Class 17: Vaccination Mini Project

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Getting Started

Load your data

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

```
##   as_of_date zip_code_tabulation_area local_health_jurisdiction         county
## 1 2021-01-05                   92395            San Bernardino San Bernardino
## 2 2021-01-05                   93206                      Kern           Kern
## 3 2021-01-05                   91006               Los Angeles    Los Angeles
## 4 2021-01-05                   91901                 San Diego      San Diego
## 5 2021-01-05                   92230                 Riverside      Riverside
## 6 2021-01-05                   92662                    Orange         Orange
##   vaccine_equity_metric_quartile                vem_source
## 1                              1 Healthy Places Index Score
## 2                              1 Healthy Places Index Score
## 3                              3 Healthy Places Index Score
## 4                              3 Healthy Places Index Score
## 5                              1 Healthy Places Index Score
## 6                              4 Healthy Places Index Score
##   age12_plus_population age5_plus_population persons_fully_vaccinated
## 1               35915.3                40888                       NA
## 2                1237.5                 1521                       NA
## 3               28742.7                31347                       19
## 4               15549.8                16905                       12
## 5                2320.2                 2526                       NA
## 6                2349.5                 2397                       NA
##   persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1                           NA                                     NA
## 2                           NA                                     NA
## 3                          873                                0.000606
## 4                          271                                0.000710
## 5                           NA                                     NA
## 6                           NA                                     NA
##   percent_of_population_partially_vaccinated
## 1                                         NA
## 2                                         NA
## 3                                   0.027850
## 4                                   0.016031
## 5                                         NA
## 6                                         NA
##   percent_of_population_with_1_plus_dose
## 1                                     NA
## 2                                     NA
## 3                               0.028456
## 4                               0.016741
## 5                                     NA
## 6                                     NA
##                                                                redacted
## 1 Information redacted in accordance with CA state privacy requirements
## 2 Information redacted in accordance with CA state privacy requirements
## 3                                                                    No
## 4                                                                    No
## 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?

8

Q2. What column details the Zip code tabulation area?

2

Q3. What is the earliest date in this dataset?

2021-01-05

Q4. What is the latest date in this dataset?

2021-11-23

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

Data summary

Name	vax
Number of rows	82908
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	47	0
local_health_jurisdiction	0	1	0	15	235	62	0
county	0	1	0	15	235	59	0
vem_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	4089	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	21106.04	0	1460.50	15364.00	34877.00	101902.0	▇▃▁
persons_fully_vaccinated	8355	0.90	9585.35	11609.12	11	516.00	4210.00	16095.00	71219.0	▇▂▁
persons_partially_vaccinated	8355	0.90	1894.87	2105.55	11	198.00	1269.00	2880.00	20159.0	▇▁
percent_of_population_fully_vaccinated	8355	0.90	0.43	0.27	0	0.20	0.44	0.63	1.0	▆▆▇
percent_of_population_partially_vaccinated	8355	0.90	0.10	0.10	0	0.06	0.07	0.11	1.0	▇▁
percent_of_population_with_1_plus_dose	8355	0.90	0.51	0.26	0	0.31	0.53	0.71	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?

8355

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

8355/82908 = 10.08%

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

Because the CDC was unable to collect the data from the given zip code due to missing infrastructure or noncompliance

Working with dates

```
library(lubridate)
```

```
## Warning: package 'lubridate' was built under R version 4.1.2
```

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

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

```
today()
```

```
## [1] "2021-11-28"
```

Convert to a format that lubridate will understand

```
vax$as_of_date <-  ymd(vax$as_of_date)
```

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

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

```
## Time difference of 5 days
```

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

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

