Income Inequality and Health Outcomes in the United States: An Empirical Analysis

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Abstract: A growing body of research suggests a consistent relationship between health and income inequality. This study specifically analyzes the correlation between income inequality, measured by state-level Gini coefficient data from the American Community Study, and individual behavioral, physical, and mental health outcomes from the Behavioral Risk Factor Surveillance System for 2006 through 2014. After controlling for demographic and socioeconomic characteristics, health insurance status, state and year trends, the Gini coefficient had significant positive relationships with physical and behavioral health outcomes dealing with weight status, including BMI, obesity and diabetes. The research suggests that economic steps to address the rising income inequality in the United States might serve to also address some of our nation's most troubling health statistics.

I. Introduction

The economic crisis of 2008 and its aftermath brought about renewed interest in the wealth gap in the United States. As the issue reentered the nation's consciousness, researchers found that the disparity between the top 1 percent and the rest of the population had risen to its highest levels since 1928. From 2009 to 2012, the top 1 percent's incomes had risen by 31.4 percent while the bottom 99 percent's incomes had only grown by 0.4 percent (Saez, 2013). The implications of such a staggering economic imbalance cause concern not only for our nation's morale and sense of fairness, but also for our nation's health.

A growing body of research suggests a consistent relationship between health and income inequality. Distinct, but heavily tied to the idea that low income or socioeconomic status is associated with poor health, income inequality has only recently garnered national attention as a contributor in determining health outcomes. Economic inequality has been shown to precipitate additional stress and reduced social capital for lower income individuals already correlated with lower educational attainment, all of which negatively impact health (Barr, 2014, p. 78). Adverse changes to income inequality have even been associated with reduced social and health policy reform such as access to education, healthcare, environmental health regulations and maternal and child health laws, especially in low-income areas of the United States (Lynch et al., 2004).

Previous studies have looked at the effects of income inequality on health status, generally involving such measures as mortality and morbidity for both children and adults (Subramanian & Kawachi, 2004). Relatively little, however, has been studied on how income inequality affects individual health measures. This study seeks to further examine this relationship over time and across a variety of measures that encompass behavioral, physical, and

mental health in order to pinpoint which areas of health seem most affected by income inequality.

II. Background

Examining an individual's health as more than just an absence of illness is imperative in developing a complete picture of what it means to be healthy. Wolinksy (1988) first suggested that health be viewed as a multidimensional model, consisting of health as one's level of social role functioning, the absence of disease and, status of their psychological health. He further dichotomized each measure to classify individuals as either "well" or "ill" (Wolinsky, 1988, p. 86). Barr (2014), based on the work of Ware and Sherbourne (1992), suggested that the model be further extended by instead measuring each dimension on a continuous spectrum. He posited that physical health be classified not merely as the absence of symptoms, but by the extent of illness or pain, and psychological health by the varying degrees of mental health conditions such as depression and Alzheimer's disease. Similarly, he suggested that behavioral health be classified not only by the either healthy or non-healthy behaviors that an individual engages in, such as smoking or regular exercise, but also by their ability to function in society and perform day to day activities (Barr, 2014, p. 22). This more nuanced model serves as the foundation for analyzing health and income inequality in the course of this study.

In measuring economic inequality, the academic community has primarily employed the Gini coefficient. This measure is equivalent to the ratio of two integration calculations on a graph of two curves: one representing actual income inequality and the other, perfect income equality. The first component of the ratio involves the area between the line representing full income equality, where each income decile has an equivalent share of wealth, and the Lorenz Curve,

which represents the actual distribution of income in a given society (Figure 1). When taken as a fraction of the entire area underneath the curve representing full equality, the resulting ratio is termed the Gini coefficient, which is expressed as a decimal that can range in value from 0 to 1, with a higher value signifying greater inequality. In many regressions, the Gini Coefficient is scaled to better reflect the variables being measured, often on a scale of 1 to 100. The simplicity of the calculation broadens its application and makes for an effective method of comparisons across localities. In fact, numerous studies have shown the benefits of using such a measure in conjunction with health outcomes, cementing the Coefficient's credibility as an analytical tool.

Berndt and colleagues (2003) outline some of the advantages of using the Gini coefficient as a measurement. As a measure of income inequality, it is highly correlated with other common measures of inequality, including the Robin Hood index, and the Atkinson index (Berndt, Rajendrababu & Studnicki, 2003). The Gini coefficient has also been the chief measure in a number of studies assessing the relationship between income inequality and mortality as well as with self-rated health (Lopez, 2004). One inherent shortcoming of this measure, however, lies in the scope of what it measures. While as an overall measure it "incorporate[s] the range and distribution of incomes with the extent of inequality" it cannot give a complete picture as to whether other moderating factors such as race, ethnicity and socioeconomic status (among other variables) play a role in the association (Karriker-Jaffe, Roberts & Bond, 2013). Considering its well established usage, adding controls for such variables into any model of income inequality and health outcomes consequently proves prudent, if not imperative to understanding the power of such a relationship.

III. Literature Review

Current literature suggests that income inequality may be associated with each dimension of health to different extents. While most studies have found a strong correlation between income inequality and individual health outcomes, others have had more muted results, meriting further investigation.

