

# Socioeconomic patterns in smoking cessation behavior

12/07/2020

This markdown document serves as a manual for repeating this analysis. The code chunks are in darker boxes while the results are in lighter boxes just below code chunk.

```
library(tidyverse) #data wrangling, analysis and visualization
library(gridExtra) #data visualization
library(survey) #library for working with survey data
library(knitr) #library for knitting code and documents into HTML, PDF, slides e.t.c.
library(lubridate) #library for working with or coercing dates
                    #(used in this document to track date of quit)

#library(broom)
# To install needed Libraries, please run the following code in R or Rstudio
#installed_pkgs <- row.names(installed.packages())
#pkgs <- c("tidyverse", "gridExtra", "survey", "knitr", "lubridate")
#for(p in pkgs){
#if(!(p %in% installed_pkgs)){
#install.packages(p, repos = "http://cran.us.r-project.org")
#}
#}
```

## Cleaning data and Assigning Variables

The data set contains only people who are current and former smokers.

```
nhis18_modelling <- read.csv("nhis18_modelling.csv")
#converting variables to factors
nhis18_modelling$REGION <- factor(nhis18_modelling$REGION)
nhis18_modelling$binmed_age <- factor(nhis18_modelling$binmed_age,
                                     levels = c("18-24", "25-44", "45-64", "65+"))
nhis18_modelling$SEX <- factor(nhis18_modelling$SEX)
nhis18_modelling$RACERPI2 <- factor(nhis18_modelling$RACERPI2,
                                   levels = c("white", "Black/African American",
                                               "AIAN", "Asian", "Multiple"))
nhis18_modelling$EDUC1 <- factor(nhis18_modelling$EDUC1,
                                 levels = c("<HS Grad", "HS Grad",
                                             "<College Grad", "College Grad+"))
nhis18_modelling$binmed_RATCAT <- factor(nhis18_modelling$binmed_RATCAT,
                                         levels = c("<100%", "100 - 200 %",
                                                     "200 - 400 %", ">400%"))
nhis18_modelling$ORIENT_A <- factor(nhis18_modelling$ORIENT_A,
                                    levels = c("Straight", "Gay/Lesbian", "Bisexual",
                                                "Something else", "Don't know the answer"))
nhis18_modelling$mental_health_problem <- factor(nhis18_modelling$mental_health_problem,
                                                  levels = c("No", "Yes"))
```

```

nhis18_modelling$HOUSEOWN <- factor(nhis18_modelling$HOUSEOWN)
nhis18_modelling$FOOD_SECURITY <- factor(nhis18_modelling$FOOD_SECURITY,
                                          levels = c("very low", "low", "high"))
nhis18_modelling$INC_GRP <- factor(nhis18_modelling$INC_GRP,
                                   levels = c("$0-34,999", "$35,000 - 74,999",
                                              "$75,000 - 99,999", "$100,000 and over"))
nhis18_modelling$DEPEV_A <- factor(nhis18_modelling$DEPEV_A,
                                   levels = c("No", "Yes"))
nhis18_modelling$ANXEV_A <- factor(nhis18_modelling$ANXEV_A,
                                   levels = c("No", "Yes"))

```

## Survey design using survey weights

Survey weights was applied throughout the analysis as specified below following the recommendation from NHIS. Link to recommendation can be found [here](#).

```

nhis18_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
                        weights = ~WTFA_SA, data = nhis18_modelling)

```

Total observations, variables collected are reported below.

```
str(nhis18_modelling)
```

```

## 'data.frame':   10041 obs. of  35 variables:
## $ X              : int  1 2 3 4 5 6 7 8 9 10 ...
## $ HHX            : int  1 100 10003 10005 10007 1001 10028 10031 10033 1004 ...
## $ PPSU           : int  19 5 109 9 5 2 34 2 73 48 ...
## $ PSTRAT         : int  103 121 107 104 124 117 123 113 109 133 ...
## $ WTFA_SA        : int  3915 13762 5348 7623 4793 12301 6439 8131 4503 12479 ...
## $ YEAR           : int  2018 2018 2018 2018 2018 2018 2018 2018 2018 2018 ...
## $ MONTH          : int  1 3 2 1 3 1 3 3 3 3 ...
## $ DAY            : int  1 1 1 1 1 1 1 1 1 1 ...
## $ REGION         : Factor w/ 4 levels "Midwest","Northeast",...: 3 3 1 3 2 1 4 4 1 1 ...
## $ binned_age     : Factor w/ 4 levels "18-24","25-44",...: 4 2 4 4 4 3 3 4 4 ...
## $ SEX            : Factor w/ 2 levels "Men","Women": 2 2 2 1 1 1 1 1 2 1 ...
## $ RACERPI2       : Factor w/ 5 levels "white","Black/African American",...: 1 1 1 1 1 2 1 1 1 ...
## $ EDUC1          : Factor w/ 4 levels "<HS Grad","HS Grad",...: 1 4 3 2 4 2 2 4 3 2 ...
## $ binned_RATCAT  : Factor w/ 4 levels "<100%","100 - 200 %",...: 2 3 4 1 1 4 2 4 NA 3 ...
## $ ORIENT_A       : Factor w/ 5 levels "Straight","Gay/Lesbian",...: 1 1 1 1 1 1 1 1 1 1 ...
## $ DEPEV_A        : Factor w/ 2 levels "No","Yes": 1 1 1 1 2 NA 1 1 NA 1 ...
## $ ANXEV_A        : Factor w/ 2 levels "No","Yes": 1 2 1 1 2 NA 1 1 NA 1 ...
## $ mental_health_problem: Factor w/ 2 levels "No","Yes": 1 1 1 1 2 NA 1 1 NA 1 ...
## $ HOUSEOWN       : Factor w/ 2 levels "No","Yes": 2 2 2 2 2 2 1 2 2 2 ...
## $ INCGRP5        : int  1 4 2 1 1 2 2 3 96 2 ...
## $ FM_SIZE        : int  1 5 1 3 1 2 3 1 1 2 ...
## $ FOOD_SECURITY  : Factor w/ 3 levels "very low","low",...: 3 3 3 3 3 3 2 3 3 3 ...
## $ CIGQTYR        : int  NA NA NA NA NA 1 NA NA NA NA ...
## $ SMKSTAT2       : int  3 3 3 3 3 2 3 3 3 3 ...
## $ SMKQTN0        : int  6 15 60 25 38 NA 3 30 50 6 ...
## $ SMKQTTP        : int  4 4 4 4 4 NA 4 4 4 4 ...
## $ SMKQTY         : int  6 15 60 25 38 NA 3 30 50 6 ...
## $ inc_per_capita : num  34999 7000 34999 11666 34999 ...