```
##  [1] "2021-01-05" "2021-01-12" "2021-01-19" "2021-01-26" "2021-02-02"
##  [6] "2021-02-09" "2021-02-16" "2021-02-23" "2021-03-02" "2021-03-09"
## [11] "2021-03-16" "2021-03-23" "2021-03-30" "2021-04-06" "2021-04-13"
## [16] "2021-04-20" "2021-04-27" "2021-05-04" "2021-05-11" "2021-05-18"
## [21] "2021-05-25" "2021-06-01" "2021-06-08" "2021-06-15" "2021-06-22"
## [26] "2021-06-29" "2021-07-06" "2021-07-13" "2021-07-20" "2021-07-27"
## [31] "2021-08-03" "2021-08-10" "2021-08-17" "2021-08-24" "2021-08-31"
## [36] "2021-09-07" "2021-09-14" "2021-09-21" "2021-09-28" "2021-10-05"
## [41] "2021-10-12" "2021-10-19" "2021-10-26" "2021-11-02" "2021-11-09"
## [46] "2021-11-16" "2021-11-23"
```

47 unique dates

Working with ZIP codes

```
library(zipcodeR)
```

```
## Warning: package 'zipcodeR' was built under R version 4.1.2
```

```
geocode_zip('92037')
```

```
## # A tibble: 1 x 3
##   zipcode   lat   lng
##   <chr>   <dbl> <dbl>
## 1 92037    32.8 -117.
```

Calculate distance between two zip code centers

```
zip_distance('92037', '92109')
```

```
##   zipcode_a zipcode_b distance
## 1     92037     92109     2.33
```

Pull census data

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

```
## # A tibble: 2 x 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 area

```
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 <- vax %>%
  filter(county == "San Diego")
```

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

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

```
##   [1] 91901 91902 92011 92055 92067 92081 92134 92124 92058 92132 92147 92135
##  [13] 92145 92078 92123 92173 92010 92019 92117 91932 92131 91905 92057 91913
##  [25] 91942 91910 92009 92026 92140 92029 92102 92155 92014 92061 91934 91916
##  [37] 91914 92082 91950 91935 92083 92113 92104 92103 92075 92084 92066 92060
##  [49] 91911 91941 91980 92139 92116 91977 92091 92118 91962 91963 91948 92154
##  [61] 91906 92120 91978 92114 92115 92122 91917 92064 92126 91931 92069 92086
##  [73] 91945 92130 92027 92071 92070 92037 92106 92024 92109 92021 92105 92127
##  [85] 92101 92028 92003 92059 92129 92119 92121 92108 92107 92128 92110 92008
##  [97] 92007 91915 92004 92020 92111 92065 92025 92036 92054 92056 92040
```

