05                92029                San Diego San Diego
## 4 2021-01-05                92026                San Diego San Diego
## 5 2021-01-05                92055                San Diego San Diego
## 6 2021-01-05                92011                San Diego San Diego
##   vaccine_equity_metric_quartile vem_source
## 1                        3 Healthy Places Index Score
## 2                        1 Healthy Places Index Score
## 3                        3 Healthy Places Index Score
## 4                        2 Healthy Places Index Score
## 5                        3   CDPH-Derived ZCTA Score
## 6                        4 Healthy Places Index Score
##   age12_plus_population age5_plus_population persons_fully_vaccinated
## 1                25422.4                29040                29
## 2                37042.3                41033                29
## 3                16904.2                18441                13
## 4                42613.9                46283                55
## 5                11548.0                11654                NA
## 6                20503.6                23247                NA
##   persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1                        573                0.000999
## 2                   1495                0.000707
## 3                      372                0.000705
## 4                      742                0.001188
## 5                      NA                NA
## 6                      NA                NA
##   percent_of_population_partially_vaccinated
## 1                        0.019731
## 2                        0.036434
## 3                        0.020172
## 4                        0.016032
## 5                      NA
## 6                      NA
##   percent_of_population_with_1_plus_dose
## 1                        0.020730
## 2                        0.037141
## 3                        0.020877
## 4                        0.017220
## 5                      NA
## 6                      NA
##                                     redacted
## 1                                     No
## 2                                     No
## 3                                     No
## 4                                     No
## 5 Information redacted in accordance with CA state privacy requirements
## 6 Information redacted in accordance with CA state privacy requirements
```

Q12. What San Diego County Zip code area has the largest 12 + Population in this dataset?

```
ind <- which.max(sd$age12_plus_population)
sd[ind,]
```



```
## as_of_date zip_code_tabulation_area local_health_jurisdiction county
## 23 2021-01-05 92154 San Diego San Diego
## vaccine_equity_metric_quartile vem_source
## 23 2 Healthy Places Index Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 23 76365.2 82971 32
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 23 1336 0.000386
## percent_of_population_partially_vaccinated
## 23 0.016102
## percent_of_population_with_1_plus_dose redacted
## 23 0.016488 No
```

What is the population in the 92037 ZIP code area?

```
filter(sd, zip_code_tabulation_area == "92037")[1,]
```

```
## as_of_date zip_code_tabulation_area local_health_jurisdiction county
## 1 2021-01-05 92037 San Diego San Diego
## vaccine_equity_metric_quartile vem_source
## 1 4 Healthy Places Index Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 1 33675.6 36144 44
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1 1265 0.001217
## percent_of_population_partially_vaccinated
## 1 0.034999
## percent_of_population_with_1_plus_dose redacted
## 1 0.036216 No
```

Q13. What is the overall average “Percent of Population Fully Vaccinated” value for all San Diego “County” as of “2021-11-09”?

```
sd.now <- filter(sd, as_of_date == "2021-11-09")
mean(sd.now$percent_of_population_fully_vaccinated,
     na.rm=TRUE)
```

```
## [1] 0.6727567
```

We can look at the 6-number summary:

```
summary( sd.now$percent_of_population_fully_vaccinated)
```

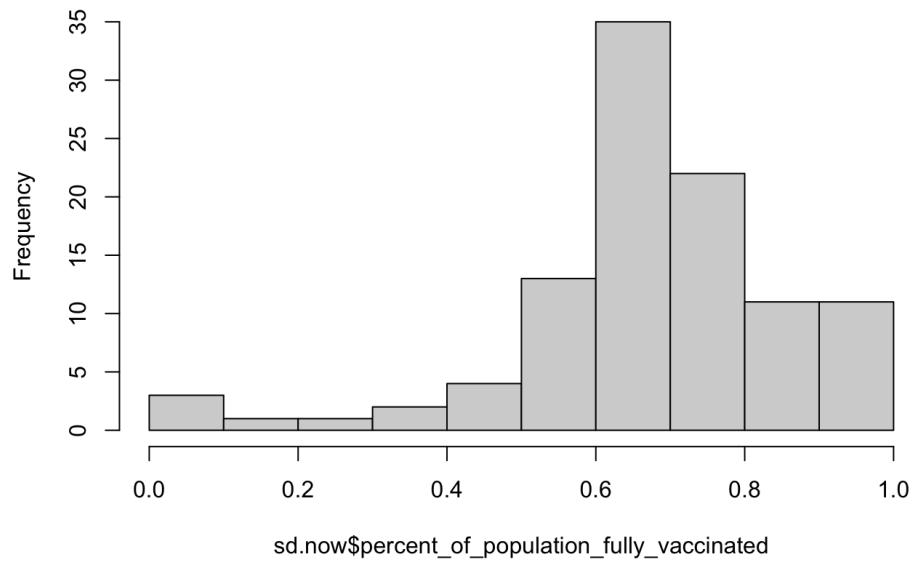
```
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.01017 0.60776 0.67700 0.67276 0.76164 1.00000 4
```

Q14. Using either ggplot or base R graphics make a summary figure that shows the distribution of Percent of Population Fully Vaccinated values as of “2021-11-09”?

Using base R plots:

```
hist(sd.now$percent_of_population_fully_vaccinated)
```

Histogram of sd.now\$percent_of_population_fully_vaccinated

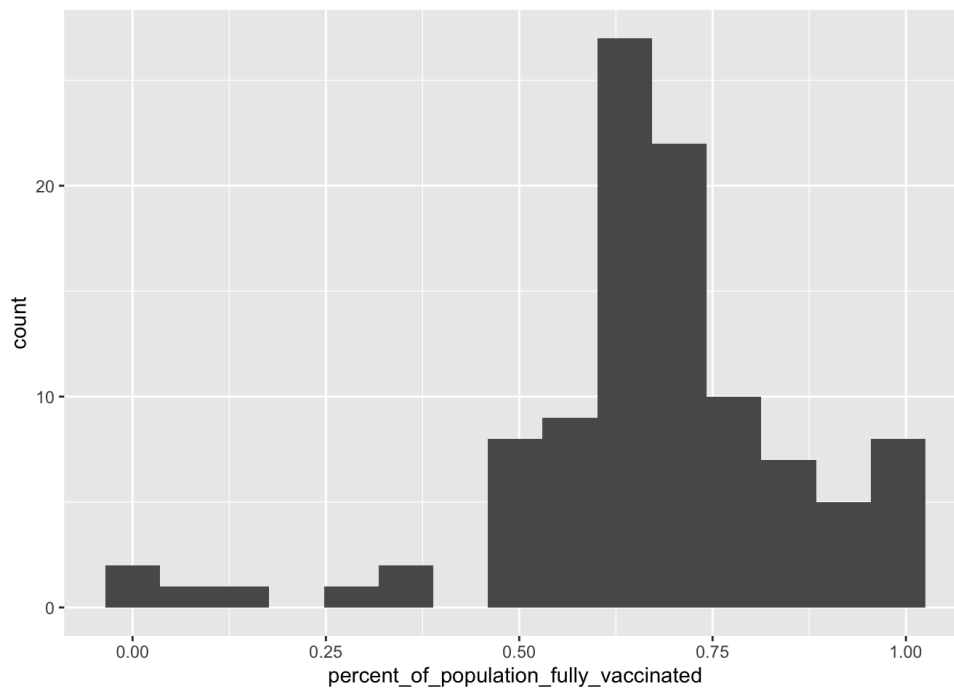


Using ggplot:

```
library(ggplot2)

ggplot(sd.now) +
  aes(percent_of_population_fully_vaccinated) +
  geom_histogram(bins=15)
```

