Introduction:

What is the role of health insurance, does it exist to mitigate financial distress or to improve health? The role of any insurance is a means to protect against financial loss, and health insurance is no exception. However, health insurance comes with the added benefit of giving access to primary care, in addition to providing coverage for large health expenditures (such as a severe illness, hospitalization, chronic condition, etc.), which should be an incentive to seek care. I seek to explore, among low-income individuals (under 200% of the Federal Poverty Line) aged 19-64 in the United States, the impact of having Medicaid coverage on self-reported health (as a proxy for health outcomes) and the impact of having Medicaid coverage on delaying care due to cost (a proxy for financial wellbeing). I then expand the purview to health insurance more broadly. Throughout this paper, I will use a cross-sectional survey design and logistic regression in order to explore the relationship between Medicaid coverage and financial and health-related well-being.

Literature suggests there are detrimental effects to both health and financial outcomes associated with losing Medicaid, and coverage gains are associated with improvements in both. There is ample evidence that suggests that having health insurance and Medicaid specifically, improves financial security, reducing the amount of medical bills sent to collections (by roughly $390 per year) and leads to a virtual elimination of catastrophic out of pocket expenses (Baicker et al., 2013; Finkelstein et al., 2012). Those who lost Medicaid health insurance coverage were more than three times more likely to have medical debt than those continuously insured (Carlson, DeVoe, & Wright, 2006). The amount of this debt is relatively significant. Individuals in Tennessee who lost Medicaid coverage, on average, faced an increase in severely delinquent debt by roughly $2,517, and a decrease of their credit score by roughly 46 points (Argys, Friedson, Pitts, & Tello-Trillo, 2017).

Multiple analyses have found positive and some found null effects of Medicaid coverage on health, but the consensus on Medicaid is that it improves access to care, yet the evidence regarding

health outcomes is a bit more mixed (Finkelstein et al., 2012; Simon, Soni, & Cawley, 2017; Sommers, Blendon, Orav, & Epstein, 2016). Increased health insurance coverage gains have been found to improve self-reported health (Sommers, Maylone, Blendon, Orav, & Epstein, 2017). While self-reported health is a reported metric, rather than measured health outcome, it is one of the key outcomes in this study, and is considered a highly valid indicator, due to its relationship with mortality. Individuals who describe their health as poor have mortality rates twice to ten times as high as those reporting being in the healthiest category (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006; Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997). Those who lost Medicaid health insurance coverage were more than five times more likely to report unmet health needs, one fifth as likely to have a primary care visit, and twice as likely to have reported unmet medication needs as those who had continuous Medicaid coverage (Carlson et al., 2006). Persons who lost Medicaid coverage were more slightly more likely to report their health as fair or poor compared to those who didn't (Kasper, Giovannini, & Hoffman, 2000). When losing Medicaid coverage, individuals experience worsening health, especially in terms of the number of days these individuals who lost coverage experience bad days of physical or mental health. Losing Medicaid coverage results in an increase of 1.2 days of incapacitation per month (Tello-Trillo, 2016). The consensus is that there is a loss of health care access once individuals lose Medicaid coverage which results in individuals not seeking care as a result of cost. While there is ample evidence suggesting impacts for both financial stability and health outcomes, I seek to compare the two, to observe where the stronger effects are, in order to identify if health insurance more fills the role of ensuring financial stability or improving health.

Methods:

I utilize two different data sources throughout this analysis. For the financial well-being component, I use data from the National Health Interview Survey (NHIS), and for the health

outcomes component, I use data from the CDC's National Health and Nutrition Examination Survey (NHANES). In both datasets, I restrict the sample to 2013-2016 and define the population of interested to be those between the ages of 19-64 (inclusive) and under 200% FPL. For the NHIS, Medicaid coverage is defined as reporting having Medicaid (not CHIP) coverage, and having insurance coverage is defined as not lacking at least one type of health insurance coverage. The main outcome variable of interest is whether an individual during the past twelve months delayed seeking medical care (excluding dental care) because of worrying about the cost. NHIS lacks a continuous variable for income, but I was able to construct income thresholds of below 100% FPL and below 200% FPL. Throughout the analysis, the sample was weighted according to final annual person weights, was stratified according to the NHIS' stratification variable and clustered on NHIS' primary sampling unit.

For NHANES, Medicaid coverage was identified by an individual reporting that they were covered by Medicaid, and health insurance was defined as having health insurance or some other kind of healthcare plan. The main outcome variable of interest was having good or better health status[1] (defined as having a general health condition of excellent, very good, or good). For income thresholds, a continuous variable of family income as a percentage of the federal poverty line was used.

