



# RACIAL/ETHNIC DISPARITIES IN ACCESS TO PRIMARY CARE

Does living in an area with above average poverty segregation have an impact on access to primary care?

## Abstract

A large literature on the influence of socioeconomic status (SES) and poverty on access to care exists; however this work typically looks both at individual or aggregate level, and rarely from a multilevel perspective. Additionally, poverty is mainly operationalized as a threshold variable that comes from the Census Bureau. The main research hypothesis is that individuals living in a neighborhood with higher poverty segregation experience lower levels of primary care use. The data for this analysis came from Behavioral Risk Factor Surveillance System (BRFSS) 2011 and the Census Bureau (American Community Survey – ACS, 2010) 5 year estimates for the US counties. A multilevel model will be used to observe whether poverty segregation influences the use of primary care services after controlling for socio-demographic characteristics. Access to care is measured by whether an individual made use of the primary care services in the last year and poverty segregation is measured using the dissimilarity and exposure index.

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## Introduction

The cost of national health expenditure reached \$2.5 trillion and grew 5.7% in 2009 from 4.4% in 2008. The rate of increase remained constant in 2010 and 2011 but the actual cost spent by the U.S. on health care was \$2.7 trillion in 2011. National health expenditure forecasts to 2019 do not look encouraging. The U.S. is expected to reach \$4.5 trillion in health expenditures (Center for Medicare & Medicaid Services, 2009, 2011).

The availability of appropriate primary care services has a significant effect on lowering costs of care, reducing health inequalities in the population and improving health outcomes, as documented by previous studies. Areas with higher ratios of primary care physicians to population observed lower rates of all causes of mortality, infant mortality, low birth weight, mortality from heart disease, cancer or stroke, and poor self-reported health even after controlling for certain socio-demographic characteristics and lifestyle factors (Gaskin, Dinwiddie, Chan, & McCleary, 2012; LaVeist, 2005; Shi 1994; Shi & Starfield, 2000; Starfield, Shi , & Macinko, 2005). Better health outcomes within an area was associated with a higher proportion of primary care physicians to specialist physicians (Andersen & Davidson, 2001; Gaskin et al., 2012; Shi & Stevens, 2010; Starfield et al., 2005). Also, several studies have shown that better access to primary care can reduce the effects of the socio-economic (SES) differentials, diminish the negative health impact of income inequality on population health (Shi & Starfield, 2000) and help in the early detection of certain diseases (Gaskin et al., 2012; Shi & Starfield, 2000; Shi & Stevens, 2010; Starfield et al., 2005). Possible mechanisms of the positive effects of higher community primary care on the individuals (better self-reported health) are described by Shi and Stevens (2010). Access to primary care can help in early detection of

certain diseases. Having access to regular care might develop a bond between the health care provider and the patient that can benefit the latter by better medical assistance and early detection of certain diseases (Shi & Stevens, 2010).

The importance of this study relies on the incorporation of poverty segregation measured by dissimilarity and interaction/isolation indices. Using a spatially approach to model the data can offer a better understanding of the outcome that was likely not captured by other attributes (Sparks, Sparks, & Campbell, 2012). Also better conceptualizations of the factors that shape access to primary care are further presented. An understanding of the underlying factors and the link between them would help policy makers design appropriate policies that target the right group of individuals rather than a specific segment of the population.

## Risk Regulators Framework and Vulnerable Population Perspective

One possible way to study access to primary care among the U.S. adults is by framing access to primary care from the risk regulators and vulnerable population perspective (Lu Ann Aday, 2001; Glass & McAtee, 2006; Shi & Stevens, 2010). The risk regulators framework would argue that social conditions are not disease causes, as previously posited by Link and Phelan (1995) and Williams and Collins (2001). Glass and McAtee (2006) define risk regulators as “relative stable features of a patch of the social and built environments” that shape, motivate, and induce behavioral risk factors that further lead to disease. The main idea of the risk regulators theory is not to diminish the importance of social conditions by saying that they are not influencing health outcomes, but rather it highlights that the influence is second-order and not causal. Contrary to causal risk factors, risk regulators operate through different pathways over time and space. Understanding the underlying pathways and the mechanisms that link poverty