```

```
## $ INC_GRP : Factor w/ 4 levels "$0-34,999","$35,000 - 74,999",...: 1 4 2 1 1 2 2 3 NA 2
## $ DATE_INTERVIEW : chr "2018-01-01" "2018-03-01" "2018-02-01" "2018-01-01" ...
## $ QUIT_DAY : int 2190 5475 21900 9125 13870 NA 1095 10950 18250 2190 ...
## $ QUIT_MONTHS : int 73 182 730 304 462 NA 36 365 608 73 ...
## $ QUIT_TYPE : int 4 4 4 4 4 1 4 4 4 4 ...
## $ DATE_QUIT_SMOKING : chr "2011-12-01" "2003-01-01" "1957-04-01" "1992-09-01" ...
## $ QUIT_SMOKING_YEAR : int 2011 2003 1957 1992 1979 NA 2015 1987 1967 2012 ...
```

### Top Years People Quit Smoking

The table below shows the top 10 years that people in this data set quit smoking.

```
top_quit_years <- nhis18_modelling %>%
  rename(`Year of Quit` = QUIT_SMOKING_YEAR) %>%
  group_by(`Year of Quit`) %>%
  summarize(Quits = n()) %>%
  arrange(desc(Quits)) %>%
  filter(!is.na(`Year of Quit`))
kable(head(top_quit_years, 10), caption="Top 10 years people quit smoking")
```

Table 1: Top 10 years people quit smoking

Year of Quit	Quits
2017	336
2008	323
1998	298
2013	257
2016	254
2015	248
2003	239
1988	227
2018	210
1987	202

## Summary of Study Sample by Subpopulation (smokers and quitters)

The function I created below summarizes the data by different sub-populations and reports the Frequency and percentage in a table.

```
freq_table_function <- function(my_data, a_var, label){  
  summary_table <- my_data %>%  
    filter(!is.na({a_var}))%>%  
    group_by({a_var})%>%  
    summarize(Freq = n())%>%  
    mutate(`%` = round(Freq/sum(Freq) * 100, 1))  
    kable(summary_table, caption = label)  
}  
  
freq_table_function(nhis18_modelling, EDUC1, "Education")
```

Table 2: Education

EDUC1	Freq	%
<HS Grad	1056	10.6
HS Grad	3215	32.1
<College Grad	3335	33.3
College Grad+	2403	24.0

```
freq_table_function(nhis18_modelling, SEX, "Gender")
```

Table 3: Gender

SEX	Freq	%
Men	5277	52.6
Women	4764	47.4

```
freq_table_function(nhis18_modelling, REGION, "Region")
```

Table 4: Region

REGION	Freq	%
Midwest	2615	26.0
Northeast	1635	16.3
South	3642	36.3
West	2149	21.4

```
freq_table_function(nhis18_modelling, binned_age, "By Age")
```

Table 5: By Age

binned_age	Freq	%
18-24	280	2.8
25-44	2670	26.6
45-64	3602	35.9
65+	3489	34.7

```
freq_table_function(nhis18_modelling, RACERPI2, "Race Group")
```

Table 6: Race Group

RACERPI2	Freq	%
white	8361	83.5
Black/African American	981	9.8
AIAN	132	1.3
Asian	316	3.2
Multiple	227	2.3

```
freq_table_function(nhis18_modelling, binned_RATCAT, "Ratio of Income to FPL")
```

Table 7: Ratio of Income to FPL

binned_RATCAT	Freq	%
<100%	1262	13.3
100 - 200 %	1908	20.2
200 - 400 %	2816	29.8
>400%	3473	36.7

```
freq_table_function(nhis18_modelling, ORIENT_A, "Sexual Orientation")
```

Table 8: Sexual Orientation

ORIENT_A	Freq	%
Straight	9346	95.0
Gay/Lesbian	219	2.2
Bisexual	142	1.4
Something else	54	0.5
Don't know the answer	77	0.8

```
freq_table_function(nhis18_modelling, mental_health_problem, "Mental Health Conditions")
```

Table 9: Mental Health Conditions

mental_health_problem	Freq	%
No	7948	81.7
Yes	1783	18.3

```
freq_table_function(nhis18_modelling, HOUSEOWN, "House Ownweship")
```

Table 10: House Ownweship

HOUSEOWN	Freq	%
No	3601	35.9
Yes	6425	64.1

```
freq_table_function(nhis18_modelling, FOOD_SECURITY, "Food Security")
```

Table 11: Food Security

FOOD_SECURITY	Freq	%
very low	529	5.3
low	714	7.1
high	8798	87.6

## Creating datasets for each types of quit

### *Data set for all quit and current smokers*

```
all_smoke_quit <- nhis18_modelling
all_smoke_quit$QUIT_STATUS <- ifelse(all_smoke_quit$QUIT_TYPE == 1, 0, 1)

#non_weighted frequency
table(all_smoke_quit$QUIT_STATUS)
```

```
##
##      0      1
## 3758 6231
```

```
#in percentage
my_table = as.table(table(all_smoke_quit$QUIT_STATUS))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 37.62 62.38
```

### *Data set for quit less than 6 months*

```
smoke_quit_less6months <- subset(nhis18_modelling, nhis18_modelling$QUIT_TYPE == 1 | nhis18_modelling$QUIT_TYPE == 0)

smoke_quit_less6months$QUIT_STATUS <- ifelse(smoke_quit_less6months$QUIT_TYPE == 1, 0, 1)

#creating survey design
less6months_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
                               weights = ~WTFA_SA, data = smoke_quit_less6months)

#non_weighted frequency
table(smoke_quit_less6months$QUIT_STATUS)
```

```
##
##      0      1
## 3758 215
```

```
#in percentage
my_table = as.table(table(smoke_quit_less6months$QUIT_STATUS))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 94.59 5.41
```

### *Data set for quit between 6 and 11 months*

```
smoke_quit_6to11months <- subset(nhis18_modelling, nhis18_modelling$QUIT_TYPE == 1 | nhis18_modelling$QUIT_TYPE == 2 |
smoke_quit_6to11months$QUIT_STATUS <- ifelse(smoke_quit_6to11months$QUIT_TYPE == 1, 0, 1)
```

```
#creating survey design
```

```
sixto11quit_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
weights = ~WTFA_SA, data = smoke_quit_6to11months)
```

```
#non_weighted frequency
```

```
table(smoke_quit_6to11months$QUIT_STATUS)
```

```
##
##      0      1
## 3758  132
```

```
#in percentage
```

```
my_table = as.table(table(smoke_quit_6to11months$QUIT_STATUS))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 96.61  3.39
```