For financial well-being consideration, among the population of interest, a cross-sectional analysis was first conducted where exposure status was defined as lacking Medicaid coverage and outcome status was defined as delaying care due to cost. This analysis was replicated where exposure status was defined as lacking any health insurance coverage. From there, I employed logistic regression to further explore the relationship, first running a baseline model, associating the probability of delaying care due to cost with having Medicaid coverage. Then I developed a more robust model,

[1] Note, the NHANES variable for a general health condition that was used was variable HUQ010 rather than HSD010.

incorporating a discrete variable to indicate that an individual is below the FPL, a continuous variable for age, as well as a discrete variable indicating whether an individual had any type of insurance.

For health outcomes, among the population of interest, a cross-sectional analysis was first conducted where exposure status was defined as having Medicaid coverage and the outcome of interest was reporting good or better health status. This cross-sectional analysis was repeated using any type of health insurance as the exposure status. From there, I consider a logistic regression model relating having good or better health status to having Medicaid coverage, and include a continuous covariate for income (as a percentage of the FPL), a continuous covariate for age, and a discreet covariate for insurance status (any type of health insurance).

Results:

Delaying Care due to Cost:

For those with Medicaid, 8.88% reported delaying care due to cost, whereas 18.26% of those without Medicaid delayed care due to cost, this corresponds to an odds ratio of 2.29 [95% CI: 2.289 to 2.294], indicating that lacking Medicaid coverage is associated with 2.29 times the chance (more than double) that an individual delay seeking care due to cost, compared to an individual with Medicaid coverage. This is a significant effect, with a p-value < 0.0001.

The effect is even stronger for health insurance more broadly among this population. Among the uninsured, 27.75% have delayed care due to cost, whereas only 10.88% of those insured have delayed care due to cost, corresponding to an odds ratio of 3.15 [95% CI: 3.1437 to 3.1483]. This implies that those who are uninsured are more than three times as likely to delay care due to cost, compared to individuals with health insurance.

In order to further study this relationship, I explore a few logistic regression models. First, I run a model associating delaying care due to cost with Medicaid coverage, and find that having

Medicaid coverage corresponds to 0.43 times the chance of delaying care due to cost, compared to not having Medicaid [95% CI:0.39 to 0.74], where the covariate for Medicaid coverage and the overall model are both significant where p<.0001. I then add controls to model for being under the federal poverty threshold, a covariate for age, and a covariate for having any type of health insurance coverage. I find that the model with controls is significant, as are all covariates at p<.0001. The effect of having Medicaid coverage is associated with 0.71 times [95% CI: 0.65 to 0.79] the chance of delaying care due to cost, compared to not having Medicaid coverage, when controlling for the other aforementioned characteristics. The odds ratios, when controlling for all other covariates, on the other variables were as follows: being below the poverty line was associated with 1.52 times [95% CI: 1.37 to 1.69] the odds of delaying care due to cost, compared to being over, a one-year increase in age is associated with roughly 1.03 times [95% CI: 1.02 to 1.03] the odds of delaying care due to cost, and having any insurance was associated with being 0.31 times [95% CI: 0.28 to 0.34] the odds of delaying care because of cost, compared to those without any insurance.

Health Outcomes:

For those with Medicaid, 62.43% reported having good or better health status, whereas those without Medicaid had 75.56% of individuals reporting good or better health status, corresponding to an odds ratio of 0.54 [95% CI: 0.537 to 0.538], which is significant, given a p-value <.0001. This indicates that those with Medicaid coverage, on average, are 0.54 (roughly half) as likely to report being in good or better health compared to those without Medicaid coverage. While Medicaid coverage among the population of interest may be associated with lower levels of good or better health status, health insurance, in general, is not. For those with health insurance of any kind, 73.34% reported having good or better health status, whereas 72.77% those without Medicaid coverage reported having

good or better health status. This corresponds to an odds ratio of 1.03 [95% CI: 1.0286 to 1.0302], which while small, is significant with a p-value of <.0001 due to very large sample size in the survey.