107 zip codes in San Diego County

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

```
sd %>%
  filter(age12_plus_population == max(sd$age12_plus_population))
```

```
##    as_of_date zip_code_tabulation_area local_health_jurisdiction    county
## 1  2021-01-05                    92154                San Diego San Diego
## 2  2021-01-12                    92154                San Diego San Diego
## 3  2021-01-19                    92154                San Diego San Diego
## 4  2021-01-26                    92154                San Diego San Diego
## 5  2021-02-02                    92154                San Diego San Diego
## 6  2021-02-09                    92154                San Diego San Diego
## 7  2021-02-16                    92154                San Diego San Diego
## 8  2021-02-23                    92154                San Diego San Diego
## 9  2021-03-02                    92154                San Diego San Diego
## 10 2021-03-09                    92154                San Diego San Diego
## 11 2021-03-16                    92154                San Diego San Diego
## 12 2021-03-23                    92154                San Diego San Diego
## 13 2021-03-30                    92154                San Diego San Diego
## 14 2021-04-06                    92154                San Diego San Diego
## 15 2021-04-13                    92154                San Diego San Diego
## 16 2021-04-20                    92154                San Diego San Diego
## 17 2021-04-27                    92154                San Diego San Diego
## 18 2021-05-04                    92154                San Diego San Diego
## 19 2021-05-11                    92154                San Diego San Diego
## 20 2021-05-18                    92154                San Diego San Diego
## 21 2021-05-25                    92154                San Diego San Diego
## 22 2021-06-01                    92154                San Diego San Diego
## 23 2021-06-08                    92154                San Diego San Diego
## 24 2021-06-15                    92154                San Diego San Diego
## 25 2021-06-22                    92154                San Diego San Diego
## 26 2021-06-29                    92154                San Diego San Diego
## 27 2021-07-06                    92154                San Diego San Diego
## 28 2021-07-13                    92154                San Diego San Diego
## 29 2021-07-20                    92154                San Diego San Diego
## 30 2021-07-27                    92154                San Diego San Diego
## 31 2021-08-03                    92154                San Diego San Diego
## 32 2021-08-10                    92154                San Diego San Diego
## 33 2021-08-17                    92154                San Diego San Diego
## 34 2021-08-24                    92154                San Diego San Diego
## 35 2021-08-31                    92154                San Diego San Diego
## 36 2021-09-07                    92154                San Diego San Diego
## 37 2021-09-14                    92154                San Diego San Diego
## 38 2021-09-21                    92154                San Diego San Diego
## 39 2021-09-28                    92154                San Diego San Diego
## 40 2021-10-05                    92154                San Diego San Diego
## 41 2021-10-12                    92154                San Diego San Diego
## 42 2021-10-19                    92154                San Diego San Diego
## 43 2021-10-26                    92154                San Diego San Diego
## 44 2021-11-02                    92154                San Diego San Diego
## 45 2021-11-09                    92154                San Diego San Diego
## 46 2021-11-16                    92154                San Diego San Diego
## 47 2021-11-23                    92154                San Diego San Diego
##    vaccine_equity_metric_quartile                vem_source
## 1                               2 Healthy Places Index Score
## 2                               2 Healthy Places Index Score
## 3                               2 Healthy Places Index Score
## 4                               2 Healthy Places Index Score
## 5                               2 Healthy Places Index Score
## 6                               2 Healthy Places Index Score
## 7                               2 Healthy Places Index Score
## 8                               2 Healthy Places Index Score
## 9                               2 Healthy Places Index Score
## 10                              2 Healthy Places Index Score
## 11                              2 Healthy Places Index Score
## 12                              2 Healthy Places Index Score
## 13                              2 Healthy Places Index Score
## 14                              2 Healthy Places Index Score
## 15                              2 Healthy Places Index Score
## 16                              2 Healthy Places Index Score
## 17                              2 Healthy Places Index Score
## 18                              2 Healthy Places Index Score
## 19                              2 Healthy Places Index Score
## 20                              2 Healthy Places Index Score
## 21                              2 Healthy Places Index Score
## 22                              2 Healthy Places Index Score
## 23                              2 Healthy Places Index Score
## 24                              2 Healthy Places Index Score
## 25                              2 Healthy Places Index Score
```

```
## 26                            2 Healthy Places Index Score
## 27                            2 Healthy Places Index Score
## 28                            2 Healthy Places Index Score
## 29                            2 Healthy Places Index Score
## 30                            2 Healthy Places Index Score
## 31                            2 Healthy Places Index Score
## 32                            2 Healthy Places Index Score
## 33                            2 Healthy Places Index Score
## 34                            2 Healthy Places Index Score
## 35                            2 Healthy Places Index Score
## 36                            2 Healthy Places Index Score
## 37                            2 Healthy Places Index Score
## 38                            2 Healthy Places Index Score
## 39                            2 Healthy Places Index Score
## 40                            2 Healthy Places Index Score
## 41                            2 Healthy Places Index Score
## 42                            2 Healthy Places Index Score
## 43                            2 Healthy Places Index Score
## 44                            2 Healthy Places Index Score
## 45                            2 Healthy Places Index Score
## 46                            2 Healthy Places Index Score
## 47                            2 Healthy Places Index Score
##    age12_plus_population age5_plus_population persons_fully_vaccinated
## 1                76365.2                82971                       33
## 2                76365.2                82971                      298
## 3                76365.2                82971                      689
## 4                76365.2                82971                     1017
## 5                76365.2                82971                     1428
## 6                76365.2                82971                     2200
## 7                76365.2                82971                     3271
## 8                76365.2                82971                     4503
## 9                76365.2                82971                     7158
## 10               76365.2                82971                     9784
## 11               76365.2                82971                    12471
## 12               76365.2                82971                    14215
## 13               76365.2                82971                    16252
## 14               76365.2                82971                    18334
## 15               76365.2                82971                    20896
## 16               76365.2                82971                    23899
## 17               76365.2                82971                    27894
## 18               76365.2                82971                    31610
## 19               76365.2                82971                    35483
## 20               76365.2                82971                    38987
## 21               76365.2                82971                    42619
## 22               76365.2                82971                    44988
## 23               76365.2                82971                    47827
## 24               76365.2                82971                    50585
## 25               76365.2                82971                    52464
## 26               76365.2                82971                    54274
## 27               76365.2                82971                    55383
## 28               76365.2                82971                    56593
## 29               76365.2                82971                    57734
## 30               76365.2                82971                    58605
## 31               76365.2                82971                    59405
## 32               76365.2                82971                    60234
## 33               76365.2                82971                    61051
## 34               76365.2                82971                    61894
## 35               76365.2                82971                    62949
## 36               76365.2                82971                    63683
## 37               76365.2                82971                    64638
## 38               76365.2                82971                    65575
## 39               76365.2                82971                    66152
## 40               76365.2                82971                    66681
## 41               76365.2                82971                    67115
## 42               76365.2                82971                    67574
## 43               76365.2                82971                    68004
## 44               76365.2                82971                    68539
## 45               76365.2                82971                    69104
## 46               76365.2                82971                    69654
## 47               76365.2                82971                    70069
##    persons_partially_vaccinated percent_of_population_fully_vaccinated
## 1                          1341                                0.000398
## 2                          1709                                0.003592
## 3                          2474                                0.008304
## 4                          3956                                0.012257
```