A. Behavioral Health

In a study on alcohol consumption and its relation to income inequality, Karriker-Jaffe, Roberts, and Bond (2013) found that the Gini coefficient was "not associated with light or heavy drinking or with alcohol-related consequences". They additionally found that there existed only a relatively weak association with alcohol dependence and suggested that these findings lined up with prior research on the subject. Alcohol and smoking, which have positive social gradients, may prove to be exceptions to general relationships between the Gini coefficient and typical health outcomes (Karriker-Jaffe, Roberts & Bond, 2013). For the Gini coefficient has been found to have more significant relationships with health outcomes that have consistently inverse social gradients, where the prevalence of a condition tends to decrease with greater social status (Wilkinson & Pickett, 2009). Continued research on whether there are other behavioral health or sociocultural factors that display a similarly weak relationship would help to cement this hypothesis.

Volland (2012) conducted a study specifically measuring income inequality's impact on one of the most notable behavioral health measures: the Body Mass Index. He found a small, but significant correlation between higher income inequality and higher BMI measurements, noting that it "is comparable in size to other state−level determinants like the unemployment rate, and

also matches closely to the size of other macro−level determinants like tobacco and soft drink taxes, reported in the literature" (Volland, 2012). He additionally stressed the cumulative effects that inequality may exhibit over time and the importance of continued research focusing on the temporal aspect of the association (Volland, 2012).

B. Physical Health

In a review done by Singer and Ryff (2001) on minority health and income inequality, disadvantaged racial and ethnic groups were shown to experience significantly worse physical health than their white counterparts in the United States. The authors attributed race's association with income inequality as a key factor in minorities' higher rates of mortality from diseases such as diabetes, heart disease, and coronary heart disease (Singer & Ryff, 2001). These findings are consistent with previous studies, such as one done by Kawachi and Kennedy that confirmed the positive relationship between mortality and the Gini coefficient (Barr, 2014). Singer and Ryff's findings also further emphasize the importance of race and its relation to income inequality.

Massing and colleagues (2004) performed a study specifically targeting cardiovascular disease and income inequality, focused on the Southeastern U.S. They found a direct relationship between income inequality and heart disease and stroke mortalities using county-level income data (Massing et al, 2004). Their findings support the physiological explanation of how repeated stressors (potentially due to income inequality) chronically elevate the allostatic load within the body, damaging blood vessels and other body tissue, which in turn can lead to cardiovascular problems such as stroke and heart disease (Barr, 2014, p.63). The power of such a causal biological relationship would indeed suggest that these conditions are associated with greater income inequality.

C. Mental Health

Lopez (2004) found that when comparing reports of self-rated health across large metropolitan areas in the United States, income inequality played a major role. After statistically controlling for a variety of factors, including age, race, education and gender, he found "for each 1 point rise in the GINI index (on a hundred point scale) the risk of reporting Fair or Poor self-rated health increased by 4.0% (95% confidence interval 1.6–6.5%)" (Lopez, 2004). He attributed this relationship to the fact that income inequality has been shown to disproportionally increase stress among low income individuals who make unfavorable comparisons between themselves and the more privileged (Lopez, 2004). These findings seem to indirectly support the notion that income inequality adversely affects mental health and may even correlate to not only lower self-assessments of health but also other mental diseases.

Layte (2011) tested three proposed hypotheses for the association between income inequality and mental health. By considering variables such as antisocial behavior, trust levels, and social support networks, among others, the study was able to prove that the social capital and status-anxiety hypotheses were best able to explain the relationship between the Gini Coefficient and a person's state of well-being (Layte, 2011). This research supports the notion that additional stressors caused by poor socialization and a lack of trust in society underlie the dangers of income inequality. Additionally, his representations of these two hypotheses in the model accounted for nearly all of the association with the Gini coefficient, further rebuking critics who doubt the existence of a relationship between health and income inequality (Layte, 2011).

Other studies have more explicitly looked at the relationship between mental health and income inequality. Pickett, James and Wilkinson (2006) found that "higher national levels of

income inequality [were] linked to a higher prevalence of mental illness" according to their study on the World Health Mental Health survey. They further posited that richer countries tended to experience higher levels of mental illness because of their greater likelihood for income inequality (Pickett, James & Wilkinson, 2006). Another study specifically linked the presence of more depressive symptoms in individuals to higher income inequality in 23 different European nations and noted that the prevalence of appropriate coping resources helped to mitigate this relationship (Deurzen, Ingen & Oorschot, 2015).

An interesting anomaly rests in the case of suicides. For despite the fact that depression has been found to be more common in unequal societies, suicide rates have proven to be higher in equal societies (Pickett & Wilkinson, 2015). The lack of a consistent social gradient in suicide rates, particularly in the United States where it has been associated with higher socioeconomic status, may prove to be the defining reason, similar to previous studies on inequality and individual alcohol consumption (Wilkinson & Pickett, 2009).

IV. Data

This study analyzes the relationship between individual health outcome and state-level Gini coefficient data across the United States in recent years. Gini coefficient data was extracted from the annual American Community Study (ACS), collected by the U.S. Census Bureau from the years 2006 through 2014. Health outcome measures and demographic information was obtained as cross-sectional data from the Centers for Disease Control and Prevention's annual Behavioral Risk Factor Surveillance System (BRFSS), the largest health survey in the world, also spanning the years 2006 through 2014. BRFSS collects data from all 50 states and 3 U.S. territories via a comprehensive telephone survey covering a range of topics, including

information on health behaviors, self-rated health, chronic health conditions, medical service usage and socioeconomic characteristics (CDC, 2016).

A. Dependent Variables

The dependent variables were grouped into the three health outcome categories: behavioral health, physical health, and mental health. To measure behavioral health, variables concerning an individual's current smoking status, average drinking habits and whether or not an individual's alcohol consumption classified them as a heavy drinker or binge drinker were included. Body Mass Index (BMI) measurements, whether or not an individual classified as obese, as well as a variable measuring recent exercise were also included as behavioral health measures. In order to calculate BMI, self-reported height and weight measurements were collected, with a BMI measurement greater than 30 indicating that the individual suffered from obesity.