segregation to limited access to primary care is therefore of the utmost importance in this approach. Vulnerable populations register higher rates of morbidity and mortality and are at greater risk of poor mental, physical, and social health. Individual characteristics such as socio-demographic characteristics and health needs are likely to increase the health risks of particular segments of the population (Shi & Stevens, 2010). Specifically race/ethnicity, sex, low socioeconomic status, employment, and health related characteristics increase disparities in access to primary care. However, vulnerability should not be misinterpreted as a personal deficiency. Rather it should be seen and understood as the interaction of different factors, some of which individuals have no control over. Increasing diversity in the U.S. and demographic shifts should make us alert to the unique characteristics and different needs that these groups experience. Also, there is a close association among wellbeing of vulnerable populations' overall and health resources available in the U.S. (Shi & Stevens, 2010).

## Disparities in access to primary care among racial/ethnic groups

Even with sustained efforts to eliminate racial/ethnic disparities in health, large gaps in minorities' health outcomes are still present (Adler, 2013; Adler & Rehkopf, 2008; Chvala & Bulger, 1999; B. J. Kirby, 2008; M. Robin Weinick, H. Samuel Zuvekas, & W. Joel Cohen, 2000; Zuvekas & Taliaferro, 2003). Health disparities are visible in multiple indicators of health status such as higher death rates for Blacks compared with Whites from causes like cancer (Hargrave & Hadley, 2003) heart disease, stroke, and cirrhosis of the liver. Researchers have also found higher diabetes rates among Hispanics when compared to Whites (Hargrave & Hadley, 2003), as well as disparities in HIV/AIDS, infant mortality, and incidence of mental illness. Part of the above mentioned disparities could be attributed to multiple and complex

inequities that are already embedded in the health care system. Some of the contributing factors are the economic resources of the place an individual lives in, as well as personal resources, ethnic and family factors, cultural values and education, social relationships, lack of transportation and inadequate health insurance, scarcity of providers, long waiting lists, and inconvenient health services (Copeland, 2005).

Previous research documents that race/ethnicity, socio-demographic characteristics, health insurance and self-reported health status are linked to disparities among minorities in access to primary care (Adler, 2013; Adler & Rehkopf, 2008; Hargrave & Hadley, 2003; B. J. Kirby, 2008; Shi & Stevens, 2010; M. Robin Weinick, H. Samuel Zuvekas, & W. Joel Cohen, 2000). Moreover, B. J. Kirby (2008) and Wen, Browning, and Cagney (2003) show the negative relationship between community poverty and access to health care and that individuals in low-income groups are not as strongly affected as individuals in middle and high-income groups. One mechanism through which poverty segregation affects access to primary care is through concentrated poverty neighborhoods (Acevedo-Garcia, Lochner, Osypuk, & Subramanian, 2003; Bell, Zimmerman, Almgren, Mayer, & Huebner, 2006; Dai, 2010). Further, this translates into low socioeconomic status neighborhoods. Since racial/ethnic minorities usually reside in poor neighborhoods they have higher exposure to/and experience lower educational attainment. This means that fewer minority populations compete for high earning jobs or earn competitive salaries when compared with individuals living in higher SES neighborhoods. For individuals living in poor neighborhoods, fewer economic resources and lack of health knowledge can act as a barrier to them accessing to primary care (creating a vicious cycle) (Shi & Stevens, 2010).

Also, neighborhoods with concentrated poverty, lower educational attainment, fewer jobs, and limited income are usually unsafe neighborhoods with higher levels of criminality and

violence that can create a barrier to future investors. Moreover, less developed infrastructure (lack of public transportation) can lead to cost related issues while seeking care, while lower quality community amenities might also discourage physicians from locating in minority neighborhoods (Gaskin et al., 2012).