```
## 5                          6199                                  0.017211
## 6                          8310                                  0.026515
## 7                          9021                                  0.039423
## 8                          9007                                  0.054272
## 9                          8725                                  0.086271
## 10                         8440                                  0.117921
## 11                         8252                                  0.150306
## 12                         9629                                  0.171325
## 13                        11344                                  0.195876
## 14                        13266                                  0.220969
## 15                        15624                                  0.251847
## 16                        16283                                  0.288040
## 17                        16254                                  0.336190
## 18                        15696                                  0.380976
## 19                        14312                                  0.427655
## 20                        13878                                  0.469887
## 21                        13160                                  0.513661
## 22                        12421                                  0.542214
## 23                        11150                                  0.576430
## 24                         9831                                  0.609671
## 25                         9473                                  0.632317
## 26                         9530                                  0.654132
## 27                         9298                                  0.667498
## 28                         9085                                  0.682082
## 29                         8940                                  0.695833
## 30                         9118                                  0.706331
## 31                         9475                                  0.715973
## 32                         9802                                  0.725964
## 33                         9979                                  0.735811
## 34                        10099                                  0.745971
## 35                         9973                                  0.758687
## 36                         9791                                  0.767533
## 37                         9589                                  0.779043
## 38                         9364                                  0.790336
## 39                         9268                                  0.797291
## 40                         9291                                  0.803666
## 41                         9401                                  0.808897
## 42                         9547                                  0.814429
## 43                         9782                                  0.819612
## 44                        10157                                  0.826060
## 45                        10985                                  0.832869
## 46                        12812                                  0.839498
## 47                        14274                                  0.844500
##    percent_of_population_partially_vaccinated
## 1                                    0.016162
## 2                                    0.020598
## 3                                    0.029818
## 4                                    0.047679
## 5                                    0.074713
## 6                                    0.100155
## 7                                    0.108725
## 8                                    0.108556
## 9                                    0.105157
## 10                                   0.101722
## 11                                   0.099456
## 12                                   0.116053
## 13                                   0.136722
## 14                                   0.159887
## 15                                   0.188307
## 16                                   0.196249
## 17                                   0.195900
## 18                                   0.189175
## 19                                   0.172494
## 20                                   0.167263
## 21                                   0.158610
## 22                                   0.149703
## 23                                   0.134384
## 24                                   0.118487
## 25                                   0.114172
## 26                                   0.114859
## 27                                   0.112063
## 28                                   0.109496
## 29                                   0.107748
## 30                                   0.109894
## 31                                   0.114197
```

```
## 32                                  0.118138
## 33                                  0.120271
## 34                                  0.121717
## 35                                  0.120199
## 36                                  0.118005
## 37                                  0.115571
## 38                                  0.112859
## 39                                  0.111702
## 40                                  0.111979
## 41                                  0.113305
## 42                                  0.115064
## 43                                  0.117897
## 44                                  0.122416
## 45                                  0.132396
## 46                                  0.154415
## 47                                  0.172036
##    percent_of_population_with_1_plus_dose redacted
## 1                                0.016560       No
## 2                                0.024190       No
## 3                                0.038122       No
## 4                                0.059936       No
## 5                                0.091924       No
## 6                                0.126670       No
## 7                                0.148148       No
## 8                                0.162828       No
## 9                                0.191428       No
## 10                               0.219643       No
## 11                               0.249762       No
## 12                               0.287378       No
## 13                               0.332598       No
## 14                               0.380856       No
## 15                               0.440154       No
## 16                               0.484289       No
## 17                               0.532090       No
## 18                               0.570151       No
## 19                               0.600149       No
## 20                               0.637150       No
## 21                               0.672271       No
## 22                               0.691917       No
## 23                               0.710814       No
## 24                               0.728158       No
## 25                               0.746489       No
## 26                               0.768991       No
## 27                               0.779561       No
## 28                               0.791578       No
## 29                               0.803581       No
## 30                               0.816225       No
## 31                               0.830170       No
## 32                               0.844102       No
## 33                               0.856082       No
## 34                               0.867688       No
## 35                               0.878886       No
## 36                               0.885538       No
## 37                               0.894614       No
## 38                               0.903195       No
## 39                               0.908993       No
## 40                               0.915645       No
## 41                               0.922202       No
## 42                               0.929493       No
## 43                               0.937509       No
## 44                               0.948476       No
## 45                               0.965265       No
## 46                               0.993913       No
## 47                               1.000000       No
```