*data set for quit less than a year*

```
smoke_quit_lessthanyear <- subset(nhis18_modelling, nhis18_modelling$QUIT_TYPE == 1 |
                                nhis18_modelling$QUIT_TYPE == 2 |
                                nhis18_modelling$QUIT_TYPE == 3)
smoke_quit_lessthanyear$QUIT_STATUS <- ifelse(smoke_quit_lessthanyear$QUIT_TYPE == 2 |
                                              smoke_quit_lessthanyear$QUIT_TYPE == 3, 1, 0)
```

```
#creating survey design
```

```
lessthanyear_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
weights = ~WTFA_SA, data = smoke_quit_lessthanyear)
```

```
#non_weighted frequency
```

```
table(smoke_quit_lessthanyear$QUIT_STATUS)
```

```
##
##      0      1
## 3758  347
```

```
#In percentage
```

```
my_table = as.table(table(smoke_quit_lessthanyear$QUIT_STATUS))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 91.55  8.45
```



### *data set for quit at least 6 months*

```
quit_6month_and_over <- subset(nhis18_modelling, nhis18_modelling$QUIT_TYPE == 1|
                               nhis18_modelling$QUIT_TYPE == 3|
                               nhis18_modelling$QUIT_TYPE == 4)
quit_6month_and_over$QUIT_STATUS <- ifelse(quit_6month_and_over$QUIT_TYPE == 1, 0, 1)

#creating survey design
quit_6month_and_over_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
                                         weights = ~WTFA_SA,
                                         data = quit_6month_and_over)

#non_weighted frequency
table(quit_6month_and_over$QUIT_STATUS)
```

```
##
##      0      1
## 3758 6016
```

```
#in percentage
my_table = as.table(table(quit_6month_and_over$QUIT_STATUS))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 38.45 61.55
```

### *data set for quit at least a year*

```
smoke_quit_yearandover <- subset(nhis18_modelling, nhis18_modelling$QUIT_TYPE ==1| nhis18_modelling$QUIT_TYPE == 3|
                                  nhis18_modelling$QUIT_TYPE == 4)
smoke_quit_yearandover$QUIT_STATUS <- ifelse(smoke_quit_yearandover$QUIT_TYPE == 1, 0, 1)

#creating survey design
yearandover_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
                               weights = ~WTFA_SA, data = smoke_quit_yearandover)

#non_weighted frequency
table(smoke_quit_yearandover$QUIT_STATUS)
```

```
##
##      0      1
## 3758 5884
```

```
#in percentage
my_table = as.table(table(smoke_quit_yearandover$QUIT_STATUS))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 38.98 61.02
```

### *data set for attempt to quit smoking*

Note that the CIGQTYR variable records people that attempt to quit smoking within the last 12 months. We are subsetting for only current smokers.

```
attempt_to_quit <- subset(nhis18_modelling, nhis18_modelling$QUIT_TYPE == 1)

#creating survey design
attempt_to_quit_design <- svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE,
                                   weights = ~WTFA_SA, data = attempt_to_quit)

# non_weighted frequency
table(attempt_to_quit$CIGQTYR)
```

```
##
##      0      1
## 1920 1834
```

```
#in percentage
my_table = as.table(table(attempt_to_quit$CIGQTYR))
round(prop.table(my_table) * 100, 2)
```

```
##
##      0      1
## 51.15 48.85
```

## REGRESSION ANALYSIS

### *Creating a function that calculates un-adjusted and adjusted Quit rates*

The function I defined below calculates un-adjusted rates using the original data and uses the regression results to predict the quit probability for each observation in the data set. The quit probability is summarized across different sub-populations and reported with the un-adjusted rate in a table as a percentage. See code chunk below for function. I implemented this function for each regression analysis to show the table for adjusted and un-adjusted quit/attempt to quit probabilities.

```
readjust_function <- function(dframe1, dframe2, a_var, label){
  dframe1$QUIT_STATUS <- as.character(dframe1$QUIT_STATUS)
  dframe1 <- dframe1 %>%
    select({{a_var}}, QUIT_STATUS)
  dframe1 <- na.omit(dframe1)
  unadjusted_quit <- dframe1 %>%
    group_by({{a_var}}, QUIT_STATUS) %>%
    summarize(QUIT_RATE = n()) %>%
    spread(QUIT_STATUS, QUIT_RATE) %>%
    transmute(`Unadjusted Quit Rate` = round((`1`)/(`1` + `0`) * 100, 1))

  adjusted_quit <- dframe2 %>%
    group_by({{a_var}}) %>%
    summarize(`Adjusted Quit Rate` = round(mean(adjusted_quit_status) * 100, 1)) %>%
    select(`Adjusted Quit Rate`)

  tabulate <- cbind(unadjusted_quit, adjusted_quit)
  kable(tabulate)
}
```

In the regression modeling, I did not account for possible interaction among the variables. The original coefficients results for are reported as log odd-ratio. I converted the log odd-ratio to odd ratio by taking the exponents. I also reported a 95 percent confidence interval for each of the odds ratio. I also reported the un-adjusted and adjusted quit rates using the function created earlier across different sub-populations.