To measure physical health, variables on the diagnoses of diabetes, coronary heart disease, heart attack, stroke, and the number of days in the past month that the individual experienced poor physical health were employed. Finally, to measure mental health, variables concerning depression and anxiety diagnoses, as well as the number of days in the past month that the individual experienced poor mental health were studied. The depressive disorder and anxiety disorder questions were not asked in every year's survey, resulting in a reduced but still relatively large sample size for both of these variables.

B. Independent Variables

BRFSS provides an extensive set of variables for control purposes, including, sex, age, race, health insurance status, education level and household size, all of which have been

correlated in previous studies with health (Barr, 2014). Race and ethnicity were controlled for using a variable for distinguishing between hispanic and non-hispanic individuals and a separate variable for the standard classifications of White, Black, Asian, Alaska Native/American Indian or Other, the latter of which included individuals who identified as multiracial, or Native Hawaiian/Pacific Islander. Education and employment variables were stratified into separate categories based on the highest level of degree acquired (No High School, High School, Some College, College or More) and employment status (Employed for Wages, Self-Employed, Unemployed for More than 1 Year, Unemployed for Less than 1 year, Homemaker, Student, Retired, Unable to Work). Annual household income was considered by classifying each individual into one of eight income brackets. The presence of healthcare coverage, as well as household size, based on the number of children in each participant's household, further controlled for income's effect on each health outcome.

C. Sample & Methods

After standardizing the BRFSS variables across the nine years of interest, each participant was matched with the appropriate Gini coefficient from the ACS dataset by their state of residence and year surveyed. Due to the vast amount of data afforded by BRFSS, observations with missing values for any of the independent or dependent variables were dropped. Additionally, residents of the noncontiguous United States, including Alaska, Hawaii and any of the off-shore U.S. territories, were excluded from the sample as well as pregnant women and any outlier observations. After cleaning the dataset, 255,678 observations came from survey year 2006, 314,750 from 2007, 306,073 from 2008, 315,774 from 2009, 326,092 from 2010, 348,967 from 2011, 340,977 from 2012, 334,550 from 2013, and 321,201 from 2014. The general model

for each of the fifteen health measures tested included 31 control variables in addition to a time trend variable and state dummy variables. It was specified as follows:

$$Health_{ist} = \beta_0 + \beta_1 Gini_{st} + \beta_2 Male_{ist} + \beta_3 Hispanic_{ist} + \beta_4 Race_{ist} + \beta_5 Age_{ist} + \beta_6 Children_{ist} + \beta_7 Education_{ist} + \beta_8 Income_{ist} + \beta_9 Employment_{ist} + \beta_{10} Health\ Coverage_{ist} + \beta_{11} Year\ Trend_{it} + \beta_{12} State\ Controls_{is} + E_{ist}$$

where *Health* is one of the fifteen health measures for individual *i* in state *s* at time *t.* To check for a potential curvilinear relationship, the Gini coefficient was squared and a squared age variable was included to better represent the relationship between age and health (Wu, 2008), represented in the above model as the *Gini* and *Age* vector variables. The *Race, Education, Income, and Employment* terms represent individual dummy variables for each classification as outlined in greater detail in the Appendix.

Ordinary least squares (OLS) analysis was run on the four continuous dependent variables (Average Drinks per Day, BMI, Physical Health in Past Month, and Mental Health in Past Month) and probit analysis was run on the remaining eleven binary coded variables (Current Smoker, Binge Drinker, Heavy Drinker, Exercised in Past Month, Obese, Diabetes, Heart Attack, Heart Disease, Stroke, Anxiety Disorder and Depressive Disorder). All statistical testing was performed using Stata 14.

V. Results & Discussion

Descriptive statistics (mean, standard deviation, minimum and maximum) for each of the dependent and independent variables employed are shown in Table 1, with a further explanation of the variable definitions in the Appendix. Coefficient estimates, along with their standard errors, sample sizes and adjusted or pseudo R^2 values are displayed in Table 2 for the OLS

regressions, and in Table 3 for the probit regressions. In every regression, the vast majority of independent variables were found to be significant at a 0.05 significance level, giving further support to previous hypotheses about the relationship between health, race, ethnicity, income, age, education, employment, health coverage, and household size.

A. Behavioral Health

Of the smoking and alcohol consumption variables measured, the average daily consumption of alcohol (Average Drinks per Day) and the dummy variable for the classification of a heavy drinker (Heavy Drinker) were found to have positive relationships with the Gini coefficient, significant at a 0.05 significance level. Specifically, a one point increase in the Gini coefficient was expected to correlate with an additional 0.042 drinks per day (Table 2), while at the same time correlating with a one percentage point increase in the probability that the individual was also a heavy drinker (Table 3). This positive relationship between alcohol consumption and the Gini coefficient seems to contradict the inverse social gradient hypothesis by Karriker-Jaffe, Roberts, and Bond (2013), suggesting instead that the ability to consume more alcohol by the economically advantaged relative to those with lower income, could be heightened with greater income inequality. In addition, Layte's (2011) hypothesis that the additional stress caused by income inequality for those with lower income reduces overall well-being, could apply to alcohol consumption as well. For while those with lower incomes were found to drink less and be less likely to be a heavy drinker, more stress could be driving even those with limited means to cope with alcohol.