92154 zip code has the age 12 plus population of 76365.2

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

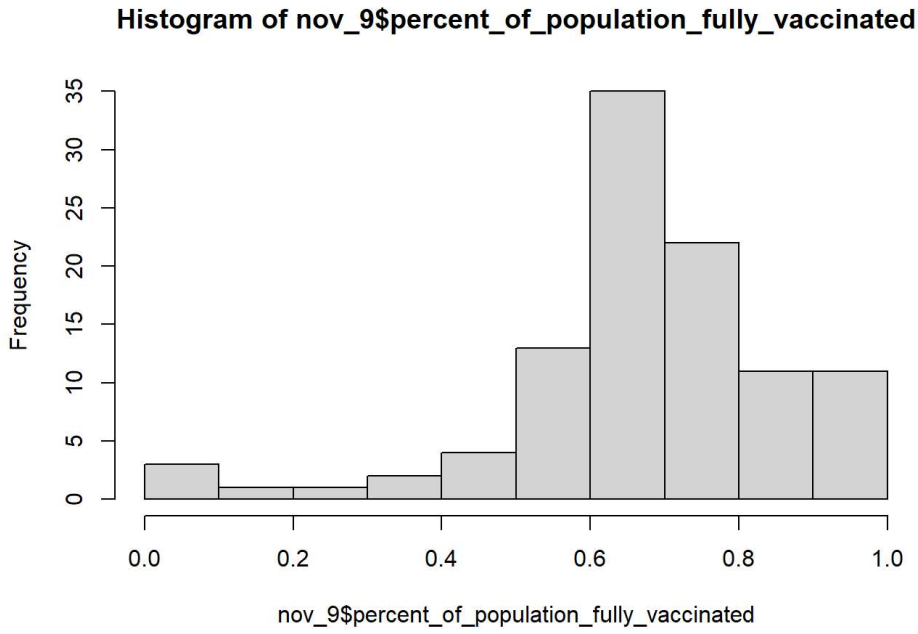
```
sd %>%
  filter(as_of_date == "2021-11-09") %>%
  summarise(avg_fullvax = mean(percent_of_population_fully_vaccinated, na.rm = TRUE))
```

```
##   avg_fullvax
## 1   0.6734714
```