To further explore this relationship, I consider a logistic regression model relating having good or better health status to having Medicaid coverage, income (as a percentage of the FPL), age, and insurance status (any type of health insurance). I find that such a model is significant with a p-value <.0001 and that each of the covariates is significant at the same confidence level. When controlling for the covariates, I obtain the following results. Having Medicaid coverage corresponds to 0.52 times [95% CI: 0.43 to 0.62] the odds of having good or better health status than someone without Medicaid, an increase in 1 percentage point of your income as a percentage of the Federal Poverty Level is associated with a 1.46 times [95% CI: 1.40 to 1.54] the likelihood of having good or better health status, a one year increase in age corresponds to 0.97 times [95% CI: 0.96 to 0.97] the likelihood of having good or better health, compared to being one year younger, and having any type of insurance is associated with 1.83 times [95% CI: 1.54 to 2.16] the likelihood of reporting good or better health status, compared to not having any insurance at all.

Discussion:

The overarching result of this analysis confirms that Medicaid coverage and health insurance more broadly functions primarily as a means to mitigate the financial distress (or increase access to care, reducing cost being a preventative factor). Lacking Medicaid is strongly associated with delaying care due to cost, and lacking health insurance is an even more strong predictor. Even when controlling for covariates like income and age (which we believe should be expected to impact an individuals' utilization of care, considering cost), we still see the effect, though it does weaken for Medicaid coverage, i.e. instead of having coverage being associated with 0.43 times the chance of delaying cost of care, it increases to 0.71 times the chance, though it is still below 1, which would indicate an equal

likelihood. Having health insurance remains a strong factor that reduces one's likelihood of delaying care due to cost. As would be expected, money is a large factor, as being below the poverty line is associated with a roughly 1.5 times the chance of delaying care due to cost, and increasing age also slightly increases the chance that an individual will delay care due to cost (perhaps as a desire to want to save for retirement).

One surprising result is that among the population, having Medicaid was associated with a lower rate of having good or better health, compared to not having Medicaid. Having health insurance was associated with being slightly more likely to have good or better health outcomes. This tends to suggest that, while health insurance may only slightly be associated with better health outcomes, those that select into Medicaid among a low income (less than 200% FPL) are more likely to have worse health outcomes. This would make sense if the bulk of individuals without Medicaid tend to be on the upper end of the income threshold, which may be the case, since we saw a large increase in those under 138% of the FPL on Medicaid with Medicaid expansion in January 2014. When controlling for other factors such as age and income, the effect remains roughly the same for Medicaid (OR = 0.54 and 0.52, cross-sectional and regression, respectively), however, having any type of health insurance is strongly associated (OR=1.83) with having good or better health status, tending to confirm the idea that those who select into Medicaid may be on the lower end of the SES distribution, even among our population, and thus are predisposed to having worse health outcomes. As expected, income is strongly associated with the likelihood of having good or better health, and age is negatively associated.

Given that we see much stronger effects for Medicaid and health insurance more broadly in decreasing care due to cost (ranging from OR = 1.41 to 2.29 for Medicaid, logistic regression and cross-sectional, respectively, and ranging from OR = 3.15 to 3.23 for health insurance, cross-sectional and logistic regression, respectively), compared to health outcomes (OR = 0.52 to 0.54 for Medicaid, logistic regression and cross-sectional, respectively, and ranging from OR = 1.03 to 1.83 for health

insurance, cross-sectional and logistic regression, respectively), I conclude that the role of Medicaid and health insurance is more oriented towards financial protection than improving health. Policymakers should consider this function of Medicaid when determining how to best ensure positive health and financial outcomes for the most vulnerable members of society.