African Americans and Hispanics were more likely to identify their usual source of care as facilities, rather than persons, when compared with Whites. Hispanics were less likely to have a usual source of care over time, while Whites and Blacks registered few changes over time in their primary care provider. However, over time, the number of ambulatory visits (not primary care) for Hispanics and Blacks increased when compared with Whites. Non-Hispanic Others encountered difficulties in scheduling an appointment with the physician and report being less satisfied with the medical staff (Shi, 1999; M. Robin Weinick et al., 2000). Individuals reported different reasons for not having a usual source of care such as rarely being sick therefore they did not need a regular source of care (66.2%), not being able to afford health care (10.2%), or moved and did not find a new source of care (6.3%) as reported by Viera, Pathman, and Garrett (2006). In another study Weinick and Drilea (1998) found that the reason Hispanics and African Americans did not have usual source of care was because they were unable to afford it (16.4% and 7.1% respectively). Factors such as fewer clinics and providers offering culturally appropriate services, poor geographical proximity to health care providers, and language difficulties, can be considered as reasons why we see these disparities among minority groups (Shi & Stevens, 2010; Weinick & Drilea, 1998).

Several studies suggest that health insurance might explain a small variation in disparities in access to and use of primary care between minority groups and Whites (Adler, 2013; Shi et al., 2013; M. Robin Weinick et al., 2000; Zuvekas & Taliaferro, 2003). Income, education, and

health status might lead to variations in insurance coverage, or can influence access to primary care directly. Even if previous mentioned factors would be equal among minority groups vs. Whites disparities, these variations in health insurance coverage mean that access to and use of primary care would not be reduced (Weinick & Drilea, 1998). Greater differences in access to care are associated with individuals' SES, an important dimension which overlaps with racial/ethnic differences. Low income, education and occupational status translate into poor access to care (Shi & Stevens, 2010; Williams, 2006). Lower levels of access to primary care are observed at lower levels of educational attainment. Weinick and Drilea (1998) found that individuals with less than a high school education had higher probabilities of not having a usual source of care, while individuals with higher levels of educational attainment had lower probabilities of not having a usual source of care and higher probabilities of having ambulatory visits. For example, data from the Medical Expenditure Panel Survey from 2006 show that Whites with high educational attainment and income levels reported that they were more likely to have a regular source of care, and more likely to have made health care visits in the previous year, compared to those with lower educational and income levels. However minorities reported a higher percentage of no regular source of care or health visit. These disparities widen for minorities in the low income and low educational group, where the percentages are double when compared with Whites in the same income and educational attainment category.

Self reported health status varies by racial/ethnic group. Based on data from the National Health Interview Survey (NHIS, 2008) American Indians and Alaska Natives were more likely to report fair or poor health status. African Americans and Hispanics were less likely to report fair or poor health status when compared with American Indians and Alaska Natives, but more likely than Whites and Asians (Shi & Stevens, 2010). Since significant racial/ethnic disparities in

health status were present, the federal government named the elimination of racial/ethnic disparities a primary goal for the Healthy People Initiative for 2020.

The purpose of this research is to construct multi-level models to model variations in the use of individual level primary care services by poverty segregation. Based on the above noted associations two research questions are being addressed: Does living in an area with above average poverty segregation have an impact on access to primary care? And does an individual with lower educational attainment living in an area with above average poverty segregation has different access to primary care when compared with an individual with higher educational attainment living in an area with above average poverty segregation?

## Data and research methods

Data for this analysis come from the Behavioral Risk Factor Surveillance System (BRFSS) SMART 2011 managed by the Center for Disease Control and Prevention (CDC) and the 2010 American Community Survey (ACS) 5 year estimates for the U.S. counties from the U.S. Census. The BRFSS survey is an annual multi-purpose survey conducted by the Division of Behavioral Surveillance (DBS) at the Center for Disease Control and Prevention. The survey has been conducted annually since 1984 using a state-based telephone survey that gathers information on several health outcomes, risk behaviors, and chronic conditions for the civilian, non-institutionalized adult population (18 years of age and older) living in households (all states and territories in the U.S.). The 2011 survey included cellular phones in addition to landline phones which were used in previous years. Individuals were randomly stratified by region and the telephone numbers were drawn from two strata or groups, high density or medium density households. To account for underrepresented groups in the sample, the post stratification