The regressions also indicated that minorities tended to drink less alcohol as compared to Whites, society has tended to increase alcohol consumption over the years as indicated by the

time trend variable (Year Trend), and that the self-employed, unemployed and retired individuals tend to consume greater amounts of alcohol, possibly due to their greater leisure time or flexibility. Interestingly, higher educational attainment was found to increase the average amount of alcohol consumed, but decrease the likelihood of the individual being a heavy drinker, potentially because those with greater education are able to afford more alcohol, but also understand the dangers of regularly consuming significant amounts. The current smoking status of an individual (Current Smokers) as well as whether or not they were a binge drinker (Binge Drinkers) were not found to have any significant relationships with the Gini coefficient, but maintained significant relationships with the rest of the independent variables (Table 2 and Table 3).

All three of the variables classified as relating to weight status (Exercised in Past Month, BMI, and Obese) maintained highly significant relationship with income inequality and had some of the highest Gini coefficient estimates. The negative relationship between exercise and the Gini coefficient, significant at the 0.001 significance level, indicated that higher income inequality was associated with a three percentage point reduction in the probability of an individual having exercised in the past month (Table 3). A possible explanation for this phenomenon could be that a shrinking middle class (evident from rising income inequality) has led to more individuals with less time for leisure and physical activity or fewer resources to access exercise facilities. The lack of exercise from income inequality could be in turn affecting an individual's weight status. BMI was found to positively correlate with the Gini coefficient, as did the dummy variable for obesity, at the 0.001 significance level. Specifically, a one point increase in the Gini coefficient was found to be associated with a 0.564 increase in BMI (Table

2). Again, Layte's (2011) hypothesis of stress from income inequality inducing poorer well-being could explain these results. This stress could be driving lower income individuals to over-consume nutrient-deficient food, which tends to be cheaper and more available in lower income areas, as a coping mechanism, causing significant weight gain and a higher BMI. It is then, perhaps unsurprising that this relationship would also increase the probability of an individual being obese.

In analyzing the control variables, minority groups tended to have a higher BMI and exercise less, except for those classified as American Indian/Alaska Native. Both higher educational attainment and income were associated with higher levels of exercise and lower levels of obesity, supporting previous literature on the importance of this relationship (Barr, 2014, p.42). Given their age and physical condition, the retired and those unable to work experienced lower levels of exercise and higher BMI as expected. And despite increases in exercise as captured by the time trend variable, levels of obesity and BMI also rose over the years studied, suggesting that poor nutrition could be a more significant contributor to this trend (Table 2 and Table 3).

B. Physical Health

Of all the chronic health conditions measured as physical health variables, only the diabetes and heart disease variables proved to have a significant relationship with income inequality. The positive association for diabetes, significant at the 0.01 significance level suggests that higher income inequality relates to a one percentage point increase in the likelihood of diabetes for an individual (Table 3). In fact, the link between individuals having diabetes and being overweight due to insulin resistance, and their significant relationships with the Gini

coefficient further support the notion that income inequality relates to both conditions (CDC, 2015). The negative association for heart disease, significant at the 0.10 significance level and lack of a significant association for heart attack and stroke contradicts Massing et al's (2004) earlier findings, suggesting further research may be necessary. In addition, the relationship between the number of days of experiencing poor physical health and income inequality may not be relevant due to the broadness of the question, as poor physical health was not explicitly defined when asked (Table 2 and Table 3).

Many of the independent variables still maintained significant associations with the physical health variables. Racial groups demonstrated varying relationships with diabetes, heart disease, heart attack, and stroke incidences, with Hispanics and American Indian/Alaska Natives having lower probabilities of ever being diagnosed with any of these conditions, except in the case of diabetes, Blacks having a higher probability for both stroke and diabetes, and Asians reporting higher likelihood across all the conditions as compared to Whites. Higher income, higher educational attainment and employment resulted in significantly lower probabilities for all of these diseases as well as correlating with fewer days of poor physical health. The time trend variable indicated reduced likelihood of heart disease and heart attacks between 2006 and 2014, but a higher probability of diabetes, each of which paralleled its relationship with the Gini coefficient (Table 3).

C. Mental Health

Among the mental health variables, only depressive disorder proved to have a significant relationship with the Gini coefficient at the 0.001 significance level. However, the association was found to be negative, suggesting that an increase in income inequality would actually result

in a seven percent reduction in the likelihood of depression in an individual (Table 3). This conclusion is particularly surprising given the literature indicating a positive relationship, but may be explained by the limitations of the BRFSS dataset, an important consideration in understanding the data from the entire study.

Even though the BRFSS collects large quantities of data, since all data are collected via telephone, the poorest individuals and those who don't live in a typical household setting with a landline are not included. In fact, the data reflect this in its distribution of individuals by income and race, as a strong majority of the individuals surveyed self-identified as white, higher income, and middle-aged (Table 1). With the rising ubiquity of cellphones, the BRFSS began adding cellphones to its surveying system, but this only took effect starting in 2011. These two factors may have resulted in an oversampling of the well off, resulting in some biased outcomes. Additionally, since the depressive disorder question (and many of the others) was phrased as having ever been diagnosed by a doctor, those less likely to schedule a doctor's appointment (which tend to be lower income individuals) would be less likely to answer the question accurately. Considering the previous literature, and the significant conclusions of this variable, further investigation seems necessary in order to determine the true relationship (if any) between income inequality and depressive disorders.

Unlike with other conditions where males tended to have worse health outcomes, males were found to be significantly less likely than females to have a mental illness, with a six percent reduction in the likelihood of anxiety disorder and a nine percent reduction for depression (Table 3). This finding, as well as the fact that minority groups were also seen as less likely to have reported any kind of mental illness corroborates much of the current literature on the subject

(Barr, 2014). The fact that higher income levels and educational attainment were also associated with a lower probability for mental illness and the fact that the time trend variable indicated a higher probability of reporting a mental illness over time, add further to the need for continued research on mental health (Table 3).