## QUIT SMOKING FOR LESS THAN A YEAR

```
# Quit smoke for less than a year
vars <- c("binned_age", "SEX", "EDUC1", "binned_RATCAT", "ORIENT_A", "mental_health_problem",
         "RACERPI2", "HOUSEOWN", "INC_GRP", "FOOD_SECURITY")

reg1_quit_lessthanyear <- smoke_quit_lessthanyear %>%
  drop_na(REGION, any_of(vars))

reg1 <- svyglm(formula = QUIT_STATUS ~ REGION + binned_age + SEX + EDUC1 + binned_RATCAT
              + ORIENT_A + mental_health_problem + RACERPI2 + HOUSEOWN + INC_GRP + FOOD_SECURITY,
              design = lessthanyear_design,
              family = quasibinomial,
              data = smoke_quit_lessthanyear,
              na.action = na.omit)

summary(reg1)
```

```
##
## Call:
## svyglm(formula = QUIT_STATUS ~ REGION + binned_age + SEX + EDUC1 +
##        binned_RATCAT + ORIENT_A + mental_health_problem + RACERPI2 +
##        HOUSEOWN + INC_GRP + FOOD_SECURITY, design = lessthanyear_design,
##        family = quasibinomial, data = smoke_quit_lessthanyear, na.action = na.omit)
##
## Survey design:
## svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE, weights = ~WTFA_SA,
##        data = smoke_quit_lessthanyear)
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -1.78283    0.46748  -3.814 0.000156 ***
## REGIONNortheast   -0.24373    0.24160  -1.009 0.313598
## REGIONSouth        0.06457    0.20199   0.320 0.749371
## REGIONWest       -0.04052    0.25527  -0.159 0.873956
## binned_age25-44   -0.85860    0.24172  -3.552 0.000422 ***
## binned_age45-64   -1.51217    0.26094  -5.795 1.28e-08 ***
## binned_age65+     -1.09055    0.29897  -3.648 0.000295 ***
## SEXWomen          -0.41007    0.14631  -2.803 0.005283 **
## EDUC1HS Grad       0.18226    0.23622   0.772 0.440774
## EDUC1<College Grad 0.25980    0.24700   1.052 0.293450
## EDUC1College Grad+ 0.70110    0.27939   2.509 0.012443 *
## binned_RATCAT100 - 200 % 0.08461    0.25696   0.329 0.742102
## binned_RATCAT200 - 400 % 0.07413    0.33951   0.218 0.827265
## binned_RATCAT>400% 0.29703    0.40607   0.731 0.464877
## ORIENT_AGay/Lesbian 0.11922    0.46272   0.258 0.796796
## ORIENT_ABisexual    0.31191    0.45328   0.688 0.491735
## ORIENT_ASomething else 0.07030    0.68209   0.103 0.917961
## ORIENT_ADon't know the answer 0.35910    0.78021   0.460 0.645548
## mental_health_problemYes 0.43226    0.16359   2.642 0.008522 **
## RACERPI2Black/African American -0.29787    0.27101  -1.099 0.272319
## RACERPI2AIAN       -0.50831    0.71197  -0.714 0.475627
## RACERPI2Asian       0.18182    0.33051   0.550 0.582507
## RACERPI2Multiple    0.47859    0.36008   1.329 0.184487
```

```
## HOUSEOWNYes -0.01930 0.16514 -0.117 0.906996
## INC_GRP$35,000 - 74,999 0.26019 0.26815 0.970 0.332405
## INC_GRP$75,000 - 99,999 -0.12148 0.39157 -0.310 0.756519
## INC_GRP$100,000 and over 0.21100 0.39706 0.531 0.595390
## FOOD_SECURITYlow -0.23411 0.36393 -0.643 0.520364
## FOOD_SECURITYhigh 0.08542 0.30087 0.284 0.776624
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasibinomial family taken to be 1.018227)
##
## Number of Fisher Scoring iterations: 5
```

```
# exponentiation of the coefficients to odds ratio with a 95 percent confidence interval
kable(exp(cbind(`Adjusted Odds Ratio` = coef(reg1), confint(reg1))), digits=3)
```

	Adjusted Odds Ratio	2.5 %	97.5 %
(Intercept)	0.168	0.067	0.420
REGIONNortheast	0.784	0.488	1.258
REGIONSouth	1.067	0.718	1.585
REGIONWest	0.960	0.582	1.584
binned_age25-44	0.424	0.264	0.681
binned_age45-64	0.220	0.132	0.368
binned_age65+	0.336	0.187	0.604
SEXWomen	0.664	0.498	0.884
EDUC1HS Grad	1.200	0.755	1.906
EDUC1<College Grad	1.297	0.799	2.104
EDUC1College Grad+	2.016	1.166	3.486
binned_RATCAT100 - 200 %	1.088	0.658	1.801
binned_RATCAT200 - 400 %	1.077	0.554	2.095
binned_RATCAT>400%	1.346	0.607	2.983
ORIENT_AGay/Lesbian	1.127	0.455	2.790
ORIENT_ABisexual	1.366	0.562	3.321
ORIENT_ASomething else	1.073	0.282	4.084
ORIENT_ADon't know the answer	1.432	0.310	6.608
mental_health_problemYes	1.541	1.118	2.123
RACERPI2Black/African American	0.742	0.436	1.263
RACERPI2AIAN	0.602	0.149	2.428
RACERPI2Asian	1.199	0.628	2.292
RACERPI2Multiple	1.614	0.797	3.269
HOUSEOWNYes	0.981	0.710	1.356
INC_GRP\$35,000 - 74,999	1.297	0.767	2.194
INC_GRP\$75,000 - 99,999	0.886	0.411	1.908
INC_GRP\$100,000 and over	1.235	0.567	2.689
FOOD_SECURITYlow	0.791	0.388	1.615
FOOD_SECURITYhigh	1.089	0.604	1.964

```
#fitting model to data
predicted_quit <- reg1_quit_lessthanyear %>%
  mutate(
    adjusted_quit_status = predict(
      reg1,
```

```

    reg1_quit_lessthanyear,
    type = "response"
  )
)

#smoke_quit_lessthanyear$QUIT_STATUS <- as.character(smoke_quit_lessthanyear$QUIT_STATUS)
#unadjusted_quit <- smoke_quit_lessthanyear %>%
  #select(REGION, QUIT_STATUS)%>%
  #group_by(REGION, QUIT_STATUS)%>%
  #summarize(QUIT_RATE = n())%>%
  #spread(QUIT_STATUS, QUIT_RATE)%>%
  #transmute(`Unadjusted Quit Rate` = round((`1`)/(`1` + `0`) * 100, 1))

#adjusted_quit <- predicted_quit %>%
  #group_by(REGION)%>%
  #summarize(`Adjusted Quit Rate` = round(mean(adjusted_quit_status) * 100, 1))%>%
  #select(`Adjusted Quit Rate`)

#tabe_final <- cbind(unadjusted_quit, adjusted_quit)
#kable(tabe_final, caption="Unadjusted and Adjusted Quit Rate by Region")

```

### *Unadjusted and Adjusted Quit Rate for Quit smoking less than a year*

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, REGION)
```

REGION	Unadjusted Quit Rate	Adjusted Quit Rate
Midwest	8.6	8.9
Northeast	8.4	7.5
South	8.0	8.7
West	9.1	9.6

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, binned_age)
```

binned_age	Unadjusted Quit Rate	Adjusted Quit Rate
18-24	18.4	21.9
25-44	10.2	10.8
45-64	5.6	5.5
65+	8.4	8.1

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, SEX)
```

SEX	Unadjusted Quit Rate	Adjusted Quit Rate
Men	9.4	10.3
Women	7.4	7.0

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, EDUC1)
```

EDUC1	Unadjusted Quit Rate	Adjusted Quit Rate
<HS Grad	6.8	6.0
HS Grad	7.6	7.8
<College Grad	8.8	8.8
College Grad+	11.4	13.7