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”?

```
library(ggplot2)
```

```
nov_9 <- sd %>%
  filter(as_of_date == "2021-11-09")
hist(nov_9$percent_of_population_fully_vaccinated)
```

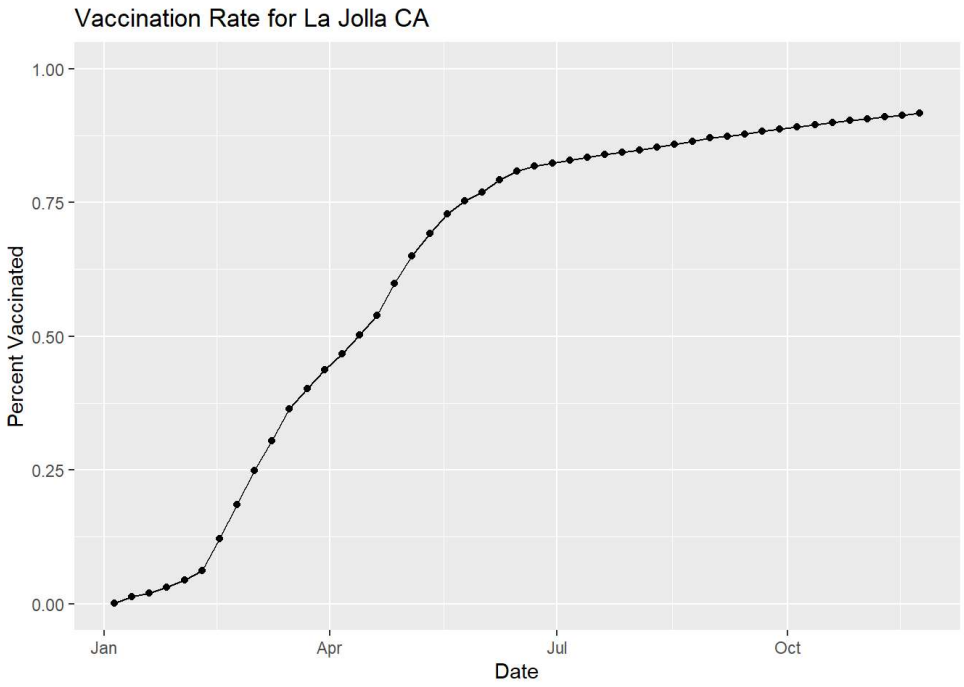


Focus on UCSD/La Jolla

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

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

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

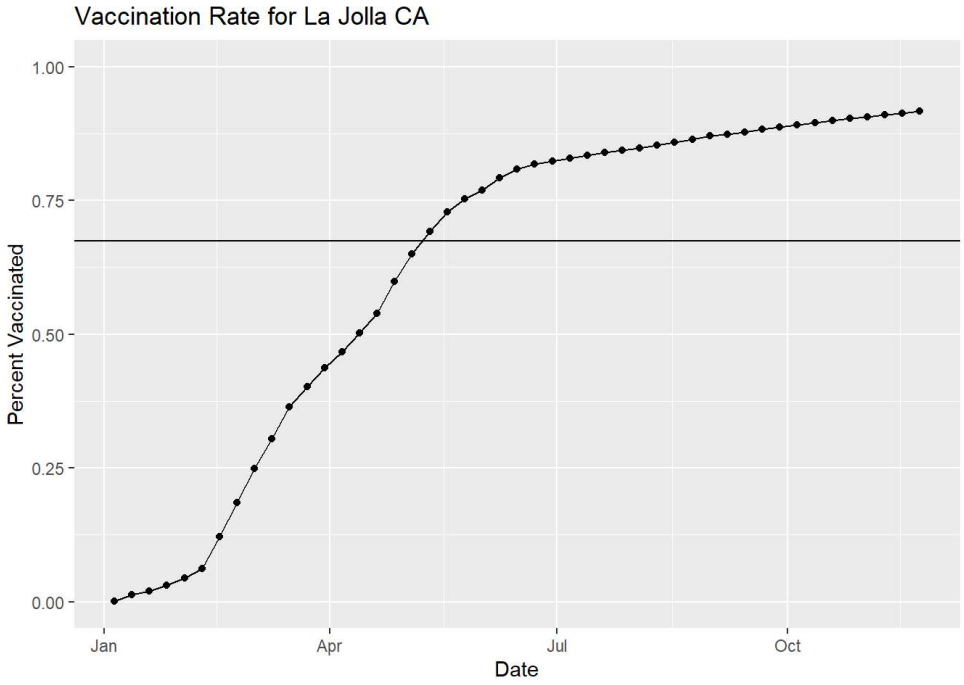


> Q16. Calculate the mean "Percent of Population Fully Vaccinated" for ZIP code areas with a population as large as 92037 (La Jolla) as_of_date "2021-11-16". Add this as a straight horizontal line to your plot from above with the geom_hline() function?

```
sd %>%
  filter(as_of_date == "2021-11-16") %>%
  filter(age5_plus_population >= 36144) %>%
  summarise(mean_vaxrate = mean(percent_of_population_fully_vaccinated))
```

```