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Appendix One: NHIS Analysis Code

```
/* Import Data from National Health Interview Survey*/
libname IPUMS "/folders/myfolders/SDA/paper/";
filename ASCIIDAT "/folders/myfolders/SDA/paper/nhis_00007.dat";

proc format cntlout = IPUMS.nhis_00007_f;

value ASTATFLG_f
  0 = "NIU"
  1 = "Sample adult, has record"
  2 = "Sample adult, no record"
  3 = "Not selected as sample adult"
  4 = "No one selected as sample adult"
  5 = "Armed force member"
  6 = "AF member, selected as sample adult"
;

value CSTATFLG_f
  0 = "NIU"
  1 = "Sample child-has record"
  2 = "Sample child-no record"
  3 = "Not selected as sample child"
  4 = "No one selected as sample child"
  5 = "Emancipated minor"
;

value POVERTY_f
  10 = "Less than 1.0"
  11 = "Under .50"
  12 = ".50 to .74"
  13 = ".75 to .99"
  14 = "Less than 1.0 (no other detail)"
  20 = "1.00 to 1.99"
  21 = "1.00 to 1.24"
  22 = "1.25 to 1.49"
  23 = "1.50 to 1.74"
  24 = "1.75 to 1.99"
  25 = "1.00 - 1.99 (no further detail)"
  30 = "2.00 and over"
  31 = "2.00 to 2.49"
  32 = "2.50 to 2.99"
  33 = "3.00 to 3.49"
  34 = "3.50 to 3.99"
  35 = "4.00 to 4.49"
  36 = "4.50 to 4.99"
  37 = "5.00 and over"
  38 = "2.00 and over (no other detail)"
  98 = "Undefinable"
  99 = "Unknown"
;

value HEALTH_f
  0 = "NIU"
  1 = "Excellent"
  2 = "Very Good"
  3 = "Good"
  4 = "Fair"
```

```
  5 = "Poor"
  7 = "Unknown-refused"
  8 = "Unknown-not ascertained"
  9 = "Unknown-don't know"
;

value DELAYCOST_f
  0 = "NIU"
  1 = "No"
  2 = "Yes"
  7 = "Unknown-refused"
  8 = "Unknown-not ascertained"
  9 = "Unknown-don't know (1993-96: DK or refused)"
;

value HINOTCOVE_f
  0 = "NIU"
  1 = "No, has coverage"
  2 = "Yes, has no coverage"
  7 = "Unknown-refused"
  8 = "Unknown-not ascertained"
  9 = "Unknown-don't know"
;

value HIMCAID_f
  0 = "NIU"
  1 = "Not mentioned"
  2 = "Mentioned"
  7 = "Unknown-refused"
  8 = "Unknown-not ascertained"
  9 = "Unknown-don't know"
;

run;

data IPUMS.nhis_00007;
infile ASCIIDAT pad missover lrecl=102;

input
  YEAR          1-4
  SERIAL        5-10
  STRATA        11-14
  PSU           15-17
  NHISHID     $ 18-31
  HHWEIGHT      32-37
  PERNUM        38-39
  NHISPID     $ 40-55
  HHX         $ 56-61
  FMX         $ 62-63
  PX          $ 64-65
  PERWEIGHT     66-77
  SAMPWEIGHT    78-86
  FWEIGHT       87-92
  ASTATFLG      93-93
  CSTATFLG      94-94
  AGE           95-96
  POVERTY       97-98
  HEALTH        99-99
```

```
  DELAYCOST    100-100
  HINOTCOVE    101-101
  HIMCAID      102-102
;

label
  YEAR       = "Survey year"
  SERIAL     = "Sequential Serial Number, Household Record"
  STRATA     = "Stratum for variance estimation"
  PSU        = "Primary sampling unit (PSU) for variance estimation"
  NHISHID    = "NHIS Unique identifier, household"
  HHWEIGHT   = "Household weight, final annual"
  PERNUM     = "Person number within family (from reformatting)"
  NHISPID    = "NHIS Unique Identifier, person"
  HHX        = "Household number (from NHIS)"
  FMX        = "Family number (from NHIS)"
  PX         = "Person number of respondent (from NHIS)."
  PERWEIGHT  = "Final basic annual weight"
  SAMPWEIGHT = "Sample Person Weight"
  FWEIGHT    = "Final annual family weight"
  ASTATFLG   = "Sample adult flag"
  CSTATFLG   = "Sample child flag"
  AGE        = "Age"
  POVERTY    = "Ratio of family income to poverty threshold"
  HEALTH     = "Health status"
  DELAYCOST  = "Medical care delayed due to cost, past 12 months"
  HINOTCOVE  = "Health Insurance coverage status"
  HIMCAID    = "Has Medicaid insurance"
;

format
  ASTATFLG    ASTATFLG_f.
  CSTATFLG    CSTATFLG_f.
  POVERTY     POVERTY_f.
  HEALTH      HEALTH_f.
  DELAYCOST   DELAYCOST_f.
  HINOTCOVE   HINOTCOVE_f.
  HIMCAID     HIMCAID_f.
;

format
  PERWEIGHT   12.
  SAMPWEIGHT  9.
;

run;

data analysis_nhis;
set IPUMS.NHIS_00007;

*restrict years;
where year > 2012 AND year < 2017;

*define Medicaid coverage;
if himcaid = 2 then medicaid = 1;
if (himcaid = 1 OR himcaid = 0) then medicaid = 2;

*define poverty levels;
```

```
if ((POVERTY> 9 AND POVERTY < 26) OR (POVERTY = 98)) then inc = 1;
else inc = 2;

*define ages;
if (AGE > 18) AND (AGE < 65) then ages = 1;
else ages = 2;

*define inclusion group;
if (ages = 1) AND (INC = 1) then sel = 1;
else sel = 2;

*delay cost;
if DELAYCOST = 2 then delay = 1;
if DELAYCOST < 2 then delay = 2;

*any health insurance;
if HINOTCOVE = 1 then insurance = 1;
if HINOTCOVE = 2 then insurance = 2;

*low income;
if (POVERTY < 15 OR POVERTY = 98) then low_income = 1;
if (POVERTY > 24) then low_income = 2;
run;



*** analysis;
Proc Freq data = analysis_nhis;
tables medicaid ages inc sel;
tables sel*medicaid*delay / CHISQ OR;
tables sel*insurance*delay / CHISQ OR;
weight PERWEIGHT;
run;

* logistic regression (base);
proc surveylogistic data = analysis_nhis;
STRATA STRATA;
CLUSTER PSU;
WEIGHT PERWEIGHT;
domain sel;
class medicaid (ref = '2') low_income (ref = '2') insurance (ref = '2')/ param
= ref;
model delay = medicaid;
run;

* logistic regression (with covariates);
proc surveylogistic data = analysis_nhis;
STRATA STRATA;
CLUSTER PSU;
WEIGHT PERWEIGHT;
domain sel;
class medicaid (ref = '2') low_income (ref = '2') insurance (ref = '2')/ param
= ref;
model delay = medicaid low_income age insurance;
run;
```