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, binned_RATCAT)
```

binned_RATCAT	Unadjusted Quit Rate	Adjusted Quit Rate
<100%	7.1	6.7
100 - 200 %	7.6	7.7
200 - 400 %	9.0	9.2
>400%	9.5	10.9

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, mental_health_problem)
```

mental_health_problem	Unadjusted Quit Rate	Adjusted Quit Rate
No	8.1	8
Yes	9.9	11

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, RACERPI2)
```

RACERPI2	Unadjusted Quit Rate	Adjusted Quit Rate
white	8.7	8.9
Black/African American	5.3	5.7
AIAN	3.9	4.9
Asian	14.5	13.1
Multiple	13.6	13.9

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, HOUSEOWN)
```

HOUSEOWN	Unadjusted Quit Rate	Adjusted Quit Rate
No	8.6	8.9
Yes	8.3	8.6

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, INC_GRP)
```

INC_GRP	Unadjusted Quit Rate	Adjusted Quit Rate
\$0-34,999	7.1	6.9
\$35,000 - 74,999	9.2	10.5
\$75,000 - 99,999	8.6	8.3
\$100,000 and over	11.2	11.7

```
readjust_function(smoke_quit_lessthanyear, predicted_quit, FOOD_SECURITY)
```

FOOD_SECURITY	Unadjusted Quit Rate	Adjusted Quit Rate
very low	7.4	7.7
low	7.1	6.2
high	8.7	9.2



## QUIT SMOKING FOR AT LEAST 6 MONTHS

```
reg2_quit_6month_and_over <- quit_6month_and_over %>%
  drop_na(REGION, any_of(vars))
# Quit smoke for at least a year or more
reg2 <- svyglm(formula = QUIT_STATUS ~ REGION + binned_age + SEX + EDUC1 + binned_RATCAT
  + ORIENT_A + mental_health_problem + RACERPI2 + HOUSEOWN + INC_GRP + FOOD_SECURITY,
  design = quit_6month_and_over_design,
  family = quasibinomial,
  data = quit_6month_and_over, na.action = na.omit)
summary(reg2)
```

```
##
## Call:
## svyglm(formula = QUIT_STATUS ~ REGION + binned_age + SEX + EDUC1 +
##   binned_RATCAT + ORIENT_A + mental_health_problem + RACERPI2 +
##   HOUSEOWN + INC_GRP + FOOD_SECURITY, design = quit_6month_and_over_design,
##   family = quasibinomial, data = quit_6month_and_over, na.action = na.omit)
##
## Survey design:
## svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE, weights = ~WTFA_SA,
##   data = quit_6month_and_over)
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -1.739103   0.259317  -6.706 5.90e-11 ***
## REGIONNortheast    0.046815   0.095335   0.491 0.623619
## REGIONSouth       -0.019504   0.075421  -0.259 0.796059
## REGIONWest         0.340629   0.092934   3.665 0.000276 ***
## binned_age25-44    0.244622   0.193731   1.263 0.207345
## binned_age45-64    0.626403   0.196884   3.182 0.001565 **
## binned_age65+      1.869591   0.198578   9.415 < 2e-16 ***
## SEXWomen          -0.004681   0.063482  -0.074 0.941247
## EDUC1HS Grad       -0.014524   0.102839  -0.141 0.887752
## EDUC1<College Grad  0.252667   0.107042   2.360 0.018672 *
## EDUC1College Grad+  0.934240   0.119267   7.833 3.36e-14 ***
## binned_RATCAT100 - 200 % 0.156386   0.105332   1.485 0.138312
## binned_RATCAT200 - 400 % 0.244764   0.138009   1.774 0.076806 .
## binned_RATCAT>400%    0.253921   0.171529   1.480 0.139473
## ORIENT_AGay/Lesbian  -0.195941   0.230073  -0.852 0.394857
## ORIENT_ABisexual     0.200346   0.238832   0.839 0.401989
## ORIENT_ASomething else -0.447853   0.377003  -1.188 0.235478
## ORIENT_ADon't know the answer -0.058641   0.322817  -0.182 0.855936
## mental_health_problemYes -0.206614   0.074577  -2.770 0.005826 **
## RACERPI2Black/African American -0.324531   0.105136  -3.087 0.002146 **
## RACERPI2AIAN         0.021828   0.296043   0.074 0.941255
## RACERPI2Asian        -0.268554   0.180788  -1.485 0.138112
## RACERPI2Multiple     -0.092830   0.201571  -0.461 0.645351
## HOUSEOWNYes         0.360540   0.069056   5.221 2.71e-07 ***
## INC_GRP$35,000 - 74,999 0.126715   0.112158   1.130 0.259159
## INC_GRP$75,000 - 99,999 0.271991   0.152279   1.786 0.074741 .
## INC_GRP$100,000 and over 0.595284   0.157954   3.769 0.000186 ***
## FOOD_SECURITYlow     0.397474   0.164296   2.419 0.015942 *
```

```
## FOOD_SECURITYhigh          0.514019    0.145755    3.527 0.000463 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasibinomial family taken to be 0.9997872)
##
## Number of Fisher Scoring iterations: 4
```

```
# exponentiation of the coefficients to odds ratio with a 95 percent confidence interval
kable(exp(cbind(`Adjusted Odds Ratio` = coef(reg2), confint(reg2))), digits=3)
```

	Adjusted Odds Ratio	2.5 %	97.5 %
(Intercept)	0.176	0.106	0.292
REGIONNortheast	1.048	0.869	1.263
REGIONSouth	0.981	0.846	1.137
REGIONWest	1.406	1.172	1.687
binned_age25-44	1.277	0.874	1.867
binned_age45-64	1.871	1.272	2.752
binned_age65+	6.486	4.395	9.572
SEXWomen	0.995	0.879	1.127
EDUC1HS Grad	0.986	0.806	1.206
EDUC1<College Grad	1.287	1.044	1.588
EDUC1College Grad+	2.545	2.015	3.216
binned_RATCAT100 - 200 %	1.169	0.951	1.437
binned_RATCAT200 - 400 %	1.277	0.975	1.674
binned_RATCAT>400%	1.289	0.921	1.804
ORIENT_AGay/Lesbian	0.822	0.524	1.290
ORIENT_ABisexual	1.222	0.765	1.951
ORIENT_ASomething else	0.639	0.305	1.338
ORIENT_ADon't know the answer	0.943	0.501	1.775
mental_health_problemYes	0.813	0.703	0.941
RACERPI2Black/African American	0.723	0.588	0.888
RACERPI2AIAN	1.022	0.572	1.826
RACERPI2Asian	0.764	0.536	1.090
RACERPI2Multiple	0.911	0.614	1.353
HOUSEOWNYes	1.434	1.253	1.642
INC_GRP\$35,000 - 74,999	1.135	0.911	1.414
INC_GRP\$75,000 - 99,999	1.313	0.974	1.769
INC_GRP\$100,000 and over	1.814	1.331	2.472
FOOD_SECURITYlow	1.488	1.078	2.053
FOOD_SECURITYhigh	1.672	1.257	2.225