VI. Conclusion

Prior literature on income inequality and health has often focused on self-rated health or a particular health measure. Using 2006-2014 BRFSS data and state-level Gini coefficient data from the ACS, this study looked at health as a multidimensional model in order to discover which measure or measures of health had particularly strong associations with the rising income inequality in recent years. The individual-level, cross-sectional analyses suggest that the strongest links exist in relation to the behavioral health variables dealing most notably with weight status, as indicated by the significance of BMI, obesity, diabetes, and even alcohol consumption. With growing concerns about the rise of income inequality and these particular health conditions, public health policies should seek to further educate lower income individuals on the importance of leading a healthy lifestyle. Additional funding and reforms for government programs such as the Supplemental Nutrition Assistance Program (SNAP), which serve needy communities, may help to mitigate further reductions in our nation's health, as those in political and economic power attempt to reduce the persistent barriers to social and monetary mobility that lower income individuals face.

Future research could attempt to see if these relationships hold up with longitudinal data as opposed to the cross-sectional data used in this study. By following the same individuals over the course of their lives and given their circumstances, a clearer association or lack thereof, could

be discovered. In addition, since BRFSS data are self-reported, data from objective sources, (such as a doctor's office) could provide a more accurate picture. Given that there is a level of uncertainty when patients are assessing their own health, having a health professional collect the data in person might yield different results. An even further step would be to employ county-level or Metropolitan Statistical Area (MSA) Gini coefficient data. Having greater precision in identifying Gini coefficient data would ensure that each observation is associated with the most accurate representation of income inequality.

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Tables

Table 1. Summary Statistics

Variable	Mean	Standard Deviation	Min	Max
Dependent Variables				
Current Smoker	0.170	0.376	0	1
Binge Drinker	0.127	0.333	0	1
Average Drinks per Day	0.367	0.884	0	20
Heavy Drinker	0.053	0.225	0	1
Exercised in Past Month	0.754	0.431	0	1
BMI	27.780	5.875	12.01	60
Obese	0.288	0.453	0	1
Physical Health in Past Month	4.147	8.624	0	30
Diabetes	0.116	0.320	0	1
Heart Attack	0.057	0.232	0	1
Heart Disease	0.061	0.239	0	1
Stroke	0.037	0.189	0	1
Mental Health in Past Month	3.374	7.618	0	30
Anxiety Disorder*	0.132	0.339	0	1
Depressive Disorder**	0.192	0.394	0	1
Independent Variables				
Scaled Gini Coefficient	45.767	1.987	40.810	54.200
Scaled & Squared Gini Coefficient	2098.575	183.567	1665.456	2937.640
Male	0.413	0.492	0	1
Hispanic	0.055	0.227	0	1
White	0.864	0.343	0	1
Black	0.082	0.275	0	1
Asian	0.017	0.130	0	1
Alaska Native/American Indian	0.013	0.111	0	1
Other	0.024	0.153	0	1

Table 1. Summary Statistics (Continued)

Variable	Mean	Standard Deviation	Min	Max
Age	54.453	16.304	18	99
Age Squared	3230.982	1773.116	324	9801
Number of Children in Household	0.572	1.047	0	10
No High School	0.075	0.263	0	1
High School	0.284	0.451	0	1
Some College	0.274	0.446	0	1
College	0.367	0.482	0	1
Less than $10,000	0.048	0.214	0	1
Between $10,000-$15,000	0.057	0.231	0	1
Between $15,000-$20,000	0.075	0.263	0	1
Between $20,000-$25,000	0.095	0.293	0	1
Between $25,000-$35,000	0.120	0.325	0	1
Between $35,000-$50,000	0.155	0.362	0	1
Between $50,000-$75,000	0.167	0.373	0	1
More than $75,000	0.283	0.450	0	1
Employed for Wages	0.457	0.498	0	1
Self Employed	0.089	0.285	0	1
Unemployed for More than 1 Year	0.023	0.151	0	1
Unemployed for Less than 1 Year	0.025	0.155	0	1
Homemaker	0.063	0.243	0	1
Student	0.018	0.134	0	1
Retired	0.260	0.439	0	1
Unable to Work	0.064	0.245	0	1
Health Coverage	0.897	0.304	0	1
Year Trend	5.148	2.525	1	9
N	2,864,062			

Note: 1. *Indicates an N of 227,361, **Indicates an N of 1,558,329
2. State control variables not included in Table