weighting method used by the CDC in prior years was replaced with a new iterative proportional fitting (or “ranking”) methodology. Ranking allows an accurate representation of the groups in the final data set. Incorporating the cell phone survey allows the inclusion of additional demographic characteristics. In addition to the standard demographic variables used in post stratification such as age, gender, and race/ethnicity, the ranking methodology uses variables like educational level, marital status, renter or owner status, and phone sources. These variables are supposed to adjust the variance of the sample (Center for Disease Control and Prevention, 2011).

## Independent variables

Main independent variable is poverty segregation. Massey and Denton (1988) classify residential segregation in five categories: evenness, exposure, concentration, centralization and clustering. The first two measures are categorized as aspatial dimensions (however because the measures depend on census tract boundaries, they are implicitly spatial) and the last three are explicitly spatial measures of segregation (for computation the measures additionally require information on the size and location of census tracts) (Massey & Denton, 1988; Reardon & O'Sullivan, 2004). Two indices were used for poverty segregation: the interaction index ( ${}_xP_y^\dagger$ ) to measure exposure and the dissimilarity index (D) to measure evenness (Massey & Denton, 1988). Poverty is defined as the number of persons living below the poverty threshold in each census tract. The aforementioned measures were used to determine if county level poverty segregation affects the way individuals make use of primary care services.

Poverty exposure addresses the probability of interaction between residents living below the poverty threshold with residents living above the poverty threshold within a county. A basic measure of exposure is the interaction index which measures the range to which different

residents that live above the poverty threshold are exposed to the ones that live below the poverty threshold. Liberson (1982) denotes the interaction index as  $xP_y^\dagger$ :

$$xP_y^\dagger = \frac{xy}{X \cdot Y}$$

where  $x$ ,  $y$ ,  $X$  and  $Y$  represent the number of residents that are living below the poverty threshold, the number of residents living above the poverty threshold, the total population of tract level  $i$  within a county, and the total number of residents living below the poverty threshold respectively. The index is bound between zero and one and can be interpreted as the probability that a resident living below the poverty threshold interacts with a resident living above the poverty threshold.

The index of dissimilarity, measures the invariability of the distribution between two groups across a county. Below is the formula that can be used to calculate the dissimilarity index:

$$D = \frac{|X - Y|}{X + Y}$$

where  $x$ ,  $y$ ,  $X$  and  $Y$  represent the number of residents below the poverty threshold, the number of residents above the poverty threshold, total county residents living below the poverty threshold, and total county residents living above the poverty threshold, respectively. The dissimilarity index varies between zero and one, where a value of zero represents an even distribution among persons living below and above the poverty threshold. A value of one corresponds to perfect segregation.

Socio-demographic and health covariates were included for this study. Race [\_RACEGR2]<sup>1</sup> has four levels: non-Hispanic Whites, non-Hispanic Blacks, Hispanics and Other (combined Asians and Multiracial). Education [EDUCA] and employment status [EMPLOY] were used to measure individual level socioeconomic status (SES). Education has four levels: no high school (reference variable), high school, some college (college completed), and college and more. Employment has four categories: unemployed (reference group; unemployed and recently unemployed), employed (self-employed or employed), homemaker (homemaker and student), and disabled. Sex was included with male as the reference group. Age [\_AGE\_G] categories only include adults over 18 and less than 65 to eliminate the bias of over-65 adults covered under Medicare. Five categories of age were created with ten year age interval. [MEDCOST] is a dummy variable that indicates whether an individual experienced a barrier to seeing a doctor due to cost. [HLTHPLN1] is a dummy variable to indicate whether the individual has health coverage. Having a personal doctor or health care provider [PERSDOC2] is an important covariate. This variable has 3 levels: having no doctor (reference group), having one doctor, and having more than one doctor. Also five levels of general health status [GENHLTH] were included: excellent (reference group), very good, good, fair, and poor.