Appendix Two: NHIS Results

Baseline Tables

The FREQ Procedure

medicaid	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	1.6822E8	13.50	1.6822E8	13.50
2	1.0775E9	86.50	1.2457E9	100.00
Frequency Missing = 12875984				

ages	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	7.6399E8	60.70	7.6399E8	60.70
2	4.9463E8	39.30	1.2586E9	100.00

inc	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	4.01E8	31.86	4.01E8	31.86
2	8.5761E8	68.14	1.2586E9	100.00

sel	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	2.2073E8	17.54	2.2073E8	17.54
2	1.0379E9	82.46	1.2586E9	100.00

Cross-Sectional Analysis (Medicaid)

Frequency Percent Row Pct Col Pct

Table 1 of medicaid by delay			
Controlling for sel=1			
	delay		
medicaid	1	2	Total
1	4680868 2.15 8.88 13.47	4.802E7 22.09 91.12 26.30	5.27E7 24.25
2	3.006E7 13.83 18.26 86.53	1.346E8 61.92 81.74 73.70	1.646E8 75.75
Total	3.474E7 15.99	1.826E8 84.01	2.173E8 100.00
Frequency Missing = 3393735			

Statistics for Table 1 of medicaid by delay
Controlling for sel=1

Statistic	DF	Value	Prob
Chi-Square	1	2613931	<.0001
Likelihood Ratio Chi-Square	1	2904872	<.0001
Continuity Adj. Chi-Square	1	2613930	<.0001
Mantel-Haenszel Chi-Square	1	2613931	<.0001
Phi Coefficient		-0.10967	
Contingency Coefficient		0.10902	
Cramer's V		-0.10967	

Odds Ratio and Relative Risks			
Statistic	Value	95% Confidence Limits	
Odds Ratio	0.4364	0.4359	0.4368
Relative Risk (Column 1)	0.4864	0.4860	0.4869
Relative Risk (Column 2)	1.1147	1.1146	1.1149

Cross-Sectional Analysis (Any Health Insurance):

Frequency Percent Row Pct Col Pct

Table 1 of insurance by delay

Controlling for sel=1

insurance	delay 1	delay 2	Total
1	1.648E7 7.58 10.88 47.44	1.35E8 62.13 89.12 73.95	1.515E8 69.71
2	1.826E7 8.40 27.75 52.56	4.756E7 21.88 72.25 26.05	6.582E7 30.29
Total	3.474E7 15.99	1.826E8 84.01	2.173E8 100.00

Frequency Missing = 3393735

Statistics for Table 1 of insurance by delay
Controlling for sel=1

Statistic	DF	Value	Prob
Chi-Square	1	9720490	<.0001
Likelihood Ratio Chi-Square	1	9045726	<.0001
Continuity Adj. Chi-Square	1	9720489	<.0001
Mantel-Haenszel Chi-Square	1	9720490	<.0001
Phi Coefficient		-0.21149	
Contingency Coefficient		0.20691	
Cramer's V		-0.21149	