Table 2. OLS Analysis for Continuous Dependent Variables

	Average Drinks per Day	BMI	Physical Health in Past Month	Mental Health in Past Month
Scaled Gini Coefficient	0.042*	0.564***	-0.185	0.043
	(0.02)	(0.12)	(0.16)	(0.15)
Scaled & Squared Gini Coefficient	-0.000*	-0.006***	0.002	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)
Male	0.304***	0.788***	-0.219***	-0.943***
	(0.00)	(0.01)	(0.01)	(0.01)
Hispanic	-0.093***	0.498***	-0.243***	-0.770***
	(0.00)	(0.02)	(0.02)	(0.02)
Black	-0.117***	1.855***	-0.776***	-0.862***
	(0.00)	(0.01)	(0.02)	(0.02)
Asian	-0.020***	1.049***	0.554***	0.348***
	(0.00)	(0.03)	(0.04)	(0.03)
Alaska Native/American Indian	-0.273***	-2.377***	-0.591***	-1.159***
	(0.00)	(0.03)	(0.04)	(0.04)
Other	-0.038***	0.119***	-0.007	-0.126***
	(0.00)	(0.02)	(0.03)	(0.03)
Age	-0.005***	0.327***	0.083***	0.069***
	(0.00)	(0.00)	(0.00)	(0.00)
Age Squared	0.000	-0.003***	-0.001***	-0.001***
	(0.00)	(0.00)	(0.00)	(0.00)
Number of Children in Household	-0.051***	0.051***	-0.045***	-0.023***
	(0.00)	(0.00)	(0.01)	(0.00)
No High School	-0.006**	0.135***	0.722***	0.405***
	(0.00)	(0.01)	(0.02)	(0.02)
Some College	0.006***	0.032***	0.145***	0.241***
	(0.00)	(0.01)	(0.01)	(0.01)
College or More	0.008***	-0.864***	-0.390***	-0.204***
	(0.00)	(0.01)	(0.01)	(0.01)
Less than $10,000	-0.045***	0.285***	2.548***	2.501***
	(0.00)	(0.02)	(0.03)	(0.02)
Between $10,000-$15,000	-0.057***	0.416***	2.263***	1.790***
	(0.00)	(0.02)	(0.02)	(0.02)
Between $15,000-$20,000	-0.054***	0.300***	1.580***	1.263***
	(0.00)	(0.02)	(0.02)	(0.02)

Table 2. OLS Analysis for Continuous Dependent Variables (Continued)

	Average Drinks per Day	BMI	Physical Health in Past Month	Mental Health in Past Month
Between $20,000-$25,000	-0.047***	0.188***	1.092***	0.875***
	(0.00)	(0.01)	(0.02)	(0.02)
Between $25,000-$35,000	-0.026***	0.072***	0.481***	0.381***
	(0.00)	(0.01)	(0.02)	(0.02)
Between $50,000-$75,000	0.027***	-0.184***	-0.313***	-0.377***
	(0.00)	(0.01)	(0.02)	(0.02)
More than $75,000	0.095***	-0.809***	-0.705***	-0.897***
	(0.00)	(0.01)	(0.02)	(0.01)
Self Employed	0.056***	-0.719***	-0.050**	-0.049**
	(0.00)	(0.01)	(0.02)	(0.02)
Unemployed for More than 1 Year	0.017***	0.185***	3.022***	3.049***
	(0.00)	(0.02)	(0.03)	(0.03)
Unemployed for Less than 1 Year	0.056***	0.023	1.357***	2.167***
	(0.00)	(0.02)	(0.03)	(0.03)
Homemaker	-0.027***	-0.574***	0.864***	0.149***
	(0.00)	(0.01)	(0.02)	(0.02)
Student	-0.070***	-0.676***	0.271***	0.371***
	(0.00)	(0.03)	(0.04)	(0.03)
Retired	0.029***	0.095***	1.449***	0.394***
	(0.00)	(0.01)	(0.02)	(0.01)
Unable to Work	-0.103***	1.409***	12.647***	7.174***
	(0.00)	(0.02)	(0.02)	(0.02)
Health Coverage	-0.084***	0.354***	0.227***	-0.554***
	(0.00)	(0.01)	(0.02)	(0.02)
Year Trend	0.007***	0.063***	-0.019***	0.019***
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	-0.400	6.631*	3.871	3.530
	(0.40)	(2.66)	(3.65)	(3.37)
State Controls	Yes	Yes	Yes	Yes
N	2,864,062	2,864,062	2,864,062	2,864,062
Adjusted R^2	0.058	0.069	0.192	0.117

Notes: 1. Standard errors are shown in parentheses
2. † p<0.10, * p<0.05, **p<0.01, *** p<0.001

Table 3. Probit Analysis for Dependent Variables

	Current Smoker	Binge Drinker	Heavy Drinker	Exercised in Past Month	Obese	Diabetes	Heart Attack	Heart Disease	Stroke	Anxiety Disorder	Depressive Disorder
Scaled Gini Coefficient	0.014†	-0.004	0.009*	-0.030***	0.040***	0.015**	-0.002	-0.006†	-0.002	-0.009	-0.069***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.01)
Scaled & Squared Gini Coefficient	-0.000	0.000	-0.000*	0.000**	-0.000***	-0.000**	0.000	0.000	0.000	0.000	0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male	0.017***	0.071***	0.003***	0.015***	0.017***	0.029***	0.035***	0.028***	0.005***	-0.059***	-0.088***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hispanic	-0.075***	-0.013***	-0.018***	-0.024***	0.024***	0.037***	-0.004***	-0.003***	-0.004***	-0.025***	-0.042***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Black	-0.039***	-0.034***	-0.022***	-0.026***	0.112***	0.060***	-0.004***	-0.007***	0.006***	-0.063***	-0.092***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Asian	0.051***	0.004***	-0.002	-0.011***	0.073***	0.071***	0.018***	0.010***	0.013***	-0.004	-0.019***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Alaska Native/American Indian	-0.063***	-0.066***	-0.035***	-0.079***	-0.164***	0.036***	-0.007***	-0.007***	-0.006***	-0.077***	-0.103***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Other	-0.013***	-0.016***	-0.006***	-0.016***	0.003	0.018***	0.001	0.000	0.003***	-0.021***	-0.022***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.010***	0.000	0.001***	-0.002***	0.021***	0.014***	0.004***	0.005***	0.001***	0.005***	0.012***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age Squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of Children in Household	-0.012***	-0.015***	-0.012***	-0.009***	0.003***	-0.003***	0.000**	-0.000**	0.000	-0.006***	-0.008***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
No High School	0.042***	0.000	0.000	-0.039***	0.014***	0.009***	0.007***	0.002***	0.003***	0.010***	0.016***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 3. Probit Analysis for Dependent Variables (Continued)