## **Dependent variable**

The use of primary care, a key variable, was measured by a dichotomous variable with the value 1 if the individual went to the doctor for a routine checkup (general physical exam, not an exam for a specific injury, illness or condition) in the last year [CHECKUP1] and a zero for individuals that went to the doctor in an interval of 1-5 years. This variable was chosen over the others available in the BRFSS survey because it properly reflected this study's purpose to

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<sup>1</sup> Original variable names in [] used in the BRFSS

research whether individuals are seeking primary care services. Using the proper definition and measurement for access to primary care is of utmost importance. A clear distinction should be made between potential for health care and the act of using/receiving health care. On one hand, potential for care delivery exists when populations in need coincide in time and space with a health care delivery system. Other the hand, realized care is materialized when certain barriers are overcome. The barriers that can intervene between potential and realized care are: availability, accessibility, affordability, acceptability and accommodation (Guagliardo, 2004). Accessibility (seen as travel impedance between individual's location and service point) and availability (defined as the number of local service points) have been further combined into a spatial accessibility measure. A complex research on spatial analyses in the field of medical geography is presented by Gesler (1986), however a simpler classification of spatial accessibility measurement is outlined by Guagliardo (2004). The latter presents the four measures of spatial accessibility: provider-to-population ratios, distance to nearest provider, average distance to a set of providers, and gravitational models of provider influence. Each measure has its own advantages and limitations that are broadly presented in aforementioned study (Gesler, 1986; Guagliardo, 2004). Moreover, the following covariates are usually used to measure access to care: insurance coverage, inability to obtain care (due to cost, transportation or physician/dentist would not accept Medicaid/Medicare), use of the hospital emergency room as their usual source of care and health problems rather than office visits (Lu Ann Aday & Andersen, 1974; Berk & Schur, 1998; Phillips, Kinman, Schnitzer, Lindbloom, & Ewigman, 2000).

## Statistical approach

In this study, SAS 9.2 was used to conduct data manipulation, variable creation, and descriptive analysis while adjusting for complex sample design. First, SURVEYFREQ procedure was used to calculate Rao-Scott Chi-Squared tests for the dependent variable (if the individual had a routine checkup in the year prior to the interview) and each covariate considered for this study. The results including the survey design adjustments are presented in Table 1.

Further, multilevel logistic regression models with adjustments for survey design were estimated to determine how residential segregation, socio-demographic, and health factors influence whether the respondent goes to the doctor for a routine checkup. These models were estimated using the statistical program R version 3.2. First, LMER package in R is used to estimate a multilevel logistic regression models. Then, random intercept and random slopes models are compared with the general multilevel model to determine the significance of the aggregate level poverty segregation. Further, a cross-level interaction model was used to determine if an individual with lower educational attainment living in an area with above average poverty segregation has different access to primary care when compared with an individual with higher educational attainment living in an area with above average poverty segregation (due to no significance in all tested models, poverty segregation measured by the isolation index was not included in the results, only the dissimilarity index). Since the random slopes model when compared with the general multilevel model and with the random intercept model lead to statistically significant results (based on ANOVA test and AIC criterion), only the random slopes model will be presented in Table 2.

## Results

**Table 1** Percentages of Socio-demographic and Health Status Characteristics of U.S. Adults by routine checkup – Adjusted for Survey Design, BRFSS 2011

