R Project Milestone 3

Moyra Rasheed, Courtney Coon, Jarett Maycott

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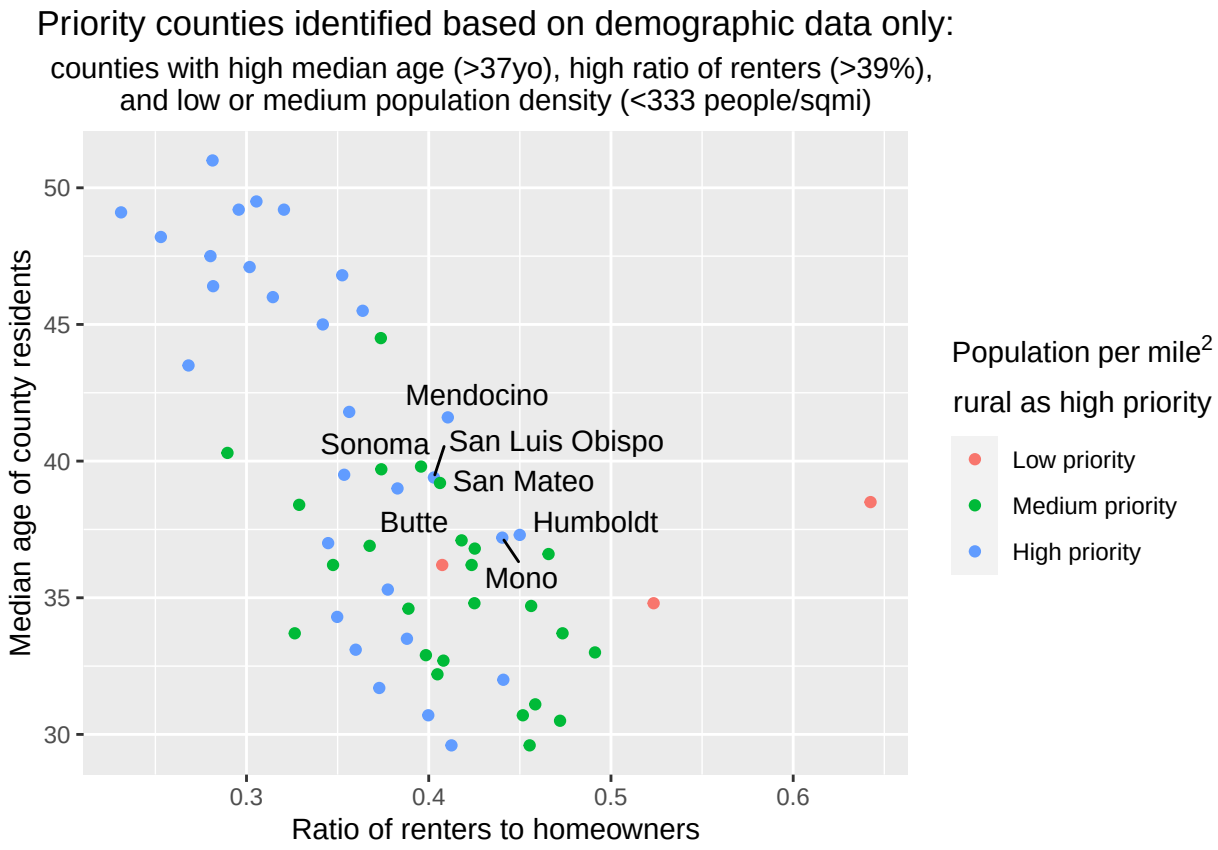
Visualization 1:

Plot 1: As a first step, we plotted demographic information only (population per square mile, renter to homeowner ratio, and median age of the residents of the county) and highlighted the counties that would be the highest priority if we were only looking at the demographic data. We prioritized low density, higher percentage of renters, and older populations.

```
## renter ratio median = 39%
## median age median = 37.05
## population density 1st quantile (low cutoff) = 25.887
## population density 3rd quantile (high cutoff) = 333.485
ggplot(data = merged_data, aes(x = renter_ratio, y = med_age)) +
geom_point(data = merged_data, aes(x = renter_ratio, y = med_age,
                                   color = pop12_sqmi_CAT)) +
geom_text_repel(aes(label=ifelse((med_age > 37 & renter_ratio > 0.39
    & (pop12_sqmi_CAT=="High priority"| pop12_sqmi_CAT=="Medium priority")),
    county, "")))+
  labs(title = "Priority counties identified based on demographic data only:",
subtitle = "counties with high median age (>37yo), high ratio of renters (>39%),
and low or medium population density (<333 people/sqmi)",
       x = "Ratio of renters to homeowners",
       y = "Median age of county residents",
       color =
         bquote(atop(Population~per~mile^{"2"}, "rural as high priority")))+
  theme(plot.title=element_text(hjust=0.5),
        plot.subtitle=element_text(hjust=0.5))
```