Odds Ratio and Relative Risks

Statistic	Value	95% Confidence Limits	
Odds Ratio	0.3179	0.3176	0.3181
Relative Risk (Column 1)	0.3921	0.3918	0.3923
Relative Risk (Column 2)	1.2335	1.2333	1.2336

Logistic Regression:
Model: Delay = Medicaid
Domain: sel = 1

Class Level Information		
Class	Value	Design Variables
medicaid	1	1
	2	0

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	99619763	97773982
SC	99619779	97774015
-2 Log L	99619761	97773978

Testing Global Null Hypothesis: BETA=0				
Test	F Value	Num DF	Den DF	Pr > F
Likelihood Ratio	531.91	1	903	<.0001
Score	388.94	1	903	<.0001
Wald	322.56	1	903	<.0001
NOTE: First-order Rao-Scott design correction 1.2193 applied to the likelihood ratio test.				

Type 3 Analysis of Effects				
Effect	F Value	Num DF	Den DF	Pr > F
medicaid	322.56	1	903	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter		Estimate	Standard Error	t Value	Pr > |t|
Intercept		-1.5031	0.0237	-63.31	<.0001
medicaid	1	-0.8388	0.0467	-17.96	<.0001
NOTE: The degrees of freedom for the t tests is 903.					

Odds Ratio Estimates			
Effect	Point Estimate	95% Confidence Limits	
medicaid 1 vs 2	0.432	0.394	0.474
NOTE: The degrees of freedom in computing the confidence limits is 903.			

Logistic Regression:
Model: Delay = Medicaid Low_Income Age Insurance
Domain: sel = 1

Class Level Information		
Class	Value	Design Variables
medicaid	1	1
	2	0
low_income	1	1
	2	0
insurance	1	1
	2	0

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	99619763	91865949
SC	99619779	91866032
-2 Log L	99619761	91865939

Testing Global Null Hypothesis: BETA=0				
Test	F Value	Num DF	Den DF	Pr > F
Likelihood Ratio	547.49	3.8279	3456.58	<.0001
Score	268.70	4	900	<.0001
Wald	336.33	4	900	<.0001
NOTE: Second-order Rao-Scott design correction 0.0450 applied to the Likelihood Ratio test.				

Type 3 Analysis of Effects				
Effect	F Value	Num DF	Den DF	Pr > F
medicaid	41.23	1	903	<.0001
low_income	58.84	1	903	<.0001
AGE	388.23	1	903	<.0001
insurance	649.93	1	903	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter		Estimate	Standard Error	t Value	Pr > |t|
Intercept		-2.2514	0.0727	-30.96	<.0001
medicaid	1	-0.3364	0.0524	-6.42	<.0001
low_income	1	0.4198	0.0547	7.67	<.0001
AGE		0.0252	0.00128	19.70	<.0001
insurance	1	-1.1757	0.0461	-25.49	<.0001
NOTE: The degrees of freedom for the t tests is 903.					

Odds Ratio Estimates			
Effect	Point Estimate	95% Confidence Limits	
medicaid 1 vs 2	0.714	0.645	0.792
low_income 1 vs 2	1.522	1.367	1.694
AGE	1.026	1.023	1.028
insurance 1 vs 2	0.309	0.282	0.338
NOTE: The degrees of freedom in computing the confidence limits is 903.			