```
#fitting model to data
predicted_quit_least_6months <- reg2_quit_6month_and_over %>%
  mutate(
    adjusted_quit_status = predict(
      reg2,
      reg2_quit_6month_and_over,
      type = "response"
    )
  )
```

*Unadjusted and Adjusted Quit Rate for Quit smoking at least 6 months*

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, REGION)
```

REGION	Unadjusted Quit Rate	Adjusted Quit Rate
Midwest	59.9	59.7
Northeast	66.0	64.5
South	58.4	58.3
West	65.5	67.0

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, binned_age)
```

binned_age	Unadjusted Quit Rate	Adjusted Quit Rate
18-24	32.7	34.1
25-44	47.3	47.2
45-64	55.6	56.1
65+	80.4	80.8

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, SEX)
```

SEX	Unadjusted Quit Rate	Adjusted Quit Rate
Men	62	62
Women	61	61

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, EDUC1)
```

EDUC1	Unadjusted Quit Rate	Adjusted Quit Rate
<HS Grad	48.9	51.4
HS Grad	54.7	53.4
<College Grad	60.9	60.4
College Grad+	77.1	78.0

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, binned_RATCAT)
```

binned_RATCAT	Unadjusted Quit Rate	Adjusted Quit Rate
<100%	39.3	40.6
100 - 200 %	51.8	53.3
200 - 400 %	61.9	62.0
>400%	73.1	72.9

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, mental_health_problem)
```

mental_health_problem	Unadjusted Quit Rate	Adjusted Quit Rate
No	64.3	64.2
Yes	49.7	49.8

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, RACERPI2)
```

RACERPI2	Unadjusted Quit Rate	Adjusted Quit Rate
white	63.4	63.4
Black/African American	49.6	47.9
AIAN	43.1	51.1
Asian	65.1	62.3
Multiple	52.3	52.8

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, HOUSEOWN)
```

HOUSEOWN	Unadjusted Quit Rate	Adjusted Quit Rate
No	46.7	47.1
Yes	69.7	69.5

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, INC_GRP)
```

INC_GRP	Unadjusted Quit Rate	Adjusted Quit Rate
\$0-34,999	50.4	51.7
\$35,000 - 74,999	61.8	62.6
\$75,000 - 99,999	67.7	67.0
\$100,000 and over	76.3	75.3

```
readjust_function(quit_6month_and_over, predicted_quit_least_6months, FOOD_SECURITY)
```

FOOD_SECURITY	Unadjusted Quit Rate	Adjusted Quit Rate
very low	32.2	32.3
low	42.9	45.5
high	64.8	64.7

## QUIT SMOKING FOR AT LEAST A YEAR

```
reg3_quit_yearandover <- smoke_quit_yearandover %>%
  drop_na(REGION, any_of(vars))
# Quit smoke for at least a year or more
reg3 <- svyglm(formula = QUIT_STATUS ~ REGION + binned_age + SEX + EDUC1 + binned_RATCAT
  + ORIENT_A + mental_health_problem + RACERPI2 +HOUSEOWN + INC_GRP + FOOD_SECURITY,
  design = yearandover_design,
  family = quasibinomial,
  data = smoke_quit_yearandover, na.action = na.omit)
summary(reg3)
```

```
##
## Call:
## svyglm(formula = QUIT_STATUS ~ REGION + binned_age + SEX + EDUC1 +
##   binned_RATCAT + ORIENT_A + mental_health_problem + RACERPI2 +
##   HOUSEOWN + INC_GRP + FOOD_SECURITY, design = yearandover_design,
##   family = quasibinomial, data = smoke_quit_yearandover, na.action = na.omit)
##
## Survey design:
## svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE, weights = ~WTFA_SA,
##   data = smoke_quit_yearandover)
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -2.091135    0.274333  -7.623 1.45e-13 ***
## REGIONNortheast    0.058899    0.096202   0.612 0.540679
## REGIONSouth      -0.020464    0.075411  -0.271 0.786228
## REGIONWest        0.350350    0.093377   3.752 0.000198 ***
## binned_age25-44    0.450009    0.214852   2.095 0.036765 *
## binned_age45-64    0.870975    0.217437   4.006 7.22e-05 ***
## binned_age65+      2.116166    0.218681   9.677 < 2e-16 ***
## SEXWomen          0.000179    0.064311   0.003 0.997780
## EDUC1HS Grad      -0.049184    0.104576  -0.470 0.638350
## EDUC1<College Grad  0.209770    0.108165   1.939 0.053075 .
## EDUC1College Grad+  0.893541    0.120779   7.398 6.67e-13 ***
## binned_RATCAT100 - 200 % 0.165292    0.106817   1.547 0.122450
## binned_RATCAT200 - 400 % 0.266690    0.138284   1.929 0.054404 .
## binned_RATCAT>400%    0.265844    0.171304   1.552 0.121382
## ORIENT_AGay/Lesbian -0.191511    0.231889  -0.826 0.409309
## ORIENT_ABisexual    0.240353    0.238699   1.007 0.314502
## ORIENT_ASomething else -0.477557    0.391946  -1.218 0.223691
## ORIENT_ADon't know the answer -0.017921    0.326110  -0.055 0.956200
## mental_health_problemYes -0.230568    0.074895  -3.079 0.002205 **
## RACERPI2Black/African American -0.303992    0.107131  -2.838 0.004748 **
## RACERPI2AIAN        0.065472    0.303833   0.215 0.829485
## RACERPI2Asian       -0.294757    0.180483  -1.633 0.103125
## RACERPI2Multiple    -0.088656    0.207171  -0.428 0.668900
## HOUSEOWNYes        0.374462    0.069254   5.407 1.03e-07 ***
## INC_GRP$35,000 - 74,999 0.109882    0.112680   0.975 0.329992
## INC_GRP$75,000 - 99,999 0.263665    0.152421   1.730 0.084333 .
## INC_GRP$100,000 and over 0.591135    0.159406   3.708 0.000234 ***
## FOOD_SECURITYlow    0.524100    0.169508   3.092 0.002110 **
```

```
## FOOD_SECURITYhigh          0.627186    0.146404    4.284 2.24e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasibinomial family taken to be 0.9993466)
##
## Number of Fisher Scoring iterations: 4
```

```
# exponentiation of the coefficients to odds ratio with a 95 percent confidence interval
kable(exp(cbind(`Adjusted Odds Ratio` = coef(reg3), confint(reg3))), digits=3)
```