##   mean_vaxrate
## 1    0.6744255
```

```
ucsd %>%
  ggplot(aes(x = as_of_date, y = percent_of_population_fully_vaccinated)) +
  geom_point()+
  geom_line(group = 1)+
  ylim(c(0,1)) +
  labs(title = "Vaccination Rate for La Jolla CA", y = "Percent Vaccinated", x = "Date")+
  geom_hline(yintercept = 0.6744255)
```



> 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"?

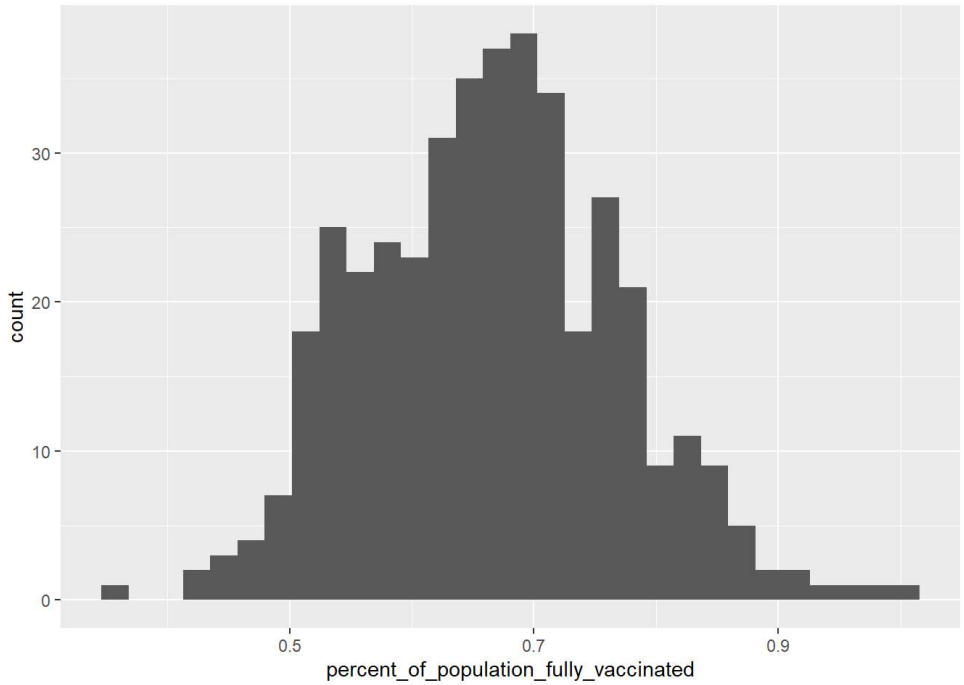
```
vax %>%
  filter(as_of_date == "2021-11-16") %>%
  filter(age5_plus_population >= 36144) %>%
  summarise(min = min(percent_of_population_fully_vaccinated), median = median(percent_of_population_fully_vaccinated), mean
= mean(percent_of_population_fully_vaccinated), sec_qtr = median/2, third_qtr = 3/2*(median),  max = max(percent_of_populati
on_fully_vaccinated))
```

```
##        min   median      mean  sec_qtr third_qtr max
## 1 0.352891 0.666522 0.6646457 0.333261  0.999783   1
```