Appendix Three: NHANES Analysis Code

```
****** Bring in 13-14 Health Insurance, Health Quality, and Demographic Data;
LIBNAME HIQ1314 XPORT '/folders/myfolders/SDA/paper/HIQ_H.xpt';
LIBNAME HUQ1314 XPORT '/folders/myfolders/SDA/paper/HUQ_H.xpt';
LIBNAME DEMO1314 XPORT '/folders/myfolders/SDA/paper/DEMO_H.xpt';
LIBNAME INQ1314 XPORT '/folders/myfolders/SDA/paper/INQ_H.xpt';
LIBNAME OUTH '/folders/myfolders/SDA/paper';
Run;

***** Merge 13-14 Health Insurance and Health Outcome Data;
DATA OUTH.HIQ_HUQ1314;
MERGE HIQ1314.HIQ_H
HUQ1314.HUQ_H (IN=H1);
BY SEQN;
IF H1;
RUN;

***** Merge 13-14 Health Insurance and Health Outcome Data with Demographic
Data;
DATA OUTH.DEMO_HIQ_HUQ1314;
MERGE OUTH.HIQ_HUQ1314
DEMO1314.DEMO_H (IN=H2);
BY SEQN;
IF H2;
RUN;

***** Merge 13-14 Health Insurance and Health Outcome Data and Demographic
Data with Income Data;
DATA OUTH.INQ_DEMO_HIQ_HUQ1314;
MERGE OUTH.DEMO_HIQ_HUQ1314
INQ1314.INQ_H (IN=H3);
BY SEQN;
IF H3;
RUN;

****** Bring in 15-16 Health Insurance, Health Quality, and Demographic Data;
LIBNAME HIQ1516 XPORT '/folders/myfolders/SDA/paper/HIQ_I.xpt';
LIBNAME HUQ1516 XPORT '/folders/myfolders/SDA/paper/HUQ_I.xpt';
LIBNAME DEMO1516 XPORT '/folders/myfolders/SDA/paper/DEMO_I.xpt';
LIBNAME INQ1516 XPORT '/folders/myfolders/SDA/paper/INQ_I.xpt';
LIBNAME OUTI '/folders/myfolders/SDA/paper';
Run;

***** Merge 15-16 Health Insurance and Health Outcome Data;
DATA OUTI.HIQ_HUQ1516;
MERGE HIQ1516.HIQ_I
HUQ1516.HUQ_I (IN=I1);
BY SEQN;
IF I1;
RUN;

***** Merge 13-14 Health Insurance and Health Outcome Data with Demographic
Data;
DATA OUTI.DEMO_HIQ_HUQ1516;
MERGE OUTI.HIQ_HUQ1516
DEMO1516.DEMO_I (IN=I2);
```

```
BY SEQN;
IF I2;
RUN;

***** Merge 15-16 Health Insurance and Health Outcome Data and Demographic
Data with Income Data;
DATA OUTI.INQ_DEMO_HIQ_HUQ1516;
MERGE OUTI.DEMO_HIQ_HUQ1516
INQ1516.INQ_I (IN=I3);
BY SEQN;
IF I3;
RUN;

***** Concatenate files;
Data combine;
set OUTH.INQ_DEMO_HIQ_HUQ1314 OUTI.INQ_DEMO_HIQ_HUQ1516;
run;

**** data cleaning;
data analysis;
set COMBINE;

*define Medicaid population;
if HIQ031D = 17 then medicaid = "1";
else medicaid = "2";

*define good or better health quality;
if HUQ010 < 4 then good = "1";
if HUQ010 > 3 AND HUQ010 < 6 then good = "2";

*define age;
if (RIDAGEYR > 18 AND RIDAGEYR < 65) then age = 1;
else age = 2;

*define income parameters;
if (INDFMMPI>= 0 AND INDFMMPI < 2) then inc = 1;
else inc = 2;

*define inclusion group;
if (inc = 1 AND age = 1) then sel = 1;
else sel = 2;

*define health insurance;
if HIQ011 = 1 then insurance = 1;
if HIQ011 = 2 then insurance = 2;


run;

*** analysis;
Proc Freq data = analysis;
tables good medicaid age inc sel;
tables sel*medicaid*good / CHISQ OR;
tables sel*insurance*good / CHISQ OR;
weight WTINT2YR;
run;
```

```
proc surveylogistic data = analysis;
cluster sdmvpsu;
stratum sdmvstra;
weight WTINT2YR;
domain sel;
class medicaid (ref = '2') insurance (ref = '2')/ param = ref;
model good = medicaid INDFMMPI RIDAGEYR insurance;
run;
```

Appendix Four: NHANES Analysis Results

Baseline Tables

good	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	5.3248E8	84.91	5.3248E8	84.91
2	94629237	15.09	6.2711E8	100.00
Frequency Missing = 575200.89141				

medicaid	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	86932915	13.85	86932915	13.85
2	5.4075E8	86.15	6.2769E8	100.00

age	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	3.7965E8	60.48	3.7965E8	60.48
2	2.4803E8	39.52	6.2769E8	100.00

inc	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	2.4348E8	38.79	2.4348E8	38.79
2	3.8421E8	61.21	6.2769E8	100.00

sel	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	1.379E8	21.97	1.379E8	21.97
2	4.8979E8	78.03	6.2769E8	100.00