	Adjusted Odds Ratio	2.5 %	97.5 %
(Intercept)	0.124	0.072	0.212
REGIONNortheast	1.061	0.878	1.281
REGIONSouth	0.980	0.845	1.136
REGIONWest	1.420	1.182	1.705
binned_age25-44	1.568	1.029	2.390
binned_age45-64	2.389	1.560	3.659
binned_age65+	8.299	5.406	12.740
SEXWomen	1.000	0.882	1.135
EDUC1HS Grad	0.952	0.776	1.169
EDUC1<College Grad	1.233	0.998	1.525
EDUC1College Grad+	2.444	1.929	3.096
binned_RATCAT100 - 200 %	1.180	0.957	1.454
binned_RATCAT200 - 400 %	1.306	0.996	1.712
binned_RATCAT>400%	1.305	0.932	1.825
ORIENT_AGay/Lesbian	0.826	0.524	1.301
ORIENT_ABisexual	1.272	0.797	2.030
ORIENT_ASomething else	0.620	0.288	1.337
ORIENT_ADon't know the answer	0.982	0.518	1.861
mental_health_problemYes	0.794	0.686	0.920
RACERPI2Black/African American	0.738	0.598	0.910
RACERPI2AIAN	1.068	0.589	1.937
RACERPI2Asian	0.745	0.523	1.061
RACERPI2Multiple	0.915	0.610	1.374
HOUSEOWNYes	1.454	1.270	1.666
INC_GRP\$35,000 - 74,999	1.116	0.895	1.392
INC_GRP\$75,000 - 99,999	1.302	0.966	1.755
INC_GRP\$100,000 and over	1.806	1.321	2.468
FOOD_SECURITYlow	1.689	1.212	2.355
FOOD_SECURITYhigh	1.872	1.405	2.495

```
#fitting model to data
predicted_quit_yearandover <- reg3_quit_yearandover %>%
  mutate(
    adjusted_quit_status = predict(
      reg3,
      reg3_quit_yearandover,
      type = "response"
    )
  )
```

*Unadjusted and Adjusted Quit Rate for Quit smoking at least a year*

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, REGION)
```

REGION	Unadjusted Quit Rate	Adjusted Quit Rate
Midwest	59.3	59.1
Northeast	65.6	64.2
South	57.8	57.8
West	65.1	66.5

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, binned_age)
```

binned_age	Unadjusted Quit Rate	Adjusted Quit Rate
18-24	27.9	28.9
25-44	46.0	45.8
45-64	55.3	55.7
65+	80.3	80.7

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, SEX)
```

SEX	Unadjusted Quit Rate	Adjusted Quit Rate
Men	61.5	61.4
Women	60.5	60.5

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, EDUC1)
```

EDUC1	Unadjusted Quit Rate	Adjusted Quit Rate
<HS Grad	48.6	51.4
HS Grad	54.1	52.8
<College Grad	60.3	59.7
College Grad+	76.8	77.6

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, binned_RATCAT)
```

binned_RATCAT	Unadjusted Quit Rate	Adjusted Quit Rate
<100%	38.5	39.7
100 - 200 %	51.3	52.6
200 - 400 %	61.3	61.5
>400%	72.8	72.5

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, mental_health_problem)
```

mental_health_problem	Unadjusted Quit Rate	Adjusted Quit Rate
No	63.9	63.8
Yes	48.8	48.6

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, RACERPI2)
```

RACERPI2	Unadjusted Quit Rate	Adjusted Quit Rate
white	62.9	62.9
Black/African American	49.2	47.6
AIAN	42.6	51.1
Asian	64.2	61.3
Multiple	51.4	52.0

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, HOUSEOWN)
```

HOUSEOWN	Unadjusted Quit Rate	Adjusted Quit Rate
No	45.8	46.1
Yes	69.3	69.2

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, INC_GRP)
```

INC_GRP	Unadjusted Quit Rate	Adjusted Quit Rate
\$0-34,999	49.8	51.1
\$35,000 - 74,999	61.3	62.0
\$75,000 - 99,999	67.1	66.4
\$100,000 and over	76.0	75.0

```
readjust_function(smoke_quit_yearandover, predicted_quit_yearandover, FOOD_SECURITY)
```

FOOD_SECURITY	Unadjusted Quit Rate	Adjusted Quit Rate
very low	30.3	29.6
low	42.4	45.1
high	64.3	64.3



## ATTEMPTS TO QUIT SMOKING

```
reg4_attempt_to_quit <- attempt_to_quit %>%
  drop_na(REGION, any_of(vars))
# Quit smoke for at least a year or more
reg4 <- svyglm(formula = CIGQTYR ~ REGION + binned_age + SEX + EDUC1 + binned_RATCAT
  + ORIENT_A + mental_health_problem + RACERPI2 +HOUSEOWN + INC_GRP + FOOD_SECURITY,
  design = attempt_to_quit_design,
  family = quasibinomial,
  data = attempt_to_quit, na.action = na.omit)
summary(reg4)
```

```
##
## Call:
## svyglm(formula = CIGQTYR ~ REGION + binned_age + SEX + EDUC1 +
##   binned_RATCAT + ORIENT_A + mental_health_problem + RACERPI2 +
##   HOUSEOWN + INC_GRP + FOOD_SECURITY, design = attempt_to_quit_design,
##   family = quasibinomial, data = attempt_to_quit, na.action = na.omit)
##
## Survey design:
## svydesign(id = ~PPSU, strata = ~PSTRAT, nest = TRUE, weights = ~WTFA_SA,
##   data = attempt_to_quit)
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.397378   0.282443   1.407 0.160138
## REGIONNortheast    0.079902   0.133533   0.598 0.549895
## REGIONSouth        0.157826   0.114736   1.376 0.169641
## REGIONWest         0.410749   0.133199   3.084 0.002170 **
## binned_age25-44    -0.527999   0.210048  -2.514 0.012295 *
## binned_age45-64    -0.582375   0.200190  -2.909 0.003804 **
## binned_age65+      -0.749899   0.232631  -3.224 0.001358 **
## SEXWomen           0.092609   0.089831   1.031 0.303130
## EDUC1HS Grad       -0.033221   0.139316  -0.238 0.811634
## EDUC1<College Grad  0.195006   0.137606   1.417 0.157135
## EDUC1College Grad+  0.189901   0.176355   1.077 0.282142
## binned_RATCAT100 - 200 % -0.025088   0.131007  -0.192 0.848218
## binned_RATCAT200 - 400 %  0.008663   0.179407   0.048 0.961509
## binned_RATCAT>400% -0.160735   0.224174  -0.717 0.473739
## ORIENT_AGay/Lesbian  0.144119   0.278452   0.518 0.605012
## ORIENT_ABisexual    0.553440   0.307753   1.798 0.072796 .
## ORIENT_ASomething else  0.338792   0.551512   0.614 0.539330
## ORIENT_ADon't know the answer -0.679266   0.485847  -1.398 0.162769
## mental_health_problemYes  0.250821   0.109118   2.299 0.021984 *
## RACERPI2Black/African American  0.491652   0.143139   3.435 0.000648 ***
## RACERPI2AIAN       -0.187194   0.332295  -0.563 0.573486
## RACERPI2Asian        0.613820   0.271632   2.260 0.024315 *
## RACERPI2Multiple     0.374923   0.292692   1.281 0.200872
## HOUSEOWNYes         -0.009337   0.099414  -0.094 0.925211
## INC_GRP$35,000 - 74,999  0.005327   0.145696   0.037 0.970848
## INC_GRP$75,000 - 99,999 -0.157793   0.223073  -0.707 0.479710
## INC_GRP$100,000 and over  0.169855   0.237846   0.714 0.475510
## FOOD_SECURITYlow    -0.250114   0.199313  -1.255 0.210174
```