	Routine checkup in the last year	Routine checkup in the last 2-5 years	Rao-Scott Chi-square	p- value
<b>Socioeconomic status (SES)</b>				
<b>Education level</b>				
No High School	12.19	15.69	1002.53	<.0001
High School	27.81	29.01		
College	31.58	31.05		
College or more	28.42	24.26		
<b>Employment status</b>				
Unemployed	67.60	68.13	2837.35	<.0001
Employed	9.37	13.87		
Homemaker and Student	14.24	13.62		
Disabled	8.79	4.39		
<i>Demographic characteristics</i>				
<b>Age</b>				
Age 18-24	14.30	17.46	4747.76	<.0001
Age 25-34	18.94	26.46		
Age 35-44	22.11	23.43		
Age 45-54	25.86	21.31		
Age 55-64	18.79	11.34		
<b>Sex</b>				
Male	45.21	56.30	3058.20	<.0001
Female	54.79	43.70		
<b>Race/Ethnicity</b>				
Non-Hispanic Whites	63.74	65.76	2106.54	<.0001
Non-Hispanic Blacks	14.51	8.85		
Hispanics	14.23	17.62		
Non-Hispanic Others (Asians and Multiracial)	7.53	7.77		
<i>Behavioral and health factors</i>				
<b>Health behaviors</b>				
<b>Health insurance</b>				
Yes	87.10	64.63	18806.37	<.0001
No	12.90	35.37		
<b>Health care access</b>				
<b>Could not see doctor because of cost</b>				
Yes	13.95	29.07	9048.28	<.0001
No	86.05	70.93		
<b>Multiple Health Care Professionals</b>				
Only one	80.04	50.29	32457.72	<.0001
More than one	6.69	5.35		
No	13.27	44.37		
<b>General Health Status</b>				
Excellent	21.02	20.44	359.67	<.0001
Very good	33.57	33.11		
Good	29.62	31.80		
Fair	11.42	11.52		
Poor	4.38	3.13		

Above, (Table 1) results of bivariate statistics adjusted for survey design are presented. Significant differences can be observed for all predictors. Respondents that reported to have seen the doctor for a routine checkup in the last year were more likely to have completed at least college education or more. They were also more likely to be unemployed (includes unemployed and recently unemployed). Those who reported seeing the doctor in the year prior to the interview for a routine checkup were more likely to be in the 35-44 and 45-54 age groups, and to be Non-Hispanic White females compared to respondents who did not report to see the doctor in the year prior to the interview. In addition, those who had a routine checkup in the last 12 months were more likely to have health coverage (health insurance, prepaid plans like HMOs or Indian Health Services) at the time of the interview as well as to report having only one health care professional. Those who went to the doctor in the last year were much more likely to report very good and good health status when compared with the ones that reported having a routine check-up in the last two to five years. Respondents that saw the doctor in the last two to five years reported the highest percentage of very good and good health status (33.11% and 31.80% respectively). Table 2 summarizes the results (odds ratios) for the multilevel logistic regression model for seeing a physician the year prior to the interview and for the cross level interaction model for education and poverty segregation.

In the random slopes model, (Table2) being employed shows lower odds (OR=.97) of seeing a physician in the year prior to the interview compared to the reference group. Respondents that reported being homemaker, student and disabled presented slightly higher odds of having a routine checkup when compared to the unemployed group. Respondents in the 25-34

and 35-44 age groups experienced lower odds of having a routine checkup in the year prior to the interview when compared to the reference group (OR=.88 and OR=.95 respectively).

**Table 2** Random Slopes Model and Cross Level Interaction Models – Adjusted for Survey Design, BRFSS 2011

	Random Slopes Model		Cross Level Interaction Model	
	Estimate	OR	Estimate	OR
<i>Socioeconomic status (SES)</i>				
Education level (No high school =ref)				
High School	-0.01	1.01‡	0.19	1.20‡
College	-0.02	0.99‡	0.16	1.17‡
College or more	-0.05	0.95‡	0.32	1.38‡
Employment status (Unemployed=ref)				
Employed	-0.03	0.97‡	-0.03	0.97‡
Homemaker and Student	0.11	1.12‡	0.11	1.12‡
Disabled	0.41	1.51‡	0.42	1.52‡
<i>Demographic characteristics</i>				
Age (Age18-24=ref)				
Age 25-34	-0.12	0.88‡	-0.12	0.88‡
Age 35-44	-0.05	0.95‡	-0.05	0.95‡
Age 45-54	0.1	1.11‡	0.10	1.11‡
Age 55-64	0.34	1.41‡	0.34	1.41‡
Sex (Male=ref)				
Female	0.35	1.42‡	0.35	1.42‡
Race/Ethnicity (NH Whites=ref)				
Non-Hispanic Blacks	0.85	2.35‡	0.85	2.34‡
Hispanics	0.44	1.55‡	0.43	1.54‡
Non-Hispanic Others (Asians and Multiracial)	0.18	1.2‡	0.18	1.20‡
<i>Behavioral and health factors</i>				
Health behaviors				
Health insurance (No=ref)				
Yes	0.71	2.04‡	0.71	2.03‡
Health care access				
Could not see doctor because of cost (No=ref)				
Yes	-0.63	0.53‡	-0.63	0.53‡
Multiple Health Care Professionals (None=ref)				
Only one	1.36	3.89‡	1.36	3.90‡
More than one	1.05	2.86‡	1.05	2.86‡
General Health Status (Excellent=ref)				