Frequency Percent Row Pct Col Pct

Table 1 of medicaid by good			
Controlling for sel=1			
	good		
medicaid	1	2	Total
1	1.609E7 11.68 62.43 15.97	9685291 7.03 37.57 26.13	2.578E7 18.70
2	8.465E7 61.42 75.56 84.03	2.739E7 19.87 24.44 73.87	1.12E8 81.30
Total	1.007E8 73.10	3.707E7 26.90	1.378E8 100.00
Frequency Missing = 84574.830391			

Statistics for Table 1 of medicaid by good
Controlling for sel=1

Statistic	DF	Value	Prob
Chi-Square	1	1836706	<.0001
Likelihood Ratio Chi-Square	1	1743690	<.0001
Continuity Adj. Chi-Square	1	1836705	<.0001
Mantel-Haenszel Chi-Square	1	1836706	<.0001
Phi Coefficient		-0.11544	
Contingency Coefficient		0.11468	
Cramer's V		-0.11544	

Odds Ratio and Relative Risks			
Statistic	Value	95% Confidence Limits	
Odds Ratio	0.5376	0.5371	0.5380
Relative Risk (Column 1)	0.8262	0.8260	0.8265
Relative Risk (Column 2)	1.5371	1.5361	1.5380

Statistics for Table 1 of insurance by good
Controlling for sel=1

Statistic	DF	Value	Prob
Chi-Square	1	5059.6642	<.0001
Likelihood Ratio Chi-Square	1	5052.1961	<.0001
Continuity Adj. Chi-Square	1	5059.6351	<.0001
Mantel-Haenszel Chi-Square	1	5059.6641	<.0001
Phi Coefficient		0.0061	
Contingency Coefficient		0.0061	
Cramer's V		0.0061	

Odds Ratio and Relative Risks			
Statistic	Value	95% Confidence Limits	
Odds Ratio	1.0294	1.0286	1.0302
Relative Risk (Column 1)	1.0078	1.0076	1.0081
Relative Risk (Column 2)	0.9791	0.9785	0.9796

Sample Size = 137551136.9
Frequency Missing = 346988.29391

Frequency Percent Row Pct Col Pct

Table 2 of insurance by good			
Controlling for sel=2			
	good		
insurance	1	2	Total
1	4.002E8 81.89 88.96 92.79	4.964E7 10.16 11.04 86.51	4.498E8 92.05
2	3.111E7 6.37 80.07 7.21	7742794 1.58 19.93 13.49	3.885E7 7.95
Total	4.313E8 88.26	5.739E7 11.74	4.887E8 100.00
Frequency Missing = 1103969.7864			

NHANES Logistic Model:
Domain: sel = 1
Model: Good = Medicaid Income Age Insurance

Probability modeled is good='1'.

Note: 2624 observations were deleted due to missing values for the response or explanatory variables.

Class Level Information		
Class	**Value**	**Design Variables**
medicaid	**1**	1
	2	0
insurance	**1**	1
	2	0

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	160055611	149657707
SC	160055628	149657791
-2 Log L	160055609	149657697

Testing Global Null Hypothesis: BETA=0				
Test	**F Value**	**Num DF**	**Den DF**	**Pr > F**
Likelihood Ratio	72.86	3.3887	101.66	<.0001
Score	34.34	4	27	<.0001
Wald	42.50	4	27	<.0001
NOTE: Second-order Rao-Scott design correction 0.1804 applied to the Likelihood Ratio test.				

Type 3 Analysis of Effects				
Effect	**F Value**	**Num DF**	**Den DF**	**Pr > F**
medicaid	31.64	1	30	<.0001
INDFMMPI	18.32	1	30	0.0002
RIDAGEYR	129.38	1	30	<.0001
insurance	12.24	1	30	0.0015

Analysis of Maximum Likelihood Estimates					
Parameter		**Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept		2.1795	0.1727	12.62	<.0001
medicaid	**1**	-0.6665	0.1185	-5.63	<.0001
INDFMMPI		0.3875	0.0905	4.28	0.0002
RIDAGEYR		-0.0411	0.00361	-11.37	<.0001
insurance	**1**	0.3282	0.0938	3.50	0.0015
NOTE: The degrees of freedom for the t tests is 30.					

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Confidence Limits**	
medicaid 1 vs 2	0.514	0.403	0.654
INDFMMPI	1.473	1.225	1.773
RIDAGEYR	0.960	0.953	0.967
insurance 1 vs 2	1.388	1.146	1.682
NOTE: The degrees of freedom in computing the confidence limits is 30.			