	Current Smoker	Binge Drinker	Heavy Drinker	Exercised in Past Month	Obese	Diabetes	Heart Attack	Heart Disease	Stroke	Anxiety Disorder	Depressive Disorder
Some College	-0.020***	-0.004***	0.000	0.051***	0.001	0.003***	0.001*	0.003***	0.002***	0.019***	0.031***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
College or More	-0.101***	-0.017***	-0.004***	0.119***	-0.062***	-0.017***	-0.008***	-0.004***	-0.002***	0.009***	0.026***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Less than $10,000	0.074***	-0.009***	-0.009***	-0.058***	0.022***	0.033***	0.017***	0.013***	0.018***	0.070***	0.095***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Between $10,000-$15,000	0.072***	-0.011***	-0.011***	-0.062***	0.032***	0.033***	0.017***	0.013***	0.016***	0.061***	0.087***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Between $15,000-$20,000	0.058***	-0.010***	-0.009***	-0.053***	0.024***	0.028***	0.014***	0.010***	0.013***	0.040***	0.064***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Between $20,000-$25,000	0.041***	-0.009***	-0.008***	-0.044***	0.016***	0.020***	0.010***	0.007***	0.009***	0.029***	0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Between $25,000-$35,000	0.022***	-0.005***	-0.004***	-0.023***	0.006***	0.010***	0.003***	0.002***	0.003***	0.015***	0.022***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Between $50,000-$75,000	-0.026***	0.005***	0.003***	0.026***	-0.013***	-0.008***	-0.005***	-0.003***	-0.004***	-0.009***	-0.020***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
More than $75,000	-0.065***	0.019***	0.011***	0.075***	-0.056***	-0.027***	-0.010***	-0.007***	-0.007***	-0.029***	-0.054***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self Employed	-0.021***	0.004***	0.009***	0.016***	-0.050***	-0.018***	-0.002***	-0.001*	0.001***	0.007**	-0.005***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Unemployed for More than 1 Year	0.048***	-0.005***	0.006***	-0.001	0.009***	0.026***	0.018***	0.021***	0.021***	0.106***	0.136***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Unemployed for Less than 1 Year	0.041***	0.008***	0.012***	0.021**	0.003	0.013***	0.011***	0.013***	0.011***	0.071***	0.094***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)

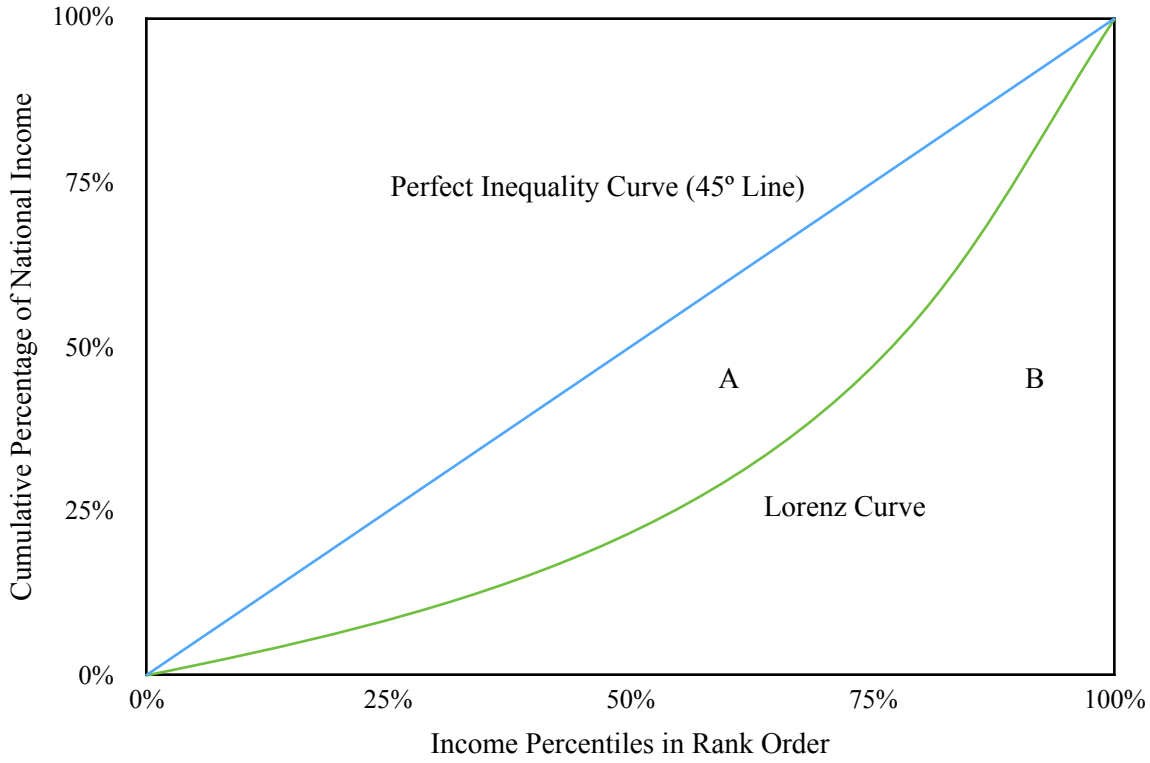
Table 3. Probit Analysis for Dependent Variables (Continued)-1