Very good	-0.2	0.99‡	-0.02	0.99‡
Good	0.03	1.03‡	0.03	1.03‡
Fair	0.14	1.15‡	0.14	1.15‡
Poor	0.2	1.22‡	0.12	1.22‡

**Table 2 Continued**

Poverty Segregation				
Dissimilarity Index	0.38	1.46‡	1.03	2.80‡
Interaction terms (no HS‡Diss =ref)				
High School*Dissimilarity			-0.59	0.55‡
College*Dissimilarity			-0.58	0.56‡
College or more*Dissimilarity			-1.19	0.30‡
Intercept	-1.39	0.24‡	-1.58	0.20‡
AIC		179,024,619		178,996,260

Significance level‡p≤0.05, †p≤0.01, ‡p≤0.0001; Survey Weight: LLCPWT; OR=odd ratios

Also, respondents in the following 45-54 and 55-64 age groups have slightly higher odds of seeing a physician in the year prior to the interview, when compared with the reference group. Non-Hispanic Blacks were twice as likely as Non-Hispanic Whites to report seeing a physician in the year prior to the interview for a routine checkup (OR=2.35). Hispanics also present higher odds of seeing a physician in the past year when compared to the reference group (OR=1.55). Non-Hispanic others presented slightly higher odds of going to the doctor for a routine checkup in the year prior to the interview when compared to the reference group. Lastly, females have higher odds of seeing a physician when compared with their male counterparts (OR=1.42).

Individuals that reported having health insurance were more likely to have a routine checkup in the year prior to the interview compared with the reference group. Individuals that reported having only one health care professional were almost four times (OR=3.89) more likely than individuals with no healthcare professional to have had a routine checkup. If the individual reported having fair health status, (s)he was slightly more likely to have seen a physician for a routine checkup when compared to the individuals that reported having excellent health status. Similarly, individuals that reported having poor health status in the year of the interview were

more likely to have seen a physician for a routine checkup, however, with slightly higher odds when compared to the reference group. Individuals that live in counties with low dissimilarity index (individuals living below the poverty threshold are almost equally distributed with individuals living above the poverty threshold) are more likely to see a physician for a routine checkup in the year prior to the interview.

By including the interaction term between an individual's educational level and county level poverty segregation measured by the dissimilarity index, educational level predictors changed from negative to positive while poverty segregation predictors increased. The interaction term's estimates show strong negative effects between educational attainment and poverty segregation.

## **Discussion and Limitations**

The purpose of this research was to answer two research questions. First, does living in an area with above average poverty segregation has an effect on access to primary care services? Second, does an individual with lower educational attainment living in an area with above average poverty segregation has different access to primary care when compared with an individual with higher educational attainment living in an area with above average poverty segregation?

The results presented in Table 2 provide support for the research questions. To answer the first research question, individuals that live in counties with higher than average poverty segregation had higher odds of seeing the doctor for a routine checkup. However, when the interaction term between education and poverty segregation is considered, the results change.

This shows that there is more unexplained association among the aggregate level poverty segregation and individuals level characteristics. Individuals in counties with higher than average poverty segregation were less likely to see a physician for a routine checkup, regardless of educational attainment. Similarly, B. J. Kirby (2008) and Wen et al. (2003) found a negative relationship between community poverty and access to health care and that individuals in low-income groups are not as strongly affected as individuals in middle and high-income groups.