Priority counties identified based on demographic data only:
counties with high median age (>37yo), high ratio of renters (>39%),
and low or medium population density (<333 people/sqmi)
Median age of county residents
50
45
40
35
30
0.3
0.4
0.5
0.6
Ratio of renters to homeowners
Mendocino
Sonoma
San Luis Obispo
San Mateo
Butte
Humboldt
Mono
Population per mile2
rural as high priority
Low priority
Medium priority
High priority

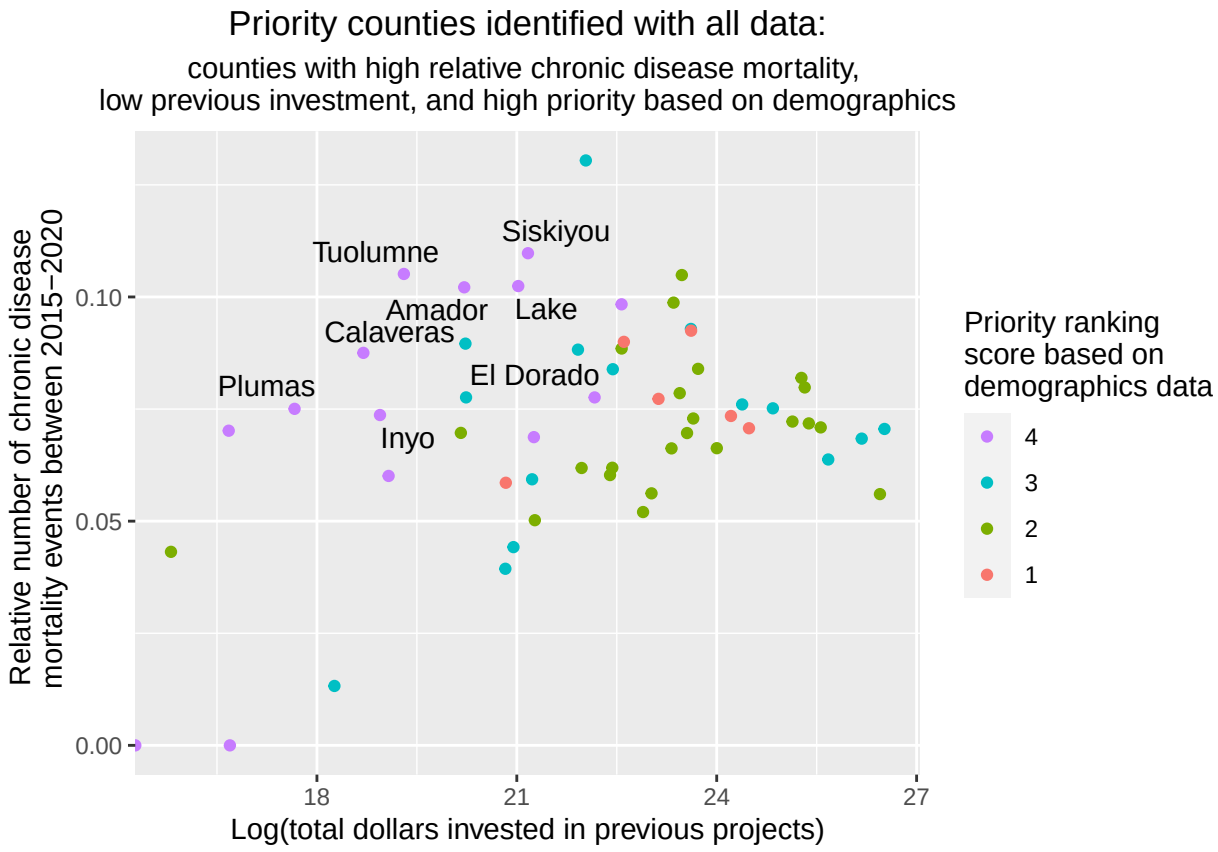
Visualization 2:

Plot 2: Here we integrated demographic data from Plot 1 with additional data: the total dollars invested in prior projects (with higher priority for less money previously invested) and number of chronic disease mortality events between 2015-2020, relativized by total population (with higher priority being higher relative levels of chronic disease mortality). We used demographic data from Plot 1 to create a new ranked variable which we used to color code data in Plot 2. Counties highlighted in Plot 1 were ranked more highly in Plot 2. Thus this Plot includes all 5 variables of interest to identify the counties that require greater funding. Note that money invested in previous projects has been logged to make the plot easier to read.

```
# make data set with continuous data and ranking factor for the demographic
# data in the first figure
second_fig_data_temp<-merged_data%>%
  select(c("county", "pop12_sqmi_CAT", "med_age_CAT", "renter_ratio_CAT"))%>%
 rowwise() %>%
 mutate(number_highs= sum(c_across(2:4) == "High priority", na.rm = TRUE),
        number_mediums= sum(c_across(2:4) == "Medium priority", na.rm = TRUE),
        demo_rank=(number_highs*2)+number_mediums
        )%>%
  ungroup()%>%
  select(c("county", "demo_rank"))

second_fig_data_final<-full_join(second_fig_data_temp, merged_data, by="county")
## summary(second_fig_data_final$relative_chronic_dis_mort)

# make the figure
## relative chronic disease mortality median = 0.07213
## log(relative chronic disease mortality median) = log(0.07213) = -2.629285
## summed total cost median = 5961782208
## log(summed total cost median) = log(5961782208) = 22.50864
ggplot(data = second_fig_data_final,
       aes(y = relative_chronic_dis_mort, x = log(summed_total_cost))) +
geom_point(data = second_fig_data_final,
           aes(y = relative_chronic_dis_mort, x = log(summed_total_cost),
                                    color = as.factor(demo_rank))) +
guides(color = guide_legend(reverse=TRUE))+
 geom_text_repel(aes(label=ifelse(
   (relative_chronic_dis_mort >= 0.07213 & summed_total_cost<=5961782208
    & demo_rank >3), county, """)), max.overlaps = Inf)+
labs(title = "Priority counties identified with all data:",
 subtitle = "counties with high relative chronic disease mortality,
low previous investment, and high priority based on demographics",
        x = "Log(total dollars invested in previous projects)",
        y =
"Relative number of chronic disease \n mortality events between 2015-2020",
        color = "Priority ranking \nscore based on \ndemographics data") +
   theme(plot.title=element_text(hjust=0.5),
         plot.subtitle=element_text(hjust=0.5))
```


Priority counties identified with all data:
counties with high relative chronic disease mortality,
low previous investment, and high priority based on demographics
Relative number of chronic disease
mortality events between 2015–2020
0.10
0.05
0.00
Tuolumne
Siskiyou
Amador
Lake
Calaveras
El Dorado
Plumas
Inyo
18
21
24
27
Log(total dollars invested in previous projects)
Priority ranking
score based on
demographics data
4
3
2
1

Visualization 3:

Table 1: We used a table as a different way to organize the 5 variables of interest. We categorized each variable and then ranked each as high, medium, or low priority. We then created a new variable where "high priority" variables were given two points, "medium priority" variables given 1 point, and "low priority" variables given 0 points for each county. Then Counties are ranked by number of points. Most of the Counties highlighted in Plot/Visualization 2 were also the most highly ranked in the table.

```
library(kableExtra)
```

```
##
## Attaching package: 'kableExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     group_rows
```

```
table_col_order <- c("county", "summed_total_cost", "pop12_sqmi",
                     "med_age", "renter_ratio",
                     "relative_chronic_dis_mort", "med_age_CAT",
                     "summed_total_cost_CAT", "pop12_sqmi_CAT",
                     "renter_ratio_CAT","relative_chronic_dis_mort_CAT")
merged_data_for_table <- merged_data[, table_col_order]

 table<-merged_data_for_table%>%
  rowwise() %>%
  mutate(number_highs= sum(c_across(7:11) == "High priority", na.rm = TRUE),
         number_mediums= sum(c_across(7:11) == "Medium priority", na.rm = TRUE),
         temp_rank=(number_highs*2)+number_mediums
         )%>%
   ungroup()%>%
   arrange(desc(temp_rank))%>%
   select(-c(number_highs, number_mediums))%>%
   slice(1:15)
table
```

```
## # A tibble: 15 x 12
##    county    summed_total_cost pop12_sqmi med_age renter_ratio relative_chronic~
##    <chr>                 <dbl>      <dbl>   <dbl>        <dbl>             <dbl>
##  1 Amador           598970736.      63.3     48.2        0.253            0.102
##  2 Calaveras        131848234.      44.6     49.1        0.231            0.0875
##  3 Tuolumne         242129946       24.3     47.1        0.302            0.105
##  4 Inyo             169160700.       1.82    45.5        0.364            0.0737
##  5 Lake            1347450993.      49.1     45          0.342            0.102
##  6 Mariposa          17474756       12.6     49.2        0.321            0.0702
##  7 Nevada          6352716267.     103.      47.5        0.280            0.0984
##  8 Plumas            46955168        7.65    49.5        0.305            0.0750
##  9 Siskiyou        1558949981.       7.12    46.8        0.353            0.110
## 10 Tehama           610226591.      21.5     39.5        0.354            0.0896
## 11 Alpine                  0        1.54    46.4        0.282            0
## 12 Del Norte        615640530.      28.3     39          0.383            0.0776
## 13 El Dorado       4239088028.     102.      43.5        0.268            0.0776
```

```
## 14 Humboldt       17981394511.      38.1     37.3        0.450            0.0929
## 15 Modoc           1703663257        2.33    46          0.314            0.0687
## # ... with 6 more variables: med_age_CAT <fct>, summed_total_cost_CAT <fct>,
## #   pop12_sqmi_CAT <fct>, renter_ratio_CAT <chr>,
## #   relative_chronic_dis_mort_CAT <fct>, temp_rank <dbl>
```

```
# kable(table,
#        col.names = c("County","Chronic disease mortality burden",
#                      "Previous spending on projects",
#                      "Population density", "Median age of population",
#                      "% population that are renters"),
#        caption="Top 10 Counties ranked by need for oshpd projects.",
#        booktabs=TRUE,
#        align='lccccc')%>%
#   kable_styling(latex_options="scale_down")

 table
```

```
## # A tibble: 15 x 12
##    county    summed_total_cost pop12_sqmi med_age renter_ratio relative_chronic~
##    <chr>                 <dbl>      <dbl>   <dbl>        <dbl>             <dbl>
##  1 Amador           598970736.      63.3     48.2        0.253            0.102
##  2 Calaveras        131848234.      44.6     49.1        0.231            0.0875
##  3 Tuolumne         242129946       24.3     47.1        0.302            0.105
##  4 Inyo             169160700.       1.82    45.5        0.364            0.0737
##  5 Lake            1347450993.      49.1     45          0.342            0.102
##  6 Mariposa          17474756       12.6     49.2        0.321            0.0702
##  7 Nevada          6352716267.     103.      47.5        0.280            0.0984
##  8 Plumas            46955168        7.65    49.5        0.305            0.0750
##  9 Siskiyou        1558949981.       7.12    46.8        0.353            0.110
## 10 Tehama           610226591.      21.5     39.5        0.354            0.0896
## 11 Alpine                  0        1.54    46.4        0.282            0
## 12 Del Norte        615640530.      28.3     39          0.383            0.0776
## 13 El Dorado       4239088028.     102.      43.5        0.268            0.0776
## 14 Humboldt       17981394511.      38.1     37.3        0.450            0.0929
## 15 Modoc           1703663257        2.33    46          0.314            0.0687
## # ... with 6 more variables: med_age_CAT <fct>, summed_total_cost_CAT <fct>,
## #   pop12_sqmi_CAT <fct>, renter_ratio_CAT <chr>,
## #   relative_chronic_dis_mort_CAT <fct>, temp_rank <dbl>
```