	Current Smoker	Binge Drinker	Heavy Drinker	Exercised in Past Month	Obese	Diabetes	Heart Attack	Heart Disease	Stroke	Anxiety Disorder	Depressive Disorder
Homemaker	-0.025***	-0.031***	-0.008***	0.042***	-0.032***	0.014***	0.007***	0.011***	0.012***	0.025***	0.028***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Student	-0.047***	-0.019***	-0.004***	0.059***	-0.037***	0.018***	0.008***	0.021***	0.006***	0.029***	0.030***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Retired	0.006***	0.004***	0.009***	0.050***	0.009***	0.028***	0.013***	0.017***	0.016***	0.038***	0.053***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Unable to Work	0.064***	-0.046***	-0.019***	-0.154***	0.073***	0.108***	0.074***	0.092***	0.078***	0.254***	0.337***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Health Coverage	-0.056***	-0.012***	-0.017***	0.029***	0.021***	0.020***	0.003***	0.005***	0.003***	0.008***	0.010***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year Trend	-0.002***	0.002***	0.002***	0.001***	0.005***	0.002***	-0.000***	-0.001***	0.000	0.002**	0.002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
State Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2,864,062	2,864,062	2,864,062	2,864,062	2,864,062	2,864,062	2,864,062	2,864,062	2,864,062	227,361	1,558,329
Pseudo R^2	0.115	0.117	0.033	0.081	0.038	0.114	0.161	0.150	0.136	0.081	0.096

Notes: 1. Marginal effects are reported and standard errors are shown in parentheses
2. $^{\dagger}p<0.10$, * $p<0.05$, **$p<0.01$, *** $p<0.001$

Figures

Figure 1. Gini Coefficient Calculation = (A)/(A+B)



Appendix

Dependent Variables

Behavioral Health

Current Smoker	Dummy variable for adults who are current smokers
Binge Drinker	Dummy variable for males having five or more drinks on one occasion, females having four or more drinks on one occasion
Average Drinks per Day	Total number of alcoholic beverages consumed per day
Heavy Drinker	Dummy variable for adult men having more than two drinks per day and adult women having more than one drink per day

Behavioral/Physical Health

Exercised in Past Month	Dummy variable for adults that reported doing physical activity or exercise during the past 30 days other than their regular job.
BMI	Body mass index (weight in kilograms divided by height in meters squared)
Obese	Dummy variable for individual's with a BMI greater than 30

Physical Health

Physical Health in Past Month	Number of days during the past 30 days that physical health was not good
Diabetes	Dummy variable for individuals diagnosed with diabetes
Heart Attack	Dummy variable for individuals who have had a heart attack
Heart Disease	Dummy variable for individuals diagnosed with coronary heart disease
Stroke	Dummy variable for individuals who have had a stroke

Mental Health

Mental Health in Past Month	Number of days during the past 30 days that mental health was not good
Anxiety Disorder	Dummy variable for individuals diagnosed with an anxiety disorder, including acute stress disorder, anxiety, generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, phobia, post traumatic stress disorder, or social anxiety disorder

Depressive Disorder	Dummy variable for individuals diagnosed with a depressive disorder, including depression, major depression, dysthymia, or minor depression

Independent Variables

Scaled Gini Coefficient	State-level gini coefficient scaled from 1 to 100
Scaled & Squared Gini Coefficient	State-level gini coefficient scaled from 1 to 100 and then squared
Male	Dummy variable for individuals who self-identify as male
Hispanic	Dummy variable for individuals who self-identify as hispanic
White	Dummy variable for individuals who self-identify as white
Black	Dummy variable for individuals who self-identify as black
Asian	Dummy variable for individuals who self-identify as asian
Alaska Native/Native American	Dummy variable for individuals who self-identify as Alaska Native or American Indian
Other	Dummy variable for individuals who self-identify as multiracial, Native Hawaiian or Pacific Islander
Age	Individual's age
Age Squared	Individual's age squared
Number of Children in Household	Number of children less than 18 years of age live in individual's household
No High School	Dummy variable for individuals who did not graduate high school
High School	Dummy variable for individuals who graduated high school or received a GED
Some College	Dummy variable for individuals who attended some college or technical school
College or More	Dummy variable for individuals who graduated from college or technical school
Less than $10,000	Dummy variable for individuals with an annual household income less than $10,000
Between $10,000-$15,000	Dummy variable for individuals with an annual household income between $10,000-$15,000
Between $15,000-$20,000	Dummy variable for individuals with an annual household income between $15,000-$20,000
Between $20,000-$25,000	Dummy variable for individuals with an annual household income between $20,000-$25,000
Between $25,000-$35,000	Dummy variable for individuals with an annual household income between 25,000-$35,000

Between $35,000-$50,000	Dummy variable for individuals with an annual household income between $35,000-$50,000
Between $50,000-$75,000	Dummy variable for individuals with an annual household income between $50,000-$75,000
More than $75,000	Dummy variable for individuals with an annual household income greater than $75,000
Employed for Wages	Dummy variable for individuals employed for wages
Self-Employed	Dummy variable for individuals who are self-employed
Unemployed for More than 1 Year	Dummy variable for individuals who have been unemployed for more than 1 year
Unemployed for Less than 1 Year	Dummy variable for individuals who have been unemployed for less than 1 year
Homemaker	Dummy variable for individuals who classify themselves as homemakers
Student	Dummy variable for individuals who classify themselves as students
Retired	Dummy variable for individuals who are retired
Unable to Work	Dummy variable for individuals who are unable to work due to some limitation
Health Coverage	Dummy variable for individuals who have any kind of healthcare coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare
Year Trend	Time trend variable where 1=2006 through 9=2014

**Italicized variables refer to reference group*