```
## FOOD_SECURITYhigh          -0.325709    0.156459   -2.082 0.037930 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasibinomial family taken to be 0.983487)
##
## Number of Fisher Scoring iterations: 4
```

```
# exponentiation of the coefficients to odds ratio with a 95 percent confidence interval
kable(exp(cbind(`Adjusted Odds Ratio` = coef(reg4), confint(reg4))), digits=3)
```

	Adjusted Odds Ratio	2.5 %	97.5 %
(Intercept)	1.488	0.855	2.588
REGIONNortheast	1.083	0.834	1.407
REGIONSouth	1.171	0.935	1.466
REGIONWest	1.508	1.161	1.958
binned_age25-44	0.590	0.391	0.890
binned_age45-64	0.559	0.377	0.827
binned_age65+	0.472	0.299	0.745
SEXWomen	1.097	0.920	1.308
EDUC1HS Grad	0.967	0.736	1.271
EDUC1<College Grad	1.215	0.928	1.592
EDUC1College Grad+	1.209	0.856	1.708
binned_RATCAT100 - 200 %	0.975	0.754	1.261
binned_RATCAT200 - 400 %	1.009	0.710	1.434
binned_RATCAT>400%	0.852	0.549	1.321
ORIENT_AGay/Lesbian	1.155	0.669	1.993
ORIENT_ABisexual	1.739	0.951	3.179
ORIENT_ASomething else	1.403	0.476	4.136
ORIENT_ADon't know the answer	0.507	0.196	1.314
mental_health_problemYes	1.285	1.038	1.592
RACERPI2Black/African American	1.635	1.235	2.165
RACERPI2AIAN	0.829	0.432	1.591
RACERPI2Asian	1.847	1.085	3.146
RACERPI2Multiple	1.455	0.820	2.582
HOUSEOWNYes	0.991	0.815	1.204
INC_GRP\$35,000 - 74,999	1.005	0.756	1.338
INC_GRP\$75,000 - 99,999	0.854	0.552	1.322
INC_GRP\$100,000 and over	1.185	0.744	1.889
FOOD_SECURITYlow	0.779	0.527	1.151
FOOD_SECURITYhigh	0.722	0.531	0.981

```
#fitting model to data
predicted_attempt_to_quit <- reg4_attempt_to_quit %>%
  mutate(
    quit_attempt = predict(
      reg4,
      reg4_attempt_to_quit,
      type = "response"
    )
  )
```

## Unadjusted and Adjusted Attempt to Quit

```
#rewriting readjust function for attempt to quit
attempt_readjust_function <- function(dframe1, dframe2, a_var, label){
  dframe1$CIGQTYR <- as.character(dframe1$CIGQTYR)
  dframe1 <- dframe1 %>%
    select({{a_var}}, CIGQTYR)
  dframe1 <- na.omit(dframe1)
  unadjusted_attempt <- dframe1%>%
    group_by({{a_var}}, CIGQTYR)%>%
    summarize(ATTEMPT_RATE = n())%>%
    spread(CIGQTYR, ATTEMPT_RATE)%>%
    transmute(`Unadjusted Attempt to Quit` = round((`1`/(`1` + `0`) * 100, 1))

  adjusted_attempt <- dframe2 %>%
    group_by({{a_var}})%>%
    summarize(`Adjusted Attempt to Quit` = round(mean(quit_attempt) * 100, 1))%>%
    select(`Adjusted Attempt to Quit`)

  tabulate <- cbind(unadjusted_attempt, adjusted_attempt)
  kable(tabulate)
}
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, REGION)
```

REGION	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
Midwest	46.6	44.0
Northeast	49.4	46.6
South	48.0	49.0
West	53.3	55.0

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, binned_age)
```

binned_age	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
18-24	60.5	63.0
25-44	53.0	50.2
45-64	46.6	47.6
65+	42.6	42.8

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, SEX)
```

SEX	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
Men	48.1	46.8
Women	49.7	50.2

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, EDUC1)
```

EDUC1	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
<HS Grad	47.4	47.5
HS Grad	46.8	45.4
<College Grad	51.1	51.2
College Grad+	50.7	50.3

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, binned_RATCAT)
```

binned_RATCAT	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
<100%	51.6	52.1
100 - 200 %	51.1	49.3
200 - 400 %	49.3	48.6
>400%	44.9	44.5

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, mental_health_problem)
```

mental_health_problem	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
No	47.4	46.3
Yes	53.5	55.0

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, RACERPI2)
```

RACERPI2	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
white	46.8	46.2
Black/African American	57.9	58.0
AIAN	50.0	43.1
Asian	58.5	63.2
Multiple	54.9	58.9

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, HOUSEOWN)
```

HOUSEOWN	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
No	51.7	50.9
Yes	46.2	45.9

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, INC_GRP)
```

INC_GRP	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
\$0-34,999	50.4	50.3
\$35,000 - 74,999	49.6	47.8
\$75,000 - 99,999	41.4	40.8
\$100,000 and over	47.0	49.2

```
attempt_readjust_function(attempt_to_quit, predicted_attempt_to_quit, FOOD_SECURITY)
```

FOOD_SECURITY	Unadjusted Attempt to Quit	Adjusted Attempt to Quit
very low	57.5	58.9
low	52.2	51.9
high	47.4	46.7