This study also suggests that minority groups have higher odds of seeing the physician for a routine checkup in the year prior to the interview. Contrary to this study's findings, Mayberry, Mili, and Ofili (2000) found that adolescent and adults Non-Hispanic Blacks and Hispanics were less likely than Non-Hispanic Whites to have any physician contact in the past year even after controlling for income and health status. One possible explanation is that minority groups are sicker and have higher needs to see a physician (Freeman et al., 1987). Individuals that reported having only one health care professional were three times more likely than individuals with no healthcare professional to have had a routine checkup in the year prior to the interview. Other studies have found that individuals are more likely to receive recommended services if they have a regular source of care and that having a regular doctor offers better access to primary care than those with a regular site or no regular doctor (J. Kirby & Kaneda, 2005; Lambrew, DeFriese, Carey, Ricketts, & Biddle, 1996).

The findings for age are as expected. Respondents in the first two age groups are less likely to see a physician for a routine checkup when compared with adults in the 18-24 age group. One explanation is that young adults are healthier and therefore seek less medical care. Individuals in the last two age groups (45-54 and 55-64) have higher odds of seeing a physician in the year prior to the interview. Also, when considering the interaction term between an individual's

educational level and county level poverty segregation (measured by the dissimilarity index), educational level predictors changed from negative to positive while poverty segregation estimates increased. The interaction term's estimates show strong negative effects between educational attainment and poverty segregation, suggesting that concentrated poverty negatively affects low SES neighborhoods. With minorities usually residing in poor neighborhoods they experience lower educational attainment, translating into fewer minorities competing for higher earned jobs/competitive salaries when compare with individuals living in higher SES neighborhoods (Shi & Stevens, 2010).

Although this research provides valuable knowledge regarding the individual level socio-demographic and health characteristics as well as poverty segregation associations with primary care visit within racial/ethnic groups, the following limitations should be acknowledged. This analysis used a cross-sectional design and might not capture the changing patterns in adult access to primary care in the U.S. Future studies should consider a longitudinal dataset that might offer insightful findings regarding the changes in access to primary care patterns for the U.S. adults. Also, there are some limitations regarding some of the covariates. For example Non-Hispanic others combines Asian, Native Hawaiian, American Indian or Alaskan Native, and Multiracial even though each racial group has different SES status and health behaviors.

One issue with previous studies is that multiple approaches have been used in measuring access to primary care, but no single measurement is proven to be better than others. Using the proper definition and measurement for access to primary care is important. One limitation is the measurement of the dependent variable. For this study, the dependent variable was constructed to capture access to primary care if the individual went to the doctor for a routine checkup (general physical exam, not an exam for a specific injury, illness or condition) in the year prior to the

interview [CHECKUP1]. Further research should consider other measurements for the use of primary care, or maybe construct an index to better capture the actual use of primary care. Also, instead of using health insurance to observe individual behavior, further research should use type of coverage. Type of coverage would offer more information about the individual's behavior and whether the cost of seeing a doctor is an issue even for insured individuals. Another limitation encountered when using logistic multilevel models arises from the “discreteness of the data” and the nonlinearity encountered in the computational steps (Gelman, 2006).

From a policy perspective, this analysis offers insightful results among racial/ethnic disparities in access to primary care. That health disparities are persistent even after controlling for individual socio-demographic, health factors and aggregate level poverty segregation is consistent with Healthy People National program findings. Even though the first goal was achieved, significant differences persist along racial/ethnic and SES lines. The emphasis of Healthy People 2020 is health equity ([www.healthypeople.gov](http://www.healthypeople.gov); US Department of health and Human Services, 2000). This analysis provides supportive evidence that socio-demographic and health factors do not operate the same for each racial/ethnic group. Policy makers need to be aware of each racial/ethnic group's characteristics in order for future policies to be effective in reducing disparities in access to primary care.

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