Q18. Using ggplot generate a histogram of this data.

```
vax %>%
  filter(as_of_date == "2021-11-16") %>%
  filter(age5_plus_population >= 36144) %>%
  ggplot(aes(x = percent_of_population_fully_vaccinated)) +
  geom_histogram()
```

```
## `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?

```
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                               0.521047
```

Lower in ZIP 92040

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

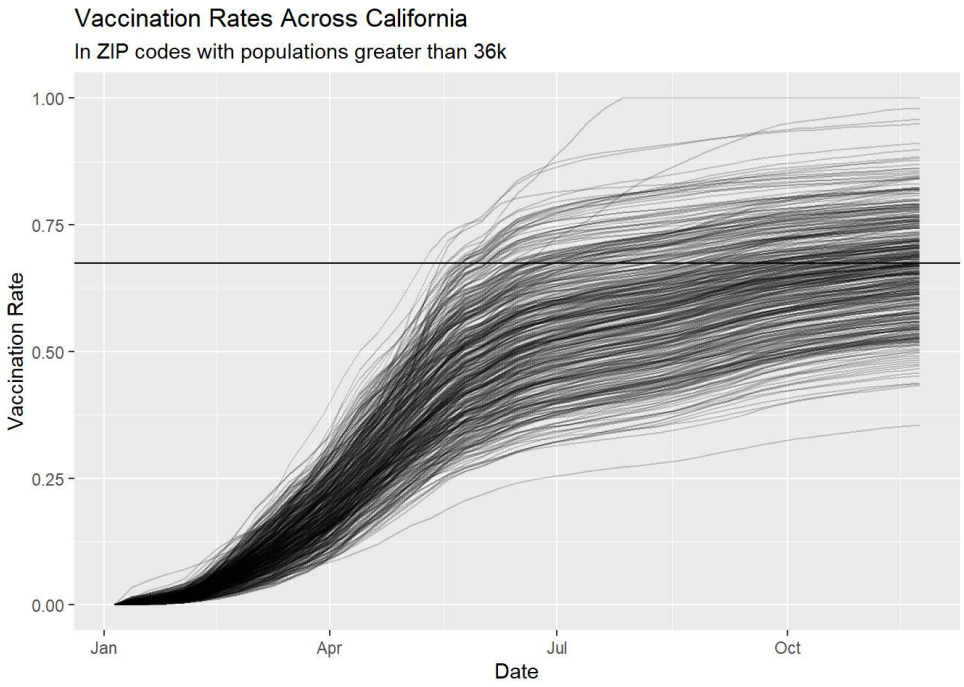
```
##   percent_of_population_fully_vaccinated
## 1                                0.68863
```

Greater in ZIP 92109

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 <- vax %>%
  filter(age5_plus_population > 36144)
vax.36 %>%
  ggplot(aes(x = as_of_date,  y = percent_of_population_fully_vaccinated, group = zip_code_tabulation_area)) +
  geom_line(alpha = 0.2)+
  ylim(c(0,1))+
  labs(x = "Date", y = "Vaccination Rate", title = "Vaccination Rates Across California", subtitle = "In ZIP codes with popu
lations greater than 36k")+
  geom_hline(yintercept = 0.6744255)
```

```
## Warning: Removed 176 row(s) containing missing values (geom_path).
```



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

I know the decision has already been made but thanks for thinking about our health after the traveling!