```
## Warning: Removed 4 rows containing non-finite values (stat_bin).
```



What about 92037 - UCSD / La Jolla?

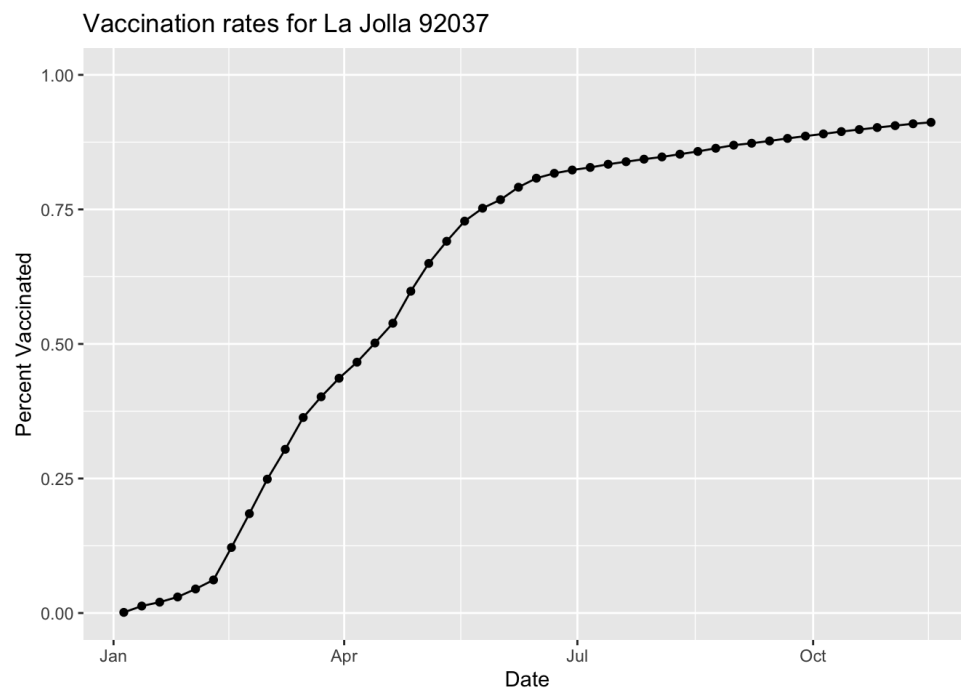
```
ucsd <- filter(sd, zip_code_tabulation_area == "92037")
head(ucsd)
```

```
## as_of_date zip_code_tabulation_area local_health_jurisdiction county
## 1 2021-01-05 92037 San Diego San Diego
## 2 2021-01-12 92037 San Diego San Diego
## 3 2021-01-19 92037 San Diego San Diego
## 4 2021-01-26 92037 San Diego San Diego
## 5 2021-02-02 92037 San Diego San Diego
## 6 2021-02-09 92037 San Diego San Diego
## vaccine_equity_metric_quartile vem_source
## 1 4 Healthy Places Index Score
## 2 4 Healthy Places Index Score
## 3 4 Healthy Places Index Score
## 4 4 Healthy Places Index Score
## 5 4 Healthy Places Index Score
## 6 4 Healthy Places Index Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 1 33675.6 36144 44
## 2 33675.6 36144 470
## 3 33675.6 36144 730
## 4 33675.6 36144 1079
## 5 33675.6 36144 1616
## 6 33675.6 36144 2222
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1 1265 0.001217
## 2 1565 0.013004
## 3 3505 0.020197
## 4 6197 0.029853
## 5 8388 0.044710
## 6 9634 0.061476
## percent_of_population_partially_vaccinated
## 1 0.034999
## 2 0.043299
## 3 0.096973
## 4 0.171453
## 5 0.232072
## 6 0.266545
## percent_of_population_with_1_plus_dose redacted
## 1 0.036216 No
## 2 0.056303 No
## 3 0.117170 No
## 4 0.201306 No
## 5 0.276782 No
## 6 0.328021 No
```

Time series of vaccination rate for 92037

Q15. Using ggplot make a graph of the vaccination rate time course for the 92037 ZIP code area:

```
ggplot(ucsd) +
  aes(as_of_date,
      percent_of_population_fully_vaccinated) +
  geom_point() +
  geom_line(group=1) +
  ylim(c(0,1)) +
  labs(x="Date", y="Percent Vaccinated", title="Vaccination rates for La Jolla 92037")
```



Let's return to the full dataset and look across every zip code area with a population at least as large as that of 92037 on as_of_date "2021-11-16".

```
# Subset to all CA areas with a population as large as 92037
vax.36 <- filter(vax, age5_plus_population > 36144 &
  as_of_date == "2021-11-16")

head(vax.36)
```

```
## as_of_date zip_code tabulation_area local_health_jurisdiction county
## 1 2021-11-16 92833 Orange Orange
## 2 2021-11-16 92234 Riverside Riverside
## 3 2021-11-16 92507 Riverside Riverside
## 4 2021-11-16 92555 Riverside Riverside
## 5 2021-11-16 92345 San Bernardino San Bernardino
## 6 2021-11-16 91306 Los Angeles Los Angeles
## vaccine_equity_metric_quartile vem_source
## 1 3 Healthy Places Index Score
## 2 1 Healthy Places Index Score
## 3 1 Healthy Places Index Score
## 4 2 Healthy Places Index Score
## 5 1 Healthy Places Index Score
## 6 2 Healthy Places Index Score
## age12_plus_population age5_plus_population persons_fully_vaccinated
## 1 43985.4 48623 34668
## 2 46401.1 51202 34191
## 3 51432.5 55253 31704
## 4 36725.7 41446 23776
## 5 66047.5 75539 35332
## 6 42671.1 46573 31858
## persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1 3377 0.712996
## 2 3966 0.667767
## 3 3434 0.573797
## 4 2424 0.573662
## 5 4428 0.467732
## 6 3372 0.684044
## percent_of_population_partially_vaccinated
## 1 0.069453
## 2 0.077458
## 3 0.062150
## 4 0.058486
## 5 0.058619
## 6 0.072402
## percent_of_population_with_1_plus_dose redacted
## 1 0.782449 No
## 2 0.745225 No
## 3 0.635947 No
## 4 0.632148 No
## 5 0.526351 No
## 6 0.756446 No
```

How many unique zip codes have a population as large as 92037?

```
length(unique(vax.36$percent_of_population_fully_vaccinated))
```

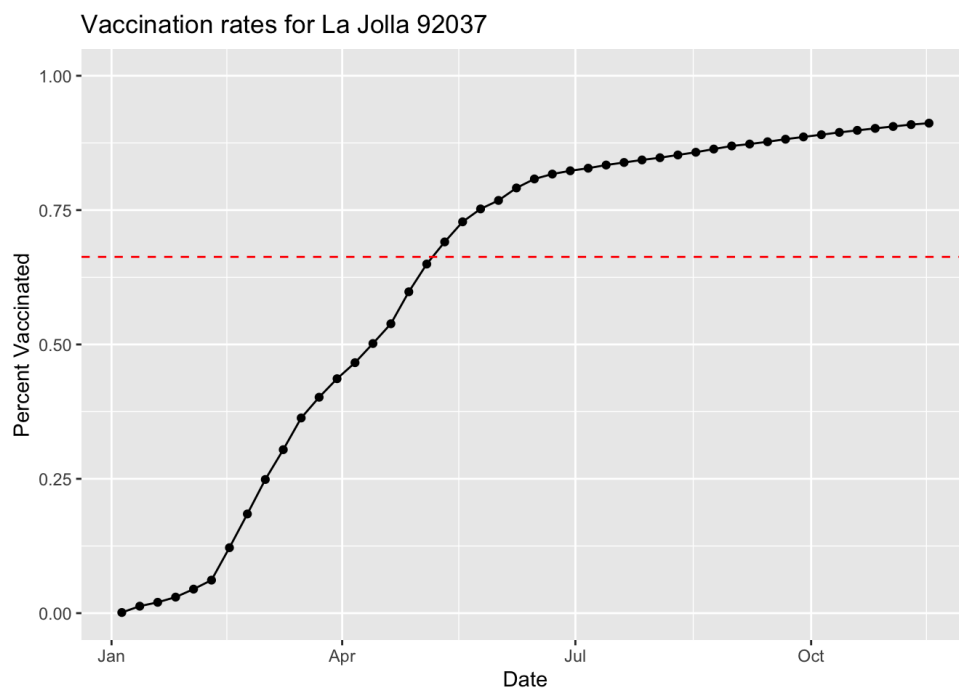
```
## [1] 411
```

Q16. Calculate the mean “Percent of Population Fully Vaccinated” for ZIP code areas with a population as large as 92037 (La Jolla) as_of_date “2021-11-16”. Add this as a straight horizontal line to your plot from above with the geom_hline() function?

```
mean(vax.36$percent_of_population_fully_vaccinated)
```

```
## [1] 0.6629812
```

```
ggplot(ucsd) +
  aes(as_of_date,
      percent_of_population_fully_vaccinated) +
  geom_point() +
  geom_line(group=1) +
  ylim(c(0,1)) +
  labs(x="Date", y="Percent Vaccinated", title="Vaccination rates for La Jolla 92037") +
  geom_hline(yintercept = 0.6629812, color="red", linetype=2)
```



Q17. What is the 6 number summary (Min, 1st Qu., Median, Mean, 3rd Qu., and Max) of the “Percent of Population Fully Vaccinated” values for ZIP code areas with a population as large as 92037 (La Jolla) as_of_date “2021-11-16”?

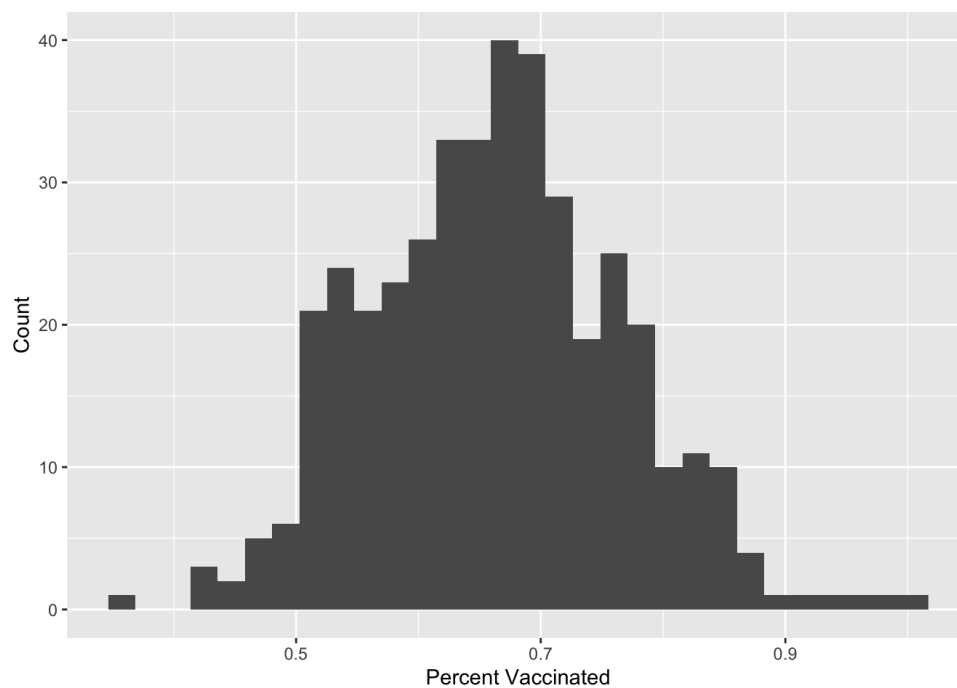
```
summary(vax.36$percent_of_population_fully_vaccinated)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.3519  0.5891  0.6649  0.6630  0.7286  1.0000
```

Q18. Using ggplot generate a histogram of this data.

```
ggplot(vax.36) +
  aes(percent_of_population_fully_vaccinated) +
  geom_histogram() +
  labs(x="Percent Vaccinated", y="Count")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



Q19. Is the 92109 and 92040 ZIP code areas above or below the average value you calculated for all these above?

92040 is below the average and 92109 is above average.

```
vax %>% filter(as_of_date == "2021-11-16") %>%
  filter(zip_code_tabulation_area=="92040") %>%
  select(percent_of_population_fully_vaccinated)
```

```
## percent_of_population_fully_vaccinated
## 1 0.520463
```

```
vax %>% filter(as_of_date == "2021-11-16") %>%
  filter(zip_code_tabulation_area=="92109") %>%
  select(percent_of_population_fully_vaccinated)
```

```
## percent_of_population_fully_vaccinated
## 1 0.687763
```

Q20. Finally make a time course plot of vaccination progress for all areas in the full dataset with a age5_plus_population > 36144.

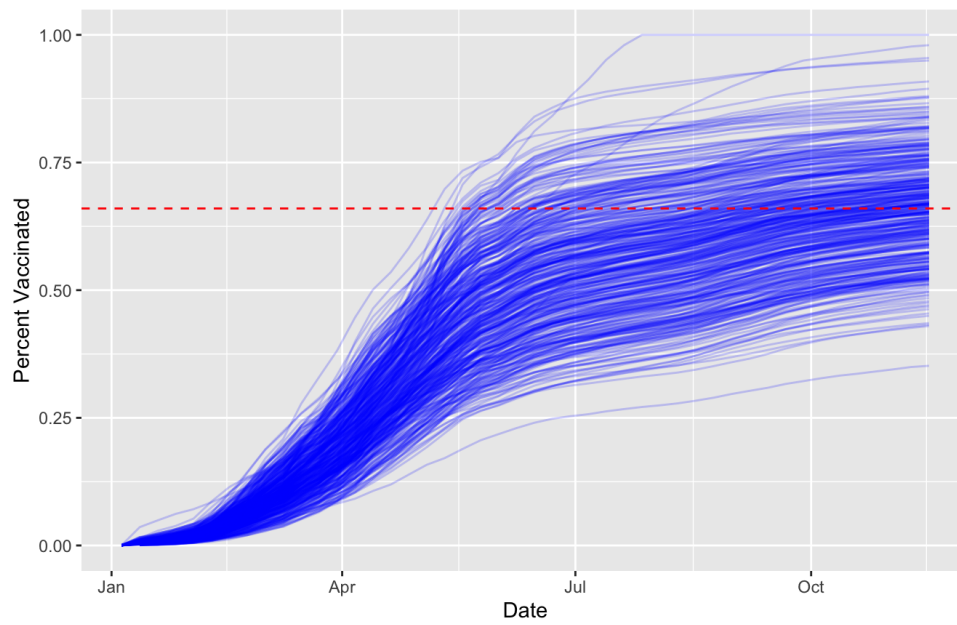
```
vax.36.all <- filter(vax, age5_plus_population > 36144)

ggplot(vax.36.all) +
  aes(as_of_date,
      percent_of_population_fully_vaccinated,
      group=zip_code_tabulation_area) +
  geom_line(alpha=0.2, color="blue") +
  labs(x="Date", y="Percent Vaccinated",
       title="Vaccination rates of California",
       subtitle="Only areas with a population above 36k are shown") +
  geom_hline(yintercept = 0.66, linetype=2, col="red")
```

```
## Warning: Removed 180 row(s) containing missing values (geom_path).
```

Vaccination rates of California

Only areas with a population above 36k are shown



Q21. How do you feel about traveling for Thanksgiving and meeting for in-person class next Week?

I'm fortunate enough that all of my family is local, so I will not be traveling far for Thanksgiving, and as long as people are vaccinated and getting frequent COVID tests if they are traveling far / meeting family that are, I am fine with in-person class next week. Obviously, I would wish those that are showing symptoms to stay home.