R Analysis Example Replication C 7

# Note: all data management and initial survey design setup code included in Chapter 5 document
nhanesdata$bpxdi1_1 <- nhanesdata$BPXDI1
nhanesdata$bpxdi1_1 [nhanesdata$bpxdi1_1 ==0] <- NA
nhanesdata$agec <- (nhanesdata$age-46.36)
nhanesdata$agecsq <- (nhanesdata$agec*nhanesdata$agec)
nhanesdata$genderc <- factor(nhanesdata$RIAGENDR, levels = 1: 2, labels =c("M", "F"))

nhanessvy2 <- svydesign(strata=~SDMVSTRA, id=~SDMVPSU, weights=~WTMEC2YR, data=nhanesdata, nest=T)
subnhanes <- subset(nhanessvy2 , age >= 18)

#EXAMPLE 7.5 BIVARIATE TESTING OF EACH FACTOR VARIABLE: RACE NHANES ADULT DATA
summary(ex75_race <- svyglm(bpxdi1_1 ~racec, design=subnhanes))
regTermTest(ex75_race, ~racec)

# EXAMPLE 7.5 BIVARIATE TEST OF MARITAL STATUS
summary(ex75_marital <- svyglm(bpxdi1_1 ~marcatc, design=subnhanes))
regTermTest(ex75_marital, ~marcatc)

# EXAMPLE 7.5 BIVARIATE TEST OF GENDER
summary(ex75_sex <- svyglm(bpxdi1_1 ~genderc, design=subnhanes))
regTermTest(ex75_sex, ~genderc)

# EXAMPLE 7.5 BIVARIATE TEST OF CENTERED AGE
summary(ex75_age <- svyglm(bpxdi1_1 ~agec, design=subnhanes))

#UNWEIGHTED OLS REGRESSION
(ex75_nowt <- lm(bpxdi1_1 ~ racec + genderc + agec, data=nhanesdata, age >=18 ))
summary(ex75_nowt)

#WEIGHTED LINEAR REGRESSION WITHOUT COMPLEX SAMPLE CORRECTION
(ex75_wt <- lm(bpxdi1_1 ~ racec + genderc + agec, data= nhanesdata, age >=18, weight=WTMEC2YR ))
summary(ex75_wt)

#EXAMPLE 7.5 WITH COMPLEX SAMPLE ADJUSTMENT AND WEIGHTS USING SVYGLM
summary(ex75_svyglm <- svyglm(bpxdi1_1 ~ racec + genderc + agec, design=subnhanes))
plot(ex75_svyglm)

#ex 7.5 with AgeC Squared
summary(ex75_svyglm_agessq <- svyglm(bpxdi1_1 ~ racec + genderc + agec + agecsq, design=subnhanes))
ex75_svyglm_agessq
plot(ex75_svyglm_agessq)

#note: additional plots could be done with more coding and plotting work, not shown here

#EXAMPLE 7.5 TEST OF INTERACTION OF AGE and AGESQUARED*RACE/ETHNICITY
ex75_raceint <- svyglm(bpxdi1_1 ~ genderc + agec*factor(racec) + agecsq*factor(racec), subnhanes)
summary(ex75_raceint, df.resid=Inf)

#note that Wald Test is used in regTermTest command
regTermTest(ex75_raceint, ~agec:factor(racec)+ agescq:factor(racec))

# EXAMPLE 7.5 AGE TIMES GENDER INTERACTION TEST
ex75_sexint <- svyglm(bpxdi1_1 ~factor(genderc)*agec + factor(genderc)*agecsq + racec, subnhanes)
summary(ex75_sexint)

# Test of interactions, note that R uses a different df formula than Stata, see documentation for details
regTermTest(ex75_sexint, ~factor(genderc):agec + factor(genderc):agecsq)
# Final Model including interactions of race and age plus gender and age

```
ex75_final <- svyglm(bpxdi1_1 ~ agec*factor(racec) + agecsq*factor(racec) + factor(genderc)*agec + factor(genderc)*agecsq, subnhanes)
summary(ex75_final, df.resid=Inf)
margins(ex75_final, at(~agec(-30,(5),30)))
```

# R Survey Diagnostics package from R. Valliant are currently available only directly from Dr. Valliant, request by email at rvalliant@survey.umd.edu.

# Until the package is available from CRAN, we refer readers to examples in book rather than repeat here.

```
# Q Approach for Weighting, Pfefferman
# Step 1 linear model with weight regressed on race, gender and age
q_wgt <- lm(WTMEC2YR ~ racec + genderc + agec, nhanesdata)
summary(q_wgt)
w_hat <- predict(q_wgt)
nhanesdata$q_wtmec2yr <- (nhanesdata$WTMEC2YR / w_hat)
names(nhanesdata)
summary(nhanesdata$q_wtmec2yr)
# design object and subset for analysis
nhanessvyq <- svydesign(strata=~SDMVSTRA, id=~SDMVPSU, weights=~q_wtmec2yr, data=nhanesdata, nest=T)
subnhanesq <- subset(nhanessvyq , age >= 18)
# Final Model with Q Weight
ex75_finalq <- svyglm(bpxdi1_1 ~ agec*factor(racec) + agecsq*factor(racec) + factor(genderc)*agec + factor(genderc)*agecsq, subnhanesq)
summary(ex75_finalq, df.resid=Inf)
```
# R Analysis Example Replication C7

> # create new variable bpxdi1_1 where 0 is set to missing
> nhanesdata$bpxdi1_1 <- nhanesdata$BPXDI1
> nhanesdata$bpxdi1_1 [nhanesdata$bpxdi1_1 == 0] <- NA
> nhanesdata$agec <- nhanesdata$age - 46.36
> nhanesdata$agecsq <- nhanesdata$agec^2
> nhanesdata$genderc <- factor(nhanesdata$RIAGENDR, levels = 1:2, labels = c("M", "F"))
> nhanessvy2 <- svydesign(strata=~SDMVSTRA, id=~SDMVPSU, weights=~WTMEC2YR, data=nhanesdata, nest=T)
> subnhanes <- subset(nhanessvy2, age >= 18)

> # EXAMPLE 7.5 BIVARIATE TESTING OF EACH FACTOR VARIABLE: RACE
> summary(ex75_race <- svyglm(bpxdi1_1 ~ racec, design=subnhanes))

Call:
svyglm(formula = bpxdi1_1 ~ racec, design = subnhanes)
Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:
                Estimate Std. Error t value Pr(>|t|)  
(Intercept)       69.8041     0.4532 154.013  < 2e-16 ***
racecOther Hispanic -0.1549     1.4556  -0.106  0.91688
racecWhite          2.1847     0.7427   2.942  0.01145 *
racecBlack          2.2902     0.7030   3.258  0.00623 **
racecOther          1.3056     0.7044   1.853  0.08665 .

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 137.0384)

Number of Fisher Scoring iterations: 2

> regTermTest(ex75_race, ~racec)

Wald test for racec
in svyglm(formula = bpxdi1_1 ~ racec, design = subnhanes)
F = 4.771214 on 4 and 13 df: p= 0.013705

> # EXAMPLE 7.5 BIVARIATE TEST OF MARITAL STATUS
> summary(ex75_marital <- svyglm(bpxdi1_1 ~ marcatc, design=subnhanes))

Call:
svyglm(formula = bpxdi1_1 ~ marcatc, design = subnhanes)
Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:
                Estimate Std. Error t value Pr(>|t|)  
(Intercept)       72.1796     0.5149 140.172   <2e-16 ***
marcatcPreviously Married -0.1451     0.6978  -0.208    0.838
marcatcNever Married    -1.1210     0.8437  -1.329    0.204

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 137.5607)

Number of Fisher Scoring iterations: 2

> regTermTest(ex75_marital, ~marcatc)

Wald test for marcatc
in svyglm(formula = bpxdi1_1 ~ marcatc, design = subnhanes)
F = 0.9023684 on 2 and 15 df: p= 0.42653
> # EXAMPLE 7.5 BIVARIATE TEST OF GENDER
> summary(ex75_sex <- svyglm(bpxdi1_1 ~ genderc, design=subnhanes))

Call:
svyglm(formula = bpxdi1_1 ~ genderc, design = subnhanes)

Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:
Estimate Std. Error t value Pr(>|t|)
(Intercept) 72.7255 0.5901 123.245 < 2e-16 ***
gendercF -2.2004 0.5679 -3.875 0.00134 **
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 136.4476)

Number of Fisher Scoring iterations: 2

> regTermTest(ex75_sex, ~ genderc)
Wald test for genderc
in svyglm(formula = bpxdi1_1 ~ genderc, design = subnhanes)
F = 15.01184 on 1 and 16 df: p = 0.0013441

> # EXAMPLE 7.5 BIVARIATE TEST OF CENTERED AGE
> summary(ex75_age <- svyglm(bpxdi1_1 ~ agec, design=subnhanes))

Call:
svyglm(formula = bpxdi1_1 ~ agec, design = subnhanes)

Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:
Estimate Std. Error t value Pr(>|t|)
(Intercept) 71.60363 0.50024 143.140 <2e-16 ***
agec 0.03941 0.01889 2.087 0.0533 .
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 137.2234)

Number of Fisher Scoring iterations: 2
> # UNWEIGHTED OLS REGRESSION
> (ex75_nowt <- lm(bpxdi1_1 ~ racec + genderc + agec, data=nhanesdata, age >=18))

Call:
  lm(formula = bpxdi1_1 ~ racec + genderc + agec, data = nhanesdata, 
    subset = age >= 18)

Coefficients:
    (Intercept) racecOther Hispanic racecWhite             
        70.78353       0.25519            1.19254             
racecBlack racecOther gendercF              
        2.20541       2.01311           -2.40368 
agec                      
        0.04136

> summary(ex75_nowt)

Call:
  lm(formula = bpxdi1_1 ~ racec + genderc + agec, data = nhanesdata, 
    subset = age >= 18)

Residuals:
   Min      1Q  Median      3Q     Max
-60.964  -7.299   0.190   7.337  47.140

Coefficients:
                  Estimate  Std. Error t value Pr(>|t|)
(Intercept)      70.783525   0.547861 129.200  < 2e-16 ***
racecOther Hispanic  0.255192   0.737979   0.346 0.729508
racecWhite         1.192541   0.597384   1.996 0.045957 *
racecBlack         2.205414   0.615401   3.584 0.000342 ***
racecOther         2.013111   0.661517   3.043 0.002353 **
gendercF           -2.403677   0.331488  -7.251 4.75e-13 ***
agec                0.041356   0.009034   4.578 4.81e-06 ***

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 11.84 on 5105 degrees of freedom
(752 observations deleted due to missingness)
Multiple R-squared: 0.01798, Adjusted R-squared: 0.01682
F-statistic: 15.58 on 6 and 5105 DF, p-value: < 2.2e-16
> #WEIGHTED LINEAR REGRESSION WITHOUT COMPLEX SAMPLE CORRECTION
> (ex75_wt <- lm(bpxdi1_1 ~ racec + genderc + agec, data= nhanesdata, age >=18, weight=WTMEC2YR ))

Call:
  lm(formula = bpxdi1_1 ~ racec + genderc + agec, data = nhanesdata, 
    subset = age >= 18, weights = WTMEC2YR)

Coefficients:
                  Estimate Std. Error  t value  Pr(>|t|)
(Intercept)      71.14870    0.59157  120.271  < 2e-16 ***
racecOther Hispanic -0.14141    0.84161   -0.168    0.86657
racecWhite        1.90420    0.60772    3.133   0.00174 **
racecBlack       2.30195    0.73449    3.134   0.00173 **
racecOther       1.26179    0.80523    1.567   0.11718
 gendercF        -2.29114    0.31816   -7.201  6.84e-13 ***
agec              0.03682    0.00929    3.964   7.47e-05 ***

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2315 on 5105 degrees of freedom
(752 observations deleted due to missingness)

Multiple R-squared:  0.01742,  Adjusted R-squared:  0.01627
F-statistic: 15.09 on 6 and 5105 DF,  p-value: < 2.2e-16
# EXAMPLE 7.5 WITH COMPLEX SAMPLE ADJUSTMENT AND WEIGHTS USING SVYGLM

```r
> summary(ex75_svyglm <- svyglm(bpxdi1_1 ~ racec + genderc + agec, design=subnhanes))
```

**Call:**
```r
svyglm(formula = bpxdi1_1 ~ racec + genderc + agec, design = subnhanes)
```

**Survey design:**
```r
subset(nhanessvy2, age >= 18)
```

**Coefficients:**

|                         | Estimate | Std. Error | t value | Pr(>|t|) |
|-------------------------|----------|------------|---------|----------|
| (Intercept)             | 71.14870 | 0.51796    | 137.364 | < 2e-16 *** |
| racecOther Hispanic     | -0.14141 | 1.37461    | -0.103  | 0.91991  |
| racecWhite              | 1.90420  | 0.80908    | 2.354   | 0.03825 * |
| racecBlack              | 2.30195  | 0.66462    | 3.464   | 0.00530 **|
| racecOther              | 1.26179  | 0.70668    | 1.786   | 0.10174  |
| gendercF                | -2.29114 | 0.54835    | -4.178  | 0.00154 **|
| agec                    | 0.03682  | 0.02081    | 1.770   | 0.10445  |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 135.3213)

Number of Fisher Scoring iterations: 2

```r
> plot(ex75_svyglm)
```
Normal Q-Q

Theoretical Quantiles

svyglm(bxrdi1_1 ~ racec + genderc + agec)
#ex 7.5 with AgeC Squared

summary(ex75_svyglm_agesq <- svyglm(bpxdi1_1 ~ racec + genderc + agec + agecsq, design=subnhanes))

ex75_svyglm_agesq

> #ex 7.5 with AgeC Squared
> summary(ex75_svyglm_agesq <- svyglm(bpxdi1_1 ~ racec + genderc + agec + agecsq, design=subnhanes))

Call:
svyglm(formula = bpxdi1_1 ~ racec + genderc + agec + agecsq,
        design = subnhanes)

Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:

                         Estimate Std. Error t value Pr(>|t|)
(Intercept)              74.4623    0.5652   131.73  < 2e-16 ***
racecOther Hispanic     0.2178     1.2172    0.18   0.8616
racecWhite              2.0845     0.8572    2.43   0.0353 *
racecBlack              2.5109     0.7337    3.42   0.0065 **
racecOther              1.4106     0.6873    2.05   0.0674 .
gendercF               -2.1692     0.4893   -4.43   0.0013 **
agec                   0.0748     0.0156    4.80   0.0007 ***
agecsq                 -0.0117     0.0007 -16.28  1.58e-08 ***

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 122.0121)
Number of Fisher Scoring iterations: 2

plot(ex75_svyglm_agesq)
# EXAMPLE 7.5 TEST OF INTERACTION OF AGE and AGESQUARED*RACE/ETHNICITY

```r
> ex75_raceint <- svyglm(bpxdi1_1 ~ genderc + agec*factor(racec) + agecsq*factor(racec), subnhanes)
> summary(ex75_raceint, df.resid=Inf)

Call:
svyglm(formula = bpxdi1_1 ~ genderc + agec * factor(racec) +
        agecsq * factor(racec), subnhanes)

Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:  
                         Estimate Std. Error t value Pr(>|t|)
(Intercept)                74.859201   0.760761  98.400  < 2e-16 ***
gendercF                   -2.168455   0.489885  -4.426 9.58e-06 ***
agec                       0.061160   0.032933   1.857 0.063297 .
factor(racec)Other Hispanic 0.224080   0.927686   0.242 0.809131
factor(racec)White         1.398993   0.906972   1.542 0.122955
factor(racec)Black         3.341583   0.961994   3.474 0.000514 ***
factor(racec)Other          1.084784   0.899712   1.206 0.227933
agecsq                    -0.013611   0.001821  -7.476 7.69e-14 ***
agec:factor(racec)Other Hispanic -0.013611   0.001821  -7.476 7.69e-14 ***
agec:factor(racec)White    -0.001124   0.049801  -0.023 0.981991
agec:factor(racec)Black    0.040001   0.036043   1.110 0.267076
agec:factor(racec)Other    0.019038   0.045655   0.417 0.676686
factor(racec)Other Hispanic:agecsq 0.001209   0.003214   0.376 0.706593
factor(racec)White:agecsq  0.029600   0.001567   1.889 0.058886 .
factor(racec)Black:agecsq   -0.001948   0.001801  -1.081 0.279525
factor(racec)Other:agecsq   0.001728   0.002710   0.637 0.523843

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for gaussian family taken to be 121.6729)

Number of Fisher Scoring iterations: 2

> #note that Wald Test is used in regTermTest command
> regTermTest(ex75_raceint, ~agec:factor(racec)+ agecsq:factor(racec))

Wald test for agec:factor(racec) factor(racec):agecsq
in svyglm(formula = bpxdi1_1 ~ genderc + agec * factor(racec) +
        agecsq * factor(racec), subnhanes)
F = 11.8955 on 8 and 2 df: p= 0.079828
```
> # EXAMPLE 7.5 AGE TIMES GENDER INTERACTION TEST
> ex75_sexint <- svyglm(bpxdi1_1 ~ factor(genderc)*agec + factor(genderc)*agecsq + racec, subnhanes)
> summary(ex75_sexint)

Call:
svyglm(formula = bpxdi1_1 ~ factor(genderc) * agec + factor(genderc) *
         agecsq + racec, subnhanes)

Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:
                 Estimate Std. Error  t value Pr(>|t|)
(Intercept)       74.9846596  0.6457104 116.127  3.38e-14 ***
factor(genderc)F  -3.1707086  0.7572255  -4.187  0.00305 **
agec               0.0481536  0.0163147   2.952  0.01838 *
agecsq            -0.0135697  0.0008394  -16.165 2.15e-07 ***
racecOther Hispanic 0.2056088  1.2087808   0.170  0.86916
racecWhite         2.0990068  0.8453388   2.483  0.03793 *
racecBlack         2.5401774  0.7328015   3.466  0.00849 **
racecOther         1.4274416  0.6919988   2.063  0.07304 .
factor(genderc)F:agec  0.0476044  0.0229564   2.074  0.07182 .
factor(genderc)F:agecsq 0.0033007  0.0016223   2.035  0.07631 .

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 121.4838)

Number of Fisher Scoring iterations: 2

> # Test of interactions, note that R uses a different df formula than Stata, see documentation for details
> regTermTest(ex75_sexint, ~factor(genderc):agec + factor(genderc):agecsq)
Wald test for factor(genderc):agec factor(genderc):agecsq
in svyglm(formula = bpxdi1_1 ~ factor(genderc) * agec + factor(genderc) *
          agecsq + racec, subnhanes)
F = 5.356873 on 2 and 8 df: p= 0.033398
> #Final Model including interactions of race and age plus gender and age
> ex75_final <- svyglm(bpxdi1_1 ~ agec*factor(racec) + agecsq*factor(racec) + factor(genderc)*agec + factor(genderc)*agecsq, subnhanes)
> summary(ex75_final, df.resid=Inf)

Call:
svyglm(formula = bpxdi1_1 ~ agec * factor(racec) + agecsq * factor(racec) + factor(genderc) * agec + factor(genderc) * agecsq, subnhanes)

Survey design:
subset(nhanessvy2, age >= 18)

Coefficients:

                   Estimate Std. Error t value Pr(>|t|)
(Intercept)       75.3464498  0.8190674  91.991  < 2e-16 ***
agec               0.0392266  0.0397727   0.986  0.324002
factor(racec)Other Hispanic  0.2714371  0.9210014   0.295  0.768208
factor(racec)White       1.4611713  0.9104608   1.605  0.108522
factor(racec)Black       3.4500173  0.9610532   3.590  0.000331 ***
factor(racec)Other       1.1441363  0.8948624   1.279  0.201052
agecsq             -0.0152356  0.0018081  -8.426  < 2e-16 ***
factor(genderc)F      -3.1953718  0.7592912  -4.208  2.57e-05 ***
agec:factor(racec)Other Hispanic  0.0496377  0.0496923   1.000  0.317843
agec:factor(racec)White  -0.0044755  0.0531791  -0.084  0.932931
agec:factor(racec)Black  -0.0345488  0.0387275  -0.892  0.372339
agec:factor(racec)Other   0.0149059  0.0492193   0.303  0.762006
factor(racec)Other Hispanic:agecsq  0.0008365  0.0034480   0.243  0.808301
factor(racec)White:agecsq   0.0026623  0.0017149   1.552  0.120562
factor(racec)Black:agecsq   0.0023680  0.0019881   1.195  0.232102
factor(racec)Other:agecsq  -0.0014446  0.0029821   0.484  0.628085
agec:factor(genderc)F       0.0454944  0.0234701   1.938  0.052575 
agecsq:factor(genderc)F    0.0033864  0.0016627   2.037  0.041683 *

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 121.1483)

Number of Fisher Scoring iterations: 2

#NOTE: Predicted Margins with Continuous Variable not currently available in R. This feature may be added in near future by software developer and will be included on ASDA website if this occurs.

#R Survey Diagnostics package from R. Valliant are currently available only directly from Dr. Valliant, request by email at rvalliant@survey.umd.edu.
#Until the package is available from CRAN, we refer readers to examples in book rather than repeat here.
# Q Approach for Weighting, Pfefferman

> # Step 1 linear model with weight regressed on race, gender and agec
>
> q_wgt <- lm(WTMEC2YR ~ racec + genderc + agec, nhanesdata)
> summary(q_wgt)

Call:
lm(formula = WTMEC2YR ~ racec + genderc + agec, data = nhanesdata)

Residuals:

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<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-72371</td>
<td>9694</td>
<td>1784</td>
<td>5723</td>
<td>160998</td>
</tr>
</tbody>
</table>

Coefficients:  

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 24948.55 | 826.84     | 30.173  | < 2e-16 *** |
| racecOther Hispanic | -3410.17 | 1105.37    | -3.085  | 0.00204 ** |
| racecWhite       | 40374.19 | 901.34     | 44.794  | < 2e-16 *** |
| racecBlack       | -9093.88 | 903.70     | -10.063 | < 2e-16 *** |
| racecOther       | -8421.65 | 989.51     | -8.511  | < 2e-16 *** |
| gendercF         | 1716.86  | 546.43     | 3.142   | 0.00168 ** |
| agec             | 158.50   | 11.35      | 13.964  | < 2e-16 *** |

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 26980 on 9749 degrees of freedom  
Multiple R-squared: 0.413,  Adjusted R-squared: 0.4126  
F-statistic: 1143 on 6 and 9749 DF,  p-value: < 2.2e-16

> w_hat <- predict(q_wgt)
>
> nhanesdata$q_wtmec2yr <- (nhanesdata$WTMEC2YR / w_hat)

> # design object and subset for analysis  
> nhanessvyq <- svydesign(strata=~SDMVSTRA, id=~SDMVPSU, weights=~q_wtmec2yr, data=nhanesdata, nest=T)
> subnhanesq <- subset(nhanessvyq , age >= 18)
>
> # Final Model with Q Weight  
> ex75_finalq <- svyglm(bpxdi1_1 ~ agec*factor(racec) + agecsq*factor(racec) + factor(genderc)*agec + factor(genderc)*agecsq, subnhanesq)
> summary(ex75_finalq, df.resid=Inf)

Call:  

svyglm(formula = bpxdi1_1 ~ agec * factor(racec) + agecsq * factor(racec) + factor(genderc) * agec + factor(genderc) * agecsq, data=nhanessvyq, agec >= 18)

Survey design:

subset(nhanessvyq, age >= 18)

Coefficients:  

<p>|                  | Estimate | Std. Error | t value | Pr(&gt;|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 75.413392 | 0.772493   | 97.623  | &lt; 2e-16 *** |
| agec             | 0.046734  | 0.040405   | 1.157   | 0.247420  |
| factor(racec)Other Hispanic | 0.247589 | 0.953863   | 0.260   | 0.795200  |
| factor(racec)White | 1.500999 | 0.894770   | 1.678   | 0.093440  |
| factor(racec)Black | 3.566390 | 0.989244   | 3.605   | 0.00312  *** |
| factor(racec)Other | 1.237697 | 0.892330   | 1.387   | 0.165429  |
| agecsq           | -0.014820 | 0.001685   | -8.794  | &lt; 2e-16 *** |
| factor(genderc)F | -3.429000 | 0.632731   | -5.419  | 5.98e-08 *** |
| agec:factor(racec)Other Hispanic | 0.048245 | 0.047486   | 1.016   | 0.309641  |
| agec:factor(racec)White | -0.005508 | 0.051294  | -0.107  | 0.914481  |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>z value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>agec:factor(racec)Black</td>
<td>0.035959</td>
<td>0.037019</td>
<td>0.971</td>
<td>0.331</td>
</tr>
<tr>
<td>agec:factor(racec)Other</td>
<td>0.012669</td>
<td>0.046463</td>
<td>0.273</td>
<td>0.785</td>
</tr>
<tr>
<td>factor(racec)Other Hispanic:agecsq</td>
<td>0.001037</td>
<td>0.003368</td>
<td>0.308</td>
<td>0.758</td>
</tr>
<tr>
<td>factor(racec)White:agecsq</td>
<td>0.002517</td>
<td>0.001712</td>
<td>1.470</td>
<td>0.141</td>
</tr>
<tr>
<td>factor(racec)Black:agecsq</td>
<td>-0.002684</td>
<td>0.001961</td>
<td>-1.368</td>
<td>0.171</td>
</tr>
<tr>
<td>factor(racec)Other:agecsq</td>
<td>0.001244</td>
<td>0.003058</td>
<td>0.407</td>
<td>0.684</td>
</tr>
<tr>
<td>agec:factor(genderc)F</td>
<td>0.034390</td>
<td>0.026440</td>
<td>1.301</td>
<td>0.193</td>
</tr>
<tr>
<td>agecsq:factor(genderc)F</td>
<td>0.002924</td>
<td>0.001646</td>
<td>1.776</td>
<td>0.075</td>
</tr>
</tbody>
</table>

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for gaussian family taken to be 123.0622)

Number of Fisher Scoring